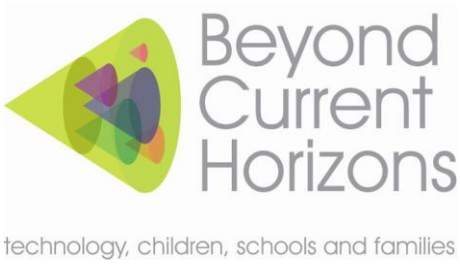

Educational, social and technological futures: a report from the Beyond Current Horizons Programme

"The first need is to become aware of the world in which we live; to survey its forces; to see the opposition in forces that are contending for mastery; to make up one's mind which of these forces come from a past that the world in its potential powers has outlived and which are indicative of a better and happier future." (Dewey, 1958)

Keri Facer
June 2009

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It has been an enormous privilege to work on this programme with so many individuals who are committed to challenging assumptions, asking awkward questions and working across disciplinary and sectoral boundaries to examine how we might need to re-imagine education in the context of socio-technical change.

I hope that this document, and the materials we have developed online, can act as the starting point for many more such challenging conversations and that these conversations will lead to the re-design of education to meet the needs of all young people, families and communities over the coming years.

Professor Keri Facer
Research Director
Beyond Current Horizons Programme

Executive Summary

The Beyond Current Horizons programme explores the potential futures for education that might emerge at the intersection of social and technological change over the coming two decades. Its purpose is to map out current and emerging socio-technical trends, the critical uncertainties in our understanding of future socio-technical developments, and the challenges or opportunities that such developments might offer to educators.

What socio-technical developments are likely to shape the next two decades?

Should existing long-term trends continue, the following developments are likely to be critical in shaping the world within which education will be acting over the coming 10-20 years:

The information landscape gets denser, deeper and more diverse. Social trends toward accountability and security, the decreasing cost and increasing availability of digital storage capacity, the development of new forms of bio- and genetic information, the ability to digitally tag almost any physical object, space or person, the ability to represent information in more diverse media; all of these developments increase the capacity to simply 'know more stuff about more stuff'. We will potentially be able to gather, store, examine and circulate more data, in more diverse forms, about more aspects of ourselves, and our world, than ever before.

Creating the personal 'cloud'. In the near future the capacity to connect to a network, and be constantly connected to knowledge, resources, people and tools will be taken for granted in most countries with a robust technology infrastructure. Individuals will have the capacity to remain in 'perpetual contact' with diverse networks and communities, both physical and virtual. The rise in mobile and personal technologies and the lowering of barriers to data storage, mean that individuals are increasingly likely to 'wrap' their information landscape around themselves rather than managing it through institutions.

Working and living alongside machines becomes increasingly normal and our understanding of what we mean by 'machines' may change as non-human entitities are more radically embedded into human bodies, and machines become semi-autonomous actors in social networks**.** Over the coming two decades, people are likely to become increasingly accustomed to machines taking on more roles previously occupied by humans across both professional and manual occupations and in homes and workplaces. Whether through devolving simple tasks or outsourcing the management of complex systems, such devolution of responsibility potentially brings a number of adjustments in our understanding of the respective roles of machines and humans. It may raise significant ethical tensions and generate public debate relating to questions of dependence and autonomy, and of privacy and trust, particularly when it comes to the use of complex systems to manage sensitive data and critical systems. Such debates may play themselves out particularly between different generations with different attitudes to delegating power and responsibility to machines.

Distance matters less, but geography still counts. The separation of 'information resources' from physical location will continue. On top of this, people are likely to become more familiar with and more used to working together at a distance. As technological developments help to increase a 'sense of presence' in remote interactions, and as social norms and etiquette for such interactions are developed between families, friends and in workplaces, being 'together apart' is likely to become a more familiar aspect of working, personal and leisure lives. This is amplified by trends towards increased mobility within and between countries for work opportunities, and towards

increasingly 'distributed' families where family members live in different places. However, geography is likely to continue to play a role in shaping the level of access that individuals and groups will have to digital networks: pricing and infrastructure, legal constraints and regulatory issues will still be influenced by physical geography. Similarly, people will still continue to use 'place' and physical location as a marker for identity, however 'virtual' their interactions, and the 'face to face' is likely to retain its importance for specific interactions. Physical proximity is also important in creating cultures of innovation and development, particularly from an economic perspective.

'Digital Natives' grow up and need to keep learning. On current trends, Western Europe will be characterised by an ageing population over the coming two decades, with over 50% of the population aged over 50 by 2030 with a further 40 year life expectancy. The adult-child relationships of the 20th century are likely to continue to be unsettled and evolve new forms; care will need to be passed up as well as down the generations; today's so-called 'digital natives' will, like their parents before them, need to learn to use new technological environments throughout their lives. Substantial changes to distribution of educational resources across the lifecourse will need to be envisaged as this cohort will be required to work (and learn) later in life. Moreover, such late life activities will be patterned by significant inequalities in health and wealth.

Weakening of institutional boundaries. The disaggregation of information from institution, the capacity to interact easily at a distance, the apparent preference for merging 'working' and 'leisure' practices amongst certain age groups and in certain workplaces, the creation of personal 'clouds' of information, people and resources, the erosion of strict boundaries between education, working and retirement as people have to work longer and develop new skills later in life, the demand for adults to manage multiple working and caring roles and for employers to find ways of enabling more flexibility in managing work practices, the increasing merging of public and private provision of public services; all of these different trends suggest that the next two decades will see an increased weakening of boundaries between institutions previously seen as separate – between workplace and home, entertainment venue and educational establishment.

The decline of the 'knowledge economy' as a utopian future. Current trends suggest that the world of work is likely to become increasingly polarised as a result of the intersection of demographic and technological trends over the coming two decades. Highly competitive R&D activities and knowledge work will continue to be needed, but the capacity for digital technologies to enable businesses to 'offshore' all forms of work to the lowest cost environment, to produce many products and services at ever decreasing cost and by ever fewer people, and to standardise and manage diverse workforces, leads to the suggestion that highly rewarded, creative and autonomous work is likely to be restricted over the coming two decades to ever smaller global elites. In contrast, ageing populations and the rise in demand for individuals to play multiple working, caring and learning roles, are likely to see a rise in demand for caring, face to face and personal services roles, often roles which are poorly rewarded and valued. These developments may bring an end to current hopes of a democratic 'knowledge economy' and hasten the search either for changed social values to mitigate the potential inequalities of a polarised workforce, or for new sites of investment and development (such as in the environmental or 'virtual world' sectors).

'Silver bullets' are not expected for complex educational problems. Despite the continuing demand for quick fixes, neuroscience, computing and bioscience are not expected to provide easy solutions to educational issues over the coming two decades. Progress may be made in relation to specific disabilities or difficulties – for example, the development of better prostheses, new learning methods or targeted pharmacological

enhancements for particular conditions. However, significant tensions may emerge around the ethics of such developments, their commercialisation and their wider application. Silver bullets, also, are not expected to emerge in relation to economic affairs, with constraints on public finances expected to continue and no significant new sources of revenue emerging for education.

How far will these changes influence social and cultural values?

Social and cultural values will continue to be played out through technologies**.** New technologies can be appropriated for diverse social, political and economic ends. Developments in remote working and automation, for example, can be used both to open up opportunities for human centred, family-friendly working practices, and to make it increasingly easy for businesses to offshore work to the lowest cost, least demanding workforce. Developments in social media can enable individuals both to engage with new communities or can reinforce connections with existing interest groups, national identities and religious beliefs. Developments in online technologies may allow both rapid and open knowledge sharing and ideas generation between individuals, and the ability to identify and control circulation of information and material, the better to protect intellectual property.

Over the coming decades, emergent technologies will be mobilised to support all social, economic and cultural agendas, from progressive to conservative, from radical to traditional. In themselves, they are unlikely to sway social values inevitably towards one trajectory or another; they will not, in and of themselves, for example, be responsible for a shift towards individualism or collectivism, towards increasing tolerance or conflict. Indeed, other forces – economic, environmental, religious – are likely to act as more significant drivers of such cultural changes than 'technologies themselves'.

Within education, the socio-technical developments described above could be mobilised to create widely divergent education systems. The developments in remote interactions and in disaggregation of content from institution; the rise of the personal 'cloud'; the diagnostic potential of genetic and neuro-science; the ageing population; all of these, when combined with different social, political and cultural values lead to very different pedagogies, curriculum, institutional arrangements and cultural dispositions towards learners. For example, the following 6 scenarios were developed by participants in the programme as prompts for reflection about the divergent potential directions of education over the coming 20 years:

> 'informed choice' – a highly personalised education system structured around the individual collaborating lifelong with mentors and structuring education provision from diverse sources around their needs
>
> 'independent consumer' – a highly atomised education system in which individuals are able to choose from a complex menu of standardised provision from private, public and not for profit sectors
>
> 'discovery' – an education system that enables individuals to understand where they might most effectively contribute to particular social and economic associations, and to build reputations within those associations
>
> 'diagnosis' – an education system targeted at early identification of capacity and potential and the close alignment of individuals' educational experiences with projected future economic roles

'integrated experience' – an education system embedded indistinguishably in society, economy and community in which learners learn through ongoing apprenticeship

'service and citizenship' – an education system targeted at developing social cohesion and competencies for social participation.

What are people's aspirations for education in the future?

When making decisions about the sorts of educational systems, policies and practices we might want to develop in the light of these potential socio-technical developments, it is important to acknowledge that a wide range of people have a stake in these decisions. Their opinions and aspirations are as critical to the design of educational futures as the technological affordances of any future world. Throughout this programme, the participants in the public and stakeholder engagement programme expressed the desire for education systems that:

- Promoted understanding, social interaction, caring and co-operation
- Tackled socio-economic inequalities
- Offered the highest quality learning experiences for all, with the quality of human interaction as central to these experiences
- Prepared individuals for the world of work

What are the key challenges for education posed by these potential socio-technical changes?

At the heart of educational processes is a concern with enabling individuals to learn to build, share, manipulate, communicate and generate knowledge. The developments described above suggest that we need to pay increasing attention to the role of socio-technical networks in these knowledge processes over the coming two decades. These developments suggest that:

- We need to assume that individuals will be constantly networked to people, tools and resources
- Network technologies will amplify and intensify the existing role of social networks in shaping access to, and production of, knowledge
- Existing inequalities will continue to be played out through socio-technical networks

The socio-technical developments described above also suggest that the coming two decades may see a significant shift away from the equation of 'learning' with 'educational institutions' that emerged with industrialisation, toward a more mixed, diverse and complex learning landscape which sees formal and informal learning taking place across a wide range of different sites and institutions. These developments suggest that:

- New providers from private, public and third sector organisations in the UK and internationally will offer widely accessible face to face, remote, work-based and informal education
- Distinctions between sites of education, leisure and work and between stages of education, working, caring and retirement will erode
- Informal learning, including inter-generational learning, will play an increasingly important role in social cohesion and educational provision

Since the early 1990s, the idea of the 'knowledge economy' has shaped education policy in the UK and around the world. This idea has led to a commitment to widening university participation, raising the school leaving age, increased investment in creative

practice and STEM subjects, and the demand for a universal rise in formal qualifications and accreditation of skills. The 'knowledge economy' is, itself, dependent upon a particular interpretation of socio-technical developments: it assumes that there will be increased economic competition between countries, facilitated by global information and communications infrastructures; and that this competition can be managed in the UK by ensuring that citizens are sufficiently skilled to take on high-value, creative and knowledge-generating employment while low paid jobs are offshored to other countries who compete on price.

The socio-technical developments described above, however, suggest that this vision of a thriving and universally beneficial UK knowledge economy focused on creative industries, knowledge work and innovation, may be increasingly hard to sustain over the coming two decades; and that its benefits are not necessarily likely to accrue to all citizens in the form of fulfilling, well rewarded employment. These developments suggest that:

- We may see an increasing polarisation in the labour market between highly paid global knowledge workers and low skilled, low paid service workers
- One response to this polarisation may be a shift in social and cultural values towards a valuing of ordinary work, and a recognition of informal and community economies
- Another response to this polarisation may be a shift toward new sites of economic activity and increased emphasis on locally focused entrepreneurialism

How might education systems need to change in the light of socio-technical developments?

These developments pose three key challenges for educators and education systems wishing to enable learners to flourish in the coming two decades:

They require us to redesign educational practices to meet the needs of networked individuals

They require us to develop systemic strategies to support learners to navigate a much more complex learning landscape

They require us to re-examine our educational goals in the context of economic uncertainties.

In respect of current formal educational provision, this implies the following aspirations:

1 The design of a 'curriculum for networked learning'

- This should comprise, for example, opportunities for learners to learn and work within meaningful socio-technical networks not wholly within single educational institutions; to be assessed in interaction with tools, resources and collaborators; to develop capacities to manage information and intellectual property, build reputation and trust, develop experience of working remotely and in mediated environments; to create new learning networks; to reflect upon how learning is connected with other areas of personal, social, and working lives and manage and negotiate these relationships; to explore the human-machine relationships involved in socio-technical networks.

2 The creation of open, flexible and networked relationships across diverse educational institutions, both formal and informal

- This would include, for example, compatible personal learning records owned and managed by learners that can be carried across diverse settings; interoperable systems and standards that enable learners to demonstrate attainment and experience across diverse settings; timetabling arrangements and tools that enable learners flexibly to build timetables across different providers to take advantage of learning opportunities in schools, museums, community settings, workplaces, universities, and homes; a map of the diverse learning landscape that can support learners and mentors to navigate this complex environment effectively.

3 The development of a mentoring and networking workforce

- This would include: a cohort of lifelong mentors or guides to ensure learners can take informed choices from diverse education providers and balance education, working, caring and personal development choices across the lifecourse and at key transitions; the diversification of teacher 'identities' to include experts in workplaces, community educators, school and university lecturers, and voluntary providers; a review of existing child protection and CRB arrangements; a cohort of educators skilled in establishing and working within social networks across institutions and ages.

4 The provision of intelligent information and improved forums for public debate on the educational implications of socio-technical change

- This would include: widely accessible and rigorous information on the field of brain science, genetics and computer science in education; and public forums for educators, parents, children, industry and community to debate and design educational responses to the ethical questions raised by, for example, changed human-machine relationships or the role of global education providers in the education arena.

How might education systems develop an ongoing and sustainable response to socio-technical change?

Socio-technical changes are not inevitable. Energy crises, lack of raw materials and economic and population changes brought about by climate change, could provide major disruptions to the course of the socio-technical developments described above.

At the same time, socio-technical change is never 'done', and as such, exploring the potential future developments to which education might wish to adapt or challenge is never an activity that is 'finished'. Instead, it is an ongoing process requiring constant monitoring, reflection and discussion.

Critically, this acknowledgement of ongoing socio-technical change and of potential uncertainty relating to such change, suggests that education policy makers faced with developing resilient education systems in the 21st century need to recognise that:

- There will be no single educational response that will prepare learners or educational institutions for all potential future developments. Rather than creating a template of 'a school for the future', then, to which all other schools might aspire, the education system needs to commit to creating a diverse ecology of educational institutions and practices. Only such diversity will ensure that, whatever changes come about we have already begun to respond and prepare for them

- Such diversity will emerge only if educators, researchers and communities are empowered to develop localised or novel responses to socio-technical change – including developing new approaches to curriculum, to assessment, to the workforce and governance, as well as to pedagogy.
- As such, building informed debate about current, emergent and potential socio-technical change is critical to creating education systems that are able both to adapt to such changes, and, where necessary, to challenge them.

This implies a new role for education policy, namely that it should be committed to:

- Creating true public space at all levels of the system to inform, explore, model and debate educational futures and educational values.
- Promoting, encouraging, archiving and sharing the development of widely diverse educational responses in order to ensure that there is diversity in the system to allow adaptation whatever changes emerge, rather than seeking out and disseminating universal and uniform solutions.

This report is a starting point for informing and stimulating the debate on how education institutions might respond to the diverse socio-technical changes we have described. These changes provide significant opportunities for educators and others to begin to re-imagine and debate the role of education over the coming decades. We hope that this debate will continue in a wide variety of other forums, and, collectively, through the website at www.beyondcurrenthorizons.org.

A note on methods

In order to address the problematic challenge of attempting to 'research the future' the programme has adopted three interconnected approaches: first, we have attempted to elicit an understanding of 'probable futures' (the developments that are currently in train and which we expect to continue); second, we have explored a range of 'possible futures' (the emergent, marginal and unexpected developments that might take place when current trends intersect); and third, we have examined people's 'preferable futures' (the hopes, aspirations and dreams for education and educational outcomes of educators, parents, young people and a range of other educational stakeholders).

These three different perspectives both help us to resist the idea that there is a single future that we can simply 'uncover' with sufficient evidence (or which can simply be predicted by identifying the specific technologies that are currently in development) and provide a framework for understanding the current expectations of researchers, developers and educational stakeholders of the likely contours and developments of the coming two decades.

Over 18 months, the programme has:

- Brought together world-leading researchers and thinkers, practitioners and stakeholders to explore future socio-technical developments which might have significant implications for the goals, institutions and practices of education

  Over 60 reviews of existing evidence and potential developments have been commissioned and over 100 researchers and leading thinkers consulted in 5 key areas: Generations and Lifecourse; Identity, Citizenship and Community; Knowledge, Creativity and Communication; Working and Employment; State, Market & Third Sector Relationships

- Promoted debate and discussion about the implications of such potential developments with educational stakeholders from industry partners and policy makers to teachers, parents and young children:

  Online consultation involving 1500 individuals, formal surveys of over 500 individuals, events bringing together over 100 practitioners, parents, young people and others, consultation with over 200 organization/individuals and leading industry, practice and research figures

- Developed a set of challenging long term scenarios for the future of education in the context of social and technological change 2025:

  Scenarios were developed in outline with an Expert Advisory Group made up of leading scentists and social scientists from the fields of education, economics, demographics,computer science and representatives of key government agencies. They were then refined and revised by the BCH team.

- Made all materials generated during the programme available to the education community to support long-term futures thinking in and for education.

  Available at www.beyondcurrenthorizons.org

Contents

Chapter 1: Introduction: the relevance of long term futures thinking for education

Education is a future-facing activity. Assumptions about and aspirations for the future underpin all levels of educational activity: from learners deciding what to study in the light of their aspirations for their future lives, to local authorities spending millions to rebuild schools and colleges to meet the future needs of their communities, to national debates over the curriculum and teaching methods that will best equip societies for future social, economic and cultural worlds.

From discussions of national strategy, to day-to-day interactions between educators and learners, education is intimately dependent upon ideas about the future.

Too often, however, the assumptions we make about the future, and upon which we make so many decisions in education, are unexamined and unchallenged[1]. We use terms such as 'the 21st century' and 'tomorrow's world' to stand in for a general feeling of social and technological change. We operate with a set of commonsense assumptions about the developments we expect to happen; assumptions which often draw on a combination of optimism, aspiration and the ideas circulated by companies and organizations with an interest in promoting one particular idea of the future over another. Where we do consider the longer-term future, too often we fall into the trap of assuming that only one set of future possibilities might emerge and we orient all our activity around this one trajectory.

Only rarely, in the education field, do we take a step back to ask 'what possible future developments are we not taking into account in our plans? What images of the future are we never using? How can we test our assumptions about what we think will happen? What other possible futures might we need to prepare for or try to prevent?'

While educators and education policy makers of course need to be intimately concerned with the immediate needs of children and young people today, there are significant potential risks in this neglect of a critical examination of our assumptions about 'the future'.

We risk, most importantly, designing education systems and strategies that only 'work' if one particular future comes to pass. Redesigning curriculum solely 'to meet the needs of the knowledge economy', for example, runs this sort of risk, reliant as it is upon one particular socio-economic trajectory coming to pass. What if other futures emerge? How successful will our children be in flourishing in different environments? How relevant will our schools and systems be in a different context?

Second, we risk designing our education system around the goals of special interest groups; if only commercial companies dedicate the resources and the time to producing images and ideas about 'the future for which education needs to prepare', what alternative visions, what alternative values and aspirations are we overlooking?. What other voices and perspectives could underpin our long term planning and strategic visions?

Finally, we also risk overlooking the needs of future generations if we do not explore the possibility that our decisions today might serve to create significant social and cultural change over the longer term[2].

[1] Gough, N. (1990) Futures in Australian Education: Tacit, Token and Taken for Granted, *Futures*, 22 (3), pp.298-311
[2] Adam, B. and Groves, C. (2007) *Future Matters: Action, Knowledge and Ethics*. Leiden and Boston: Brill

The Beyond Current Horizons programme is an attempt to systematically explore the potential futures for education that might emerge at the intersection of social and technological change. Its purpose is to map out the current and emerging trends, the possible directions these might lead us in over coming years, the critical uncertainties about future socio-technical developments, and the challenges or opportunities that all of these might pose to educators. Its goal is not to provide a single picture of an ideal or distopian future toward which we are progressing, but to open up the possibility of exploring potential socio-technical change in ways that allow us, as educators, to take informed and thoughtful decisions about which of these emergent developments we wish to embrace, to challenge or to overcome.

Chapter 2: About this report

This report is intended to provide a detailed record of the work of the Beyond Current Horizons Programme, to provide access to the major outputs of the programme, and to begin the discussion of the implications of the programme for educational policy and practice.

For those wishing to engage in more detail with the evidence generated in the programme, all the individual reviews are available at: www.beyondcurrenthorizons.org.uk.

For those wishing to use the scenarios in practice to support educational planning and development, further supporting materials and resources are available at: www.visionmapper.org.uk

The report comprises:

Chapter 3: Terms of Reference, principles and processes
A summary of the initial briefing for the programme, the underpinning principles, and the design of the programme

Chapter 4: The Challenge Reports
Synoptic reports of the reviews commissioned from leading social scientists in five key areas, identifying the emergent trends and uncertainties, and their implications for education. The reports are written by the following authors:

- Section 4a: Generations and Lifecourse, by Professor Sarah Harper, Oxford University
- Section 4b: Identities, Citizenship and Communities, by Professor Helen Haste, Harvard University
- Section 4c: Knowledge, Creativity and Communication, by Dr Carey Jewitt, London Knowledge Lab
- Section 4d: Working and Employment, by Professor Robert Wilson, Warwick University
- Section 4e: State, Market and Third Sector Provision, by Richard Sandford, Futurelab

Chapter 5: The Public Engagement Activity
This chapter describes the key themes and issues emerging from the Beyond Current Horizons Public Engagement Work. This chapter is authored by Dan Sutch, Futurelab.

Chapter 6: The Beyond Current Horizons Scenarios
This chapter describes the evidence and insights used to design the scenarios and presents the three worlds and six scenarios for education 2025. The scenarios are authored by Richard Sandford and Helen Beetham, based upon initial outlines created by the Expert Advisory Group.

Chapter 7: Discussion and Potential Future Directions
This chapter explores the key themes emerging across the programme and extracts from these a set of potential implications for education policy and practice for further debate and action. This discussion was written by Keri Facer with comments from members of the BCH team, challenge leads and the Expert Advisory Group. Responsibility for the final text and its conclusions, however, rests with the BCH team.

Chapter 3: Beyond Current Horizons: Terms of Reference, Principles and Process

Terms of Reference

The Beyond Current Horizons programme was commissioned by the DCSF Technology Futures Unit. The programme aims agreed between Futurelab and the DCSF TFU were as follows:

> To understand what society might look like in 2025 in order to anticipate the demands that will be placed on the UK education system, taking as a focus not 'the future' in its entirety, but specifically the intersection between technological, educational and social futures. This focus arises specifically from remit of the Technology Futures Unit at DCSF, which is tasked with preparing DCSF and DIUS for the potential implications of socio-technical change.

The aims of the programme were to:

- rigorously review evidence from science and social science in the UK and internationally to identify and analyse the emerging trends in society, technology and education that will act as the most significant drivers of change in education from 2020 onwards

- identify the future ethical challenges and needs for education that will be presented by these emerging trends

- develop long-term visions for the potential purpose, nature and organisation of education in 2025 through the use of creative and collaborative tools to enable consultation around emerging trends and challenges with diverse education stakeholders – including industry, media, parents, students, teachers, education leaders, governors

More specifically, we were asked 'to build a set of long term and challenging scenarios for the future of education 2025 and beyond in the context of socio-technical change' and to make such scenarios, the materials that informed their design, and the implications arising from such scenarios available to a wider public of educational stakeholders and policy makers for use in supporting long term strategic planning.

The programme was also designed to ensure that it did not replicate work going on elsewhere. As such, projects that were taken into account in the course of the programme and which we have taken as important context include the 'Mental Capital and Wellbeing Programme' (GoScience/DIUS), the Inquiry into the Future of Lifelong Learning (NIACE), the Review of the Impact of the Commercial World on Children's Wellbeing (Professor David Buckingham for DCSF), the OFCOM review of Public Sector Broadcasting. Where available and appropriate, we have drawn on the evidence and insights of these programmes to inform our overall analysis.

Underpinning Principles

Through discussion with the DCSF team, with academics and futures experts, and through the public engagement work, we developed the following set of principles to support the aims of the programme. These principles derived from a review of existing futures research and futures methods and from a workshop explicitly set up to address the ethical challenges of engaging in long term 'futures' research in education conducted in Summer and Autumn 2007. These principles have guided the process of

commissioning reviews, designing the public engagement work, and scenario development for the programme in 2008 and 2009. We outline them here to make visible the ways in which they informed the programme design.

Principle 1: The objective of educational futures work is to challenge assumptions rather than produce 'predictions'

History is littered with examples of those who tried, and failed, to make predictions about the future. While it is possible to map out broad directions of current and historical trends, such trends can be disrupted, whether by our own actions or by 'events, dear boy, events'. The future is not, therefore, simply an unmapped terrain that merely requires better cartographers and scouts to fully plot its dimensions. Instead, the future is a place whose contours and cultures are shaped by the institutions, values and actions of those who make it. The future is neither a blank canvas waiting to be filled in (we do, after all, inherit a significant legacy from the past) nor is it a predetermined world waiting simply to be inhabited (we have the capacity to change the future in many ways if we wish to do so)[3].

As such, the greatest benefit of thinking about long-term futures is not to be seen in the attempt to produce increasingly accurate maps of a future world to which education systems must adapt. Instead, the real benefit in such work is in equipping us with the confidence to believe that we can not only explore some of the possibilities that future developments might present, but also act to influence them to meet our values, goals and aspirations as educators.

The principle that we are setting out to challenge assumptions and mobilize action, means that the programme has intentionally worked from the 'outside in'; namely, it has started by mapping potential wider socio-technical changes and resources before exploring educational implications. This approach specifically allows us to examine the ways in which educational goals, institutions and practices might be challenged over the coming years. It does not, however, mean that we see education simply as a servant of fate, required to meekly respond to whatever socio-technical changes emerge. Instead, our aim in presenting such potential developments is precisely to present these as possibilities and to pose the question to educators – how do we want to respond to avert or ensure these developments?

This principle has also shaped our methods. It has meant that we have had to design three sets of activities 1) mapping out the general trends and directions that current evidence would suggest may form the broad context in which future worlds will develop 2) exploring the potential uncertainties and unintended consequences that might emerge in the light of intersections between these general trends, and 3) examining the sorts of values and aspirations that are held by educators, parents, children and others about the future trajectory they would wish education to take in the light of such potential socio-technical developments.

Principle 2: The future is not defined by its technologies

Often, the stories we tell of the future are saturated with visions of gleaming technologies and shiny new gadgets. This generates the illusion that, if only we knew enough about the technologies and tools that will develop, we would be able to understand what the future will bring.

[3] See Sandford, R. and Facer, K. (2007) 'Futures Review: looking at previous global futures', Bristol: Futurelab http://www.beyondcurrenthorizons.org.uk/findings/futures-review/ ; Bell, W. (2002) *Making people responsible: the possible, the probable, and the preferable.* In: Dator, J.A. (ed) *Advancing Futures: Futures Studies in Higher Education.* pp.33-52. Westport, CT: Praeger Studies on the 21st Century, 2002., http://research.yale.edu/sociology/faculty/docs/bell/MakingPeopleResponsible2.pdf ; See also BHASKAR, R. (1975) *A Realist Theory of Science*. London, Verso

Life is, of course, more complicated than that. New technologies of any sort are shaped by the social contexts into which they are introduced: the different cultures and values of different societies, the different economic conditions, the different family practices or friendship ties, all serve to influence how technologies are understood, valued and used[4]. At the same time, the cultures, priorities, economies and values of any society also shape which areas of scientific inquiry are pursued, which technologies are developed and which are brought to market. We can't, therefore, simply assume that 'foretelling the future' is a question of 'predicting technological development'.

At the same time, however, we cannot simply assume that the future is a world in which technological developments have no role to play in enabling changes in social structures, values and customs. Just as the development of the printing press or the plough offered the opportunity for humans to work, learn and farm in different ways, so too will the technologies that we develop over the coming years offer us the means to develop new social practices, new ways of forming social relationships, new ways of organizing social institutions, new ways of doing business or parenting.

Social and technological developments can be understood as fundamentally interconnected. As such, any examination of 'the future' of socio-technical change requires an acknowledgement of the reciprocal relationship between technological affordances and social practices[5].

This principle means that the programme has focused first, on building a picture of the currently envisaged trajectories for technological development, trajectories which are shaped by today's priorities and funding in research labs and universities, and second, on exploring the ways in which such developments might interact with a wider set of socio-cultural and socio-economic developments, equally also identifiable as in train in the present day. We have, in this way, taken a position which views emergent technological developments as offering a set of strategic resources that can be used to intensify, challenge or reconfigure our existing social practices, values and institutions depending upon the values and circumstances in train at any given time. Our goal has been to describe the potential developments that might emerge at this intersection.

Principle 3: Education has a range of responsibilities

In attempting to understand the potential implications of socio-technical change for the future of education, the BCH programme has taken a broad view of the purposes of education. The programme sees education as responsible for: qualifying learners to take on certain roles (requiring the development of knowledge and competencies), socializing learners to participate in wider community, family and social contexts, and equipping learners to develop their own sense of selves, identity and agency.

[4] See, for example, Woolgar, S. (2002) *Virtual Society? Technology, Cyberbole, Reality*. Oxford, OUP

[5] The term 'affordance' here relates to the idea that the environment 'affords' action possibilities that are invitations to engage in certain activities, but that the question of whether these possibilities are realised or not depends upon these possibilities being identified by individuals and groups. For example, a chair doesn't necessarily afford the act of sitting if it is a small child who is perceiving it, a book doesn't necessarily afford the act of reading if it is someone from an oral culture who is perceiving it. The possible 'impact' of technologies, from this perspective, would be seen to emerge in interaction between perception of individuals and societies and the properties of the technology. See Norman, D.A. (1999) Affordances, Conventions and Design. *Interactions* 6 (3), pp.38-43, May 1999, ACM Press; Gibson, J.J. (1977) *The Theory of Affordances*. In: Shaw, R. and Bransford, J. (eds) *Perceiving, Acting, and Knowing*

In so doing, the programme has drawn not only upon the values implicit in the current UK policy context (such as the Children's Plan and the QCA Big Picture Curriculum) but also upon wider historical and cross-cultural perspectives which make visible the diverse purposes and goals of education in evidence in different societies at different times[6].

As such, the programme is not simply concerned with questions of how the future world of work might change (a perspective which would assume a narrow economic agenda for education); it is also concerned with understanding how processes of personal and social interaction, how the formation of community and identity, how the practices of creativity, imagination and communication might develop over the coming years as emerging technologies are appropriated into social and personal lives.

Such a diverse understanding of educational goals has required that we work collaboratively across different disciplines in order to attempt to explore a wide range of areas of social, economic, cultural and political life. This very broad approach does not therefore provide detailed insights into the future shape, for example, of particular emergent industries or of specific forms of citizenship (as might have been achieved had the programme taken a more restricted view of educational goals). It does, however, provide insights into the ways in which the diverse elements of individuals' life-worlds may broadly play out differently in different socio-technical futures. What the programme has lost in detail, it has gained in the richness of the narrative it is able to tell across diverse social, economic and cultural domains.

Principle 4: Thinking about the future always involves values and politics
Visions of the future are used in politics and daily life as support for a whole range of social changes. Future visions of impending technical collapse in the run up to the year 2000, for example, were used to mobilize international efforts to fix the millennium bug. Future visions of environmental catastrophe are used to encourage investment in green industries and carbon reduction. Future visions of economic uncertainty are used to encourage investment by business in staff and development. Future visions of social tension are used to resist immigration to the UK.

Visions of the future are powerful rhetorical devices to promote change in the present (consider Martin Luther King's 'dream' of a very different future). As such, they are powerful political tools. Any futures work which aims to empower individuals and groups to make decisions, rather than simply coerce them towards certain predetermined actions, needs therefore to be clear about 1) the people involved in the production of future visions (whose voices are represented?) and 2) the methods by which these future visions are produced (what is the basis for the ideas represented?)

The programme, therefore, has attempted to explore in some detail the question of who should be involved in 'educational visioning' and has made concerted efforts to engage a diverse range of educational stakeholders in the debate (see Chapter 4). We also, in this report and elsewhere, have attempted to present as clearly as possible the assumptions and methods that have gone into shaping the programme and its outputs.

In making clear the participants involved in the programme and the methods and assumptions we have used, we hope to make clear the origins and assumptions guiding the future visions presented. This report, like all other representations of the future, is partial. However, the reader should know the origins of its partiality and be able to read and interpret the findings accordingly.

[6] This principle was developed during the Technology, Education and Social Responsibility Workshop held Autumn 2007 as part of the BCH programme. It was also informed by Biesta, G.J.J. (2007) Education and the democratic person: Towards a political understanding of democratic education. *Teachers College Record,* 109 (3), pp.740-769

A caveat: the continuing importance of children's rights and voice today
While educational institutions are, clearly, places in which young people are prepared for future worlds and in which young people, teachers and parents together create values, knowledge and practices that will shape those future worlds. Education is also a site in which young people live today and in which their needs, rights and voice must be taken seriously. To see educational institutions solely as sites of preparation for the future would be to risk overlooking the need for such institutions to offer dignity, respect and protection for children and young people in the present. This is not the intention of this report.

The Beyond Current Horizons Process

The Beyond Current Horizons programme was, as its aims suggest, broadly inspired by the 'foresight'[7] model of futures research (although its methods and tools were developed and adapted along the way). It was intended to generate a range of different outcomes: both a robust evidence bank of existing trends and a set of provocative scenarios to challenge assumptions, both a review of existing insight and evidence from the academic research community and a mechanism for engaging a much wider range of voices in the debate over the future of education.

In many ways, the programme design draws on the long track record of futures research in sociology, specifically upon Wendell Bell's argument that futures work should comprise an examination of the interplay between probable, possible and preferable futures. We used this tripartite structure to develop a series of activities that would elicit these three potential futures 1) a programme of review commissioning from the academic community to generate evidence of existing broad trends 2) a scenario process to explore potentially radically divergent developments, and 3) a public engagement programme to access individuals' and groups' aspirations for the future.

The following provides a summary overview of the programme of desk research, events, consultation and analysis that have made up the programme. Appendix 1 provides a list of all individuals and organizations consulted during the programme.

Phase 1: Defining the areas of priority focus
Phase 1 of the research programme comprised a series of desk research, consultations, events, interviews and commissioned pieces intended to identify the key areas of focus for the programme within the overarching goal of mapping 'the emerging trends in society, technology and education that will act as the most significant drivers of change in education from 2020 onwards'.

Phase 1 (broadly July 2007- March 2008) comprised:

- A review of futures research methods and theories, including reviews of previous educational futures research, and analysis of the relationship between social and technological change. See: http://www.beyondcurrenthorizons.org.uk/outcomes/reports/futures-review/
- A one day workshop specifically examining the ethics of futures research. This workshop, bringing together philosophers, ethicists and educational researchers was used, alongside the review of futures research methods, to develop the programme principles outlined above.
- A set of stakeholder consultation activities with diverse age groups who could be understood as beneficiaries of and users of education. These consultations included 3 x 1 day workshops with 1) 43 50-65 year olds examining their

[7] http://www.foresight.gov.uk/About/index.asp

personal histories of and aspirations for education in the context of socio-technical change 2) 55 young people (aged 12-17) and 26 teachers from 24 schools across the UK, to examine which areas of socio-technical change they thought most significant for education, and their aspirations for education 2025 3) 30 parents of early years children to examine their aspirations for education over the coming 20 years, and their views of socio-technical change. See http://www.beyondcurrenthorizons.org.uk/evidence/public-engagement/outcomes-from-public-events/

- A series of interviews, meetings and discussions with industry partners and leading academics to ascertain their perceptions of the key social or technological trends that might have implications for education.
- A series of 'charettes' bringing together leading thinkers, researchers and developers, were designed and chaired by Professor Stephen Heppell as part of his HorizonTAL programme, to explore specific potential areas of technological development (http://www.heppell.net/horizontal/default.html).
- A workshop and review examining the role of new technologies in the future of education was designed and run by the Institute of Education in co-operation with the DIUS Mental Capacity and Wellbeing programme

On the basis of, and alongside, these activities, a 'long-list' of potential areas for exploration was developed. These comprised the changing nature of childhood, the field of demographic and population change, questions of diversity, citizenship, culture and identities, the relationship between new forms of communication and democracy, the development of new working practices and values, current and potential relationships between public and private sectors in education, complexity science and theory, developments in digital technologies, bioscience and mathematics, changing uses of space and place mediated by information and communications technologies.

These broad areas of interest were used as a basis for commissioning a series of 18 challenge papers from leading academics in social science and computer science, with a remit to identify the key tensions, issues, trends and uncertainties that might emerge in each of these fields over the coming 20 years. See http://www.beyondcurrenthorizons.org.uk/background/research-challenges/long-list-of-challenges/

These 18 challenge papers formed the pre-reading for the first meeting of the Expert Advisory Group which brought together education policy and practice representatives and a multi-disciplinary team of leading social scientists and computer scientists (for membership, see Appendix 2). Over two days, the group shaped the programme for phase 2:

1 The five priority areas for commissioning of evidence and insight were identified as:

- lifecourse and generations
- identities, communities and citizenship
- knowledge, creativity and communication
- working and employment
- public, private and third sector relationships in education provision.

2 The strategy for dealing with 'scientific and technological evidence' was developed. The EAG proposed that developments in computer science and biotechnology should be included within these five areas above, rather than being extracted as a separate 'stand-alone strand of commissioning. This decision reflects the view held by the group, and the underpinning principle of the programme, that it is not possible to separate out technological development from social change. To support

review commissioning in the five areas, however, it was agreed that a summary of key developments currently in process should be produced to stimulate discussion and exploration of possibilities potentially outside the initial consideration by social scientists in these fields.

3 The decision was taken that it should not be the role of the BCH programme to attempt to develop models of the potential trajectories of 'climate change' and demographic change over the coming 20 years. It was also felt that while the programme should not focus specifically upon developments in biosciences (given the work of the Mental Capacity and Wellbeing programme), it was important that a broad overview of the field should be generated to ensure that the BCH programme was able to avoid naivety in these areas. A set of 'cross-challenge' activities were therefore identified as important: 1) developing a set of 'assumptions' about climactic, energy and other potential major risks that would act as a framework for the programme 2) commissioning an overview of forecast demographic change to provide a framework for the programme 3) commissioning a series of reviews to map the current broad understandings of the potential implications for education of developments in neuroscience and bioscience.

These agreements formed the basis for the commissioning and consultation activities in phase two of the programme.

Phase 2: Exploring probable, preferable and possible futures
The challenge activity: building an evidence base of probable futures and mapping key uncertainties

The members of the Science and Technology Subgroup, led by Professor Dave Cliff (Bristol) were asked to collate their initial challenge papers to identify areas that they might have initially overlooked or under-developed in order to provide a description of developments in computer science and related fields that might emerge over the coming 20 years. This paper was published and made widely available for all challenge leads and review authors. It was intended to enhance understanding amongst social science researchers of some of the affordances of emergent technologies as a prompt for reflection in each of the five challenge areas.
http://www.beyondcurrenthorizons.org.uk/evidence/other/

Leads were recruited for the five Challenge areas identified above:

Challenge 1: Professor Sarah Harper, Oxford University
Challenge 2: Professor Helen Haste, Bath University and Harvard University
Challenge 3: Dr Carey Jewitt, London Knowledge Lab
Challenge 4: Professor Rob Wilson, Warwick University
Challenge 5: Richard Sandford, Futurelab[8]

Each challenge lead was given a brief that tasked them with the following responsibilities:

Challenge 1: Generations and Lifecourse
This challenge is particularly concerned with understanding trends in demographics, family structure, intergenerational relationships and ageing 2025 and beyond, the role that developments in science and technology may play in these processes and the implications of any emerging trends for education.

[8] A Professor of Education was initially recruited for this role. She was forced to withdraw after three months and, given the time constraints on the programme, it was decided that a member of the BCH team would take on this role instead of recruiting another lead researcher.

It should help the programme to understand:

1 Key trends in demographics, family structures, intergenerational relationships and aging 2025 and beyond
2 Key uncertainties and potential discontinuities in these areas
3 How these trends potentially intersect with developments in science and technology
4 What range of potential futures these trends might point to from the present to 2025-2050
5 What the implications might be for educational goals, structures, methods and resources
6 What evidence exists of interventions and strategies to respond to these different future scenarios

Challenge 2: Identity, Citizenship and Community
This challenge is particularly concerned with understanding the development of cultural identity, citizenship and community in the context of globalising/localising forces, the role that developments in science and technology may play in these processes, and the implications of any emerging trends for education

It should help the programme to understand:

1 Key cultural, political and economic globalising/localising trends and their relation to the nation state 2025 and beyond
2 Key uncertainties and potential discontinuities in these areas
3 How these trends potentially intersect with developments in science and technology
4 What range of potential futures these trends might point to from the present to 2025-2050
5 What the implications might be for educational goals, structures, methods and resources
6 What evidence exists of interventions and strategies to respond to these different future scenarios

Challenge 3: Knowledge, Creativity and Communication
This challenge is particularly concerned with understanding trends in the creation, circulation and communication of knowledge, the role that developments in science and technology may play in these processes and the implications of any emerging trends for education

It should help the programme to understand:

1 Key trends in the processes (social, cultural and cognitive) of knowledge production, creation and communication by individuals, groups and societies to 2025 and beyond
2 Key uncertainties and potential discontinuities in these areas
3 How these trends potentially intersect with developments in science and technology
4 What range of potential futures these trends might point to from the present to 2025-2050
5 What the implications might be for educational goals, structures, methods and resources
6 What evidence exists of interventions and strategies to respond to these different future scenarios

Challenge 4: Working and Employment
This challenge is particularly concerned with understanding trends in working practices and employment, the role that developments in science and technology may play in relation to these practices, and the implications of any emergent trends for education

It should help the programme to understand:

1 Key trends in the organisation and practices of work and employment to 2025 and beyond
2 Key uncertainties and potential discontinuities in these areas
3 How these trends potentially intersect with developments in science and technology
4 What range of potential 'futures' these trends might point to from the present until 2025-2050
5 What the implications might be for educational goals, structures, methods and resources
6 What evidence exists of interventions and strategies to respond to these different future scenarios

Challenge 5: State, Market, Third Sector
This challenge is particularly concerned with understanding trends in relationships between state, private and third sector provision of public services; the role that developments in science and technology may play in these processes, and the implications of any emergent trends for education.

It should help the programme to understand:

1 Key trends in the relationships between state, private and third sector provision of public services
2 Key uncertainties and potential discontinuities in these areas
3 How these trends potentially intersect with developments in science and technology
4 What range of potential futures these trends might point to from the present to 2025-2050
5 What the implications might be for educational goals, structures, methods and resources
6 What evidence exists of interventions and strategies to respond to these different future scenarios

Each Challenge lead was responsible for bringing together a steering group or set of advisors to work with the brief from the Expert Advisory Group and to commission and peer review a set of review papers that would address these questions. A list of the completed reviews and a summary of the different processes and people participating within each challenge is available in Appendices 3 and 4.

The initial design of the challenges and commissioning plans were presented to the Expert Advisory Group in July 2008. Interim reports on review findings were presented and discussed at a meeting of the Expert Advisory Group in November 2008. At this meeting, early findings were used to develop draft scenarios and test the potential of emerging issues to act as structuring variables for the final scenarios.

Alongside the Challenge reviews, the BCH team also commissioned three further review papers in the fields of demography, biofutures, and neuroscience and education. The team also held an event and completed a programme of desk research to develop an

informed position on how the potential for major risks and uncertainties, such as climate change or energy shortages, should be dealt with in the scenarios (see the end of this chapter).

Each challenge, once completed, provides a rich body of research evidence and insight in its own particular area. This massive resource has been reviewed by the challenge leads, and their relevant steering committees, and synthesized into a series of synoptic reports which discuss 1) the socio-technical trends in each area that are expected to pertain to 2025 and beyond 2) the key uncertainties that remain in each area 3) where possible, some alternative future trajectories are explored.

In and of itself, the material generated in these five challenges provides a rich resource for educators and others interested in exploring potential future trajectories for education. They have also been used to provide the architecture (the framing elements) for the Beyond Current Horizons Scenarios.

The public engagement activity: understanding preferable futures

Participation as an approach to research, policy-making and design is increasingly being seen as an important strategy both in the UK and internationally. Although the academic discipline of participation is still regarded by some as an emerging field[9], the practices of co-design, deliberative democracy and public participation are becoming widely used. The public and stakeholder engagement activities in phase 2 of the BCH programme have built on two typical approaches to explore the values, aspirations and opinions of education's stakeholders:

- Deliberative engagement: a process of sharing information from the project within (and preceding) discussion to ensure that the responses from the participants are as fully-informed as possible. (For example: Citizens Council, Whitehall Engagement activities).
- Normative/typical engagement: activities which ask questions (with limited amount of information provided) to encourage immediate, personal or emotional responses. (For example: Million Futures; Citizens Panel).

Where normative engagement approaches seek to gather immediate public views, the intention of deliberative engagement strategies is to provide an opportunity for stakeholders to discuss the issues and to interact with a range of sources of information in order to make a considered response to questions about futures and educational futures. The intention of using both approaches was to elicit a rich mixture of public and stakeholder opinions to inform the wider Beyond Current Horizons programme.

The public and stakeholder engagement activity served two purposes in relation to the overarching programme: it provided an ongoing balance to the academic research evidence and ensured that key issues of concern to public and stakeholder audiences were addressed in the review commissioning process. It acted as a mechanism for prioritizing the concerns around which the scenarios were designed. The following provides a summary overview of these activities (further detailed information on the survey questions used is available in Appendix 5)

[9] For example Pyser, N. (2008), Ross and Glock-Grueneich (2008) and Hartz-Karp (2007)

Citizens Panel
The Citizens Panel was established to elicit responses about the preferable futures for education from members of the wider public. Partnering with Bristol City Council's existing Panel (a demographically-sampled group set up in order to share policy plans and to seek a representative public response) a ten-question survey was distributed. Questions included those looking at the immediate goals of education, as well as hopes, fears and expectations for future education. An additional seven questions were included to gather demographic characteristics of the respondents. In total 514 surveys were returned (1100 sent out, a return rate of 47%).

Citizens Council
The Citizens Council is made up of 15 senior figures from organisations that represent or work for particular groups within society. The Council met once and was provided with emerging evidence and ideas from the challenge areas. The council members were encouraged to explore the implications of such issues for future social and educational development. Their responses were used to assist in selecting and prioritising issues for examination and exploration in the scenario development process.

Million Futures
Million Futures is an online tool that presents questions about future life and learning in the UK. Over the course of the Beyond Current Horizons programme, eight different questions were posed using this tool (six displayed at any one time) to provide the opportunity for anyone who visited the site to enter free text in response to these questions. In addition to the questions, lesson ideas were presented for teachers and students to use Million Futures in a more structured way. 1539 entries were made against eight question prompts from 100 different countries. The majority of the site use was from the UK (3002 visits), with 1397 visits from the United States. There were more than 150 visits each from Australia, New Zealand, Spain, France and Mexico.

Power League: Beyond Current Horizons edition
Power League is an online tool that asks users to cast votes, in which they choose between two competing ideas or options. Two leagues were set up for Beyond Current Horizons providing comparative pairs of options for futures education. The two leagues were intended to elicit insights into aspirations for both curriculum (educational goals) and for pedagogy (teaching and learning). By repeatedly casting votes, the users created leagues, ranked in order of the most important, valued or influential options. The first league (educational goals) included 70 different factors and received 5387 votes; the second league (educational processes) included 73 factors and received 1452 votes.

Stakeholder meetings and workshops
Meeting with a wide range of organisations and individuals was an important part of sharing the Beyond Current Horizons programme and eliciting a wider range of views and questions from education's stakeholders. In total over 200 organisations/individuals were involved in this process (See Appendix 1)

In keeping with the overarching approaches to engagement, the interactions with stakeholders included deliberative approaches (for example, Whitehall workshops and BESA workshops) as well as normative discussions (individual or small group interviews). The deliberative workshops built on the emerging research from the Challenges as part of a semi-structured group interview. The key design features of these workshops were the presentation of the emerging research and facilitated dialogue based on questions that were also used as part of the Million Futures site and with the Citizens Panel.

The scenario development activity: exploring possible futures
The third strand of activity in the Beyond Current Horizons programme was a scenario development process. This process drew upon the previous two sets of activities, namely, the challenge activity and the public engagement activity, but was designed to go beyond this evidence to explore a set of challenging alternative futures for education that might emerge at the intersection between currently identifiable socio-technical trends.

The scenario architecture was developed as follows:

1 The BCH Team reviewed all draft challenge reviews and challenge reports, and reviewed findings from the public engagement programme, to develop a set of key contexts and developments which would be assumed to be acting in all future worlds. These pre-determined elements were selected in order to 1) ensure that the scenarios were not side-tracked into attempting to identify certain future possibilities (the likelihood or otherwise of overcoming climate change, for example) and 2) to ensure that the scenarios focused on issues of primary concern to the programme (the interaction between technological and social change). As such, they reflected the underpinning principles of the programme described above (see Chapter 3 below for a full discussion of these elements)
2 The BCH team reviewed all draft challenge reviews and identified a set of critical uncertainties – significant socio-technical developments which might play out in radically divergent directions - that would have a significant potential impact on the goals, institutions and processes of education. A shortlist of six candidate uncertainties was produced. In addition, a second variable was determined that would be used to structure the scenarios, namely the speed and coherence of the education system's response to socio-technical change.
3 The recommended pre-determined elements and the shortlist of six candidate critical uncertainties were circulated to the challenge leads, the expert advisory group and the Citizens Council who were asked for feedback on the pre-determined elements, and to rank the critical uncertainties against their potential significance for education. Comments were also elicited from all groups on their rankings to help ascertain priorities.
4 Feedback from these groups informed the final selection of the key variables and predetermined elements and the final scenario architecture was drafted.
5 The Expert Advisory group and BCH team met for three days to produce first drafts of the scenarios
6 BCH team members took these drafts, revised them and circulated to the EAG members for comment, and revised them again in order to create distinctive worlds and scenarios.
7 Final versions of the scenarios and final text of the Vision Mapper tool were subject to edits by Becta before final publication. They are included in this document in Chapter 6.
8 These scenarios are also now being translated into easily accessible scenario toolkits for use by education practitioners in an online toolkit (see www.visionmapper.org.uk).

Dealing with risks and uncertainties in the scenarios
Scenario work is intended to provide us with some idea of the possible contexts in which we might be living, learning and working in years to come, through extrapolating existing trends and features of the present-day to various alternative constructions of different futures. The implied routes from the present to the various futures represented within the scenarios tend to be smooth and relatively untroubled: things increase or decrease, grow or decay, become more or less important to society, and different kinds of world emerge as a consequence.

However, history and experience demonstrate that events do not always unfold in a smooth and untroubled way. Rather than the continuous progression from one state to another that would be experienced if trends played themselves out smoothly, accident, coincidence and random happenstance have all apparently directed the path of human experience at one time or another and played a part in shaping the world we experience today. The progression from one condition in society to another is often discontinuous, and the events that precipitate the change from one to another are sometimes referred to as "discontinuities"[10].

It might be reasonable to expect an examination of future possibilities to recognise this, and try and account for the unforeseen in some way. However, there are differences of opinion amongst futures researchers, academics and consultants on the place of scenario work in addressing issues raised by considering discontinuous events (eg van Notten et al, 2005). Some scenario authors have chosen to make no acknowledgement of the role the unexpected might play in the unfolding of a future, or believe that scenario planning is not an appropriate tool with which to try and apprehend discontinuities. Other authors have attempted to distinguish between different sorts of discontinuity, differentiating between these events by examining their duration (do they occur in a day or over a decade?), their visibility (were they, with hindsight, discernable, or were they always going to be surprising?), their impact (is it felt immediately and clearly, or does it manifest in unexpected areas of society?), the degree to which they might depart from expectations, and the perspectives from which they might appear abrupt.

These last points, regarding the subjective perception of a particular occurrence, are important in any discussion of discontinuous events. Firstly, the temporal perspective from which the event is described matters: for example, from the vantage point of somebody looking at long stretches of time, human population growth might appear to be explosive, whereas from a more immediate perspective it is a difficult trend to notice. Conversely, some events that seem highly discontinuous when they first occur (such as the fall of the Berlin Wall in 1989) might from a more removed perspective seem continuous with a larger set of processes (such as economic strains on the Soviet Union and political moves towards glasnost and perestroika): from a sufficiently local or distant perspective, they may not be seen as discrete events at all. Secondly, the expectations and beliefs that dominate within a particular group will determine how discontinuous an event appears to be. If an event conforms to the expectations of a group it will seem unremarkable: if it is counter to their expectations it will be a surprise. The discontinuity is not an essential quality of the event but of the way in which it is perceived.

This fact highlights the distinction between the notions of the unexpected and the unlikely, or between discontinuity and risk. Saying something is unexpected is to make a claim about our beliefs, that is, our lack of confidence in its taking place: saying something is unlikely is making a claim about a property of the event itself[11]. If the outcome of an event whose probability is reckoned to be calculable is perceived as negative, it could be described as a "risk". As many authors (but perhaps principally Beck[12]) have discussed, there are layers of uncertainty associated with "risk" beyond the purely actuarial assessment of probability: in addition to the epistemic issues surrounding the calculation of the event's probability, there are questions about the

[10] Van Notten et al provide a brief summary of other terms, including "wild card", "shock", "structural breaks", "bifurcations" and "paradigm busters"(van Notten, P., Sleegers, A., van Asselt, M. (2005) The future shocks: On discontinuity and scenario development *Technological Forecasting & Social Change,* 72, pp.175–194)
[11] Though, more properly, it might be a claim about our belief regarding its predictability
[12] Beck, U.(1999) *World Risk Society*: Cambridge, Polity Press

implicit ability of the agencies making the assessment to manage this risk, and the distortions that inevitably occur when stating risks in a public arena[13].

All this is simply to say that notions of uncertainty and unpredictability are complex and dealt with inconsistently within existing scenario work. There exists no single established approach to recognising uncertainty – each organisation or group commissioning or undertaking scenario work has different motivations for doing so, and consequently the meaningful consideration of uncertain events will vary also. Any decision, then, on how to reflect uncertainty in the BCH scenarios will be guided more by the aims and needs of this particular programme than by following any particular previously-established methodological approach.

As such, we have taken the decision that, when considering which discontinuous or uncertain events have a place in the construction of the BCH scenarios, and which do not, our guiding principle is to reflect only those events whose occurrence would require a particular response from education (in that they would require changes to the goals and methods of education) and which are likely to demand a response over the next two decades. As a result, we have excluded from consideration a number of areas that are commonly thought of as discontinuities within futures work.

For example, while it is indisputable that a widespread pandemic (for example, SARS) or the aftermath of an extreme weather event (for example, widespread floods) would have an immediate impact on schools, these events do not, in themselves, impact on longer-term priorities or direction for education: they do not necessarily change the aims of education. Indeed, the goal following these types of events is often to ensure a return to the *status quo*. Consequently, events that would more immediately be the concern of disaster planning or emergency committees are not being considered.

Equally, it is hard to see how including events at the extreme edges of possibility is likely to be of significant use to the design of education, however great their impact if they were to occur. Extreme and unpredictable events, often referred to as "wild cards" or "outliers", such as the Earth's catastrophic collision with an asteroid, rapid proliferation of nanotechnological agents throughout the food chain, genuine artificial intelligence, the rise of transhumanism (and associated "Singularity" possibilities), widespread nuclear war or the rise of a global totalitarianism, are, however potentially disastrous or uplifting, not within the scope of this programme[14]. Such genuinely unpredictable and unforeseeable events are hard things to ask policy-makers to respond to[15]; the cost of preparation for such low level possibilities combined with the uncertainty of whether it is the responsibility of the education sector to either prevent or adapt to such events, means that such considerations are not a high priority when it comes to asking how education systems may need to adapt their goals, institutions and processes for socio-technical change over the coming 20 or so years.

This does not mean, however, that the programme is dedicated solely to attempting to forecast predictable change on the basis of continuous development from current trends. Instead, we have worked to elicit indications both of existing trajectories, and the levers and factors that might disrupt these. We have worked to examine both emergent trends, and the unfamiliar directions such trends might take when they interact. In each of the challenge reports (below) we identify the remaining critical uncertainties in each field for

[13] For a deeper exploration of some of these complexities, see Schillmeier's paper "Societal Change, Self-Endangerment and Self-Education", from the "Knowledge, Creativity and Communication" research Challenge within BCH.
[14] For an exploration of risks of this scale, however, see "Global Catastrophic Risks" ((http://www.global-catastrophic-risks.com) from the Future of Humanity Institute at Oxford (http://www.fhi.ox.ac.uk)
[15] For a discussion of the difficulties of meaningfully discussing the genuinely unknown, see Taleb's "The Black Swan" (Penguin, 2007)

education. And in the BCH scenarios we work through these critical uncertainties to produce a set of potential future directions for education. And in our conclusions and recommendations, we clearly state the potential for responding to such uncertainty within our current education system.

Chapter 4: The Challenge Reports: the evidence base

Challenge 1: Demographic Change, Generations and the Life-Course

Professor Sarah Harper, University of Oxford

This report forms a synthesis of the 10 Challenge papers listed in Appendix 3 and Appendix 4, and should be read in conjunction with the fuller material there described.

Section 1: Introduction

Challenge One *Demographic Change, Generations and the Life Course* comprised a multi-disciplinary team drawn from demography, anthropology, sociology, philosophy, economics, neuro-science, education and social policy. The evidence was drawn from commissioned reviews which were commented on and revised in discussions and at a formal review workshop. This report takes the key challenge questions as its focus and draws on the evidence to address them. It summarizes the papers in support of the identified factors, trends and certainties and uncertainties. It should be noted that Sections 2 and 3 draw heavily on the writings of Harper, Howse and Leeson, Sections 4 and 5 on the writings of Leeson, Demireva, Hoff, Mann, Lee, and Jessel, and Section 6 on the writings of Lee, Hoff, Mann, Leeson, Lauder, Kelan and Jessel. Full references are provided in the papers.

Section 2: Trends in the challenge area of Demographic Change which we can reasonably confidently expect to continue to 2025

2.1 Fertility: the return to high total fertility rates in this country is considered possible but extremely unlikely. The most likely trends are therefore declining or stable.

The causes of these trends are unclear.

- Standard *demographic transition theory* explains fertility reduction as a result of infant and juvenile mortality. Fertility reduction is thus *an equilibrating response to maintain population stability in the face of changing mortality regimes*.
- *Capital-investment theory,* suggests that the need to invest in education as skill-based labour markets arose during the Industrial Revolution resulted in parents lowering fertility to invest more in fewer high quality children. This thus explains fertility decline as a response to changing economic systems.
- *Cultural theories* suggest that fundamental norms and values with regard to the need and desire to have children have changed radically as societies and their members have become increasingly hedonistic. Thus self actualisation, freedom of choice, emphasis on quality of life and leisure, and a retreat from commitments, may all act against the notion of investment in offspring.
- *Relative economic status theory* proposes that fertility is influenced by generation size and relative economic status. This would mean that the baby-bust generations as they enter adulthood would enjoy increased relative economic status thereby giving rise to increased levels of fertility – in theory at least. Easterlin's models did not take into account the influx of women into the workplace since the 1970s, and the high opportunity costs of leaving the workplace to have and bring up children should lead to declining fertility. Indeed one of the driving theories behind the fall in fertility focuses on increased female labour participation, suggesting that increased female education and autonomy, increased desire for consumption requiring second incomes, and increased female investment in careers have all led to increased female economic activity and subsequent decline in childbearing.

2.2 Mortality: there is general consensus that mortality across the life course is unlikely to show a significant long term increase. Much of the uncertainty around falling mortality and life extension occurs at the oldest ages. The most likely trends are therefore declining or stable across the life course until late age.

Understanding these trends is complex. Within the United Kingdom, mortality levels declined throughout the post-war period at almost all ages, and with the exception of decreases in infant mortality, the mortality decline at around age 40 was the most significant in the 1970-1990 period. Life expectancies at birth in the United Kingdom, for example, increased throughout the period and for both sexes as mortality declined at almost all ages. In fact, in the United Kingdom, it is particularly the scale of the decline in adult and old age mortality which contributes to the observed increases in life expectancies at birth. For infant mortality, although declining, it is already so low in this country that the contribution of this decline to the increase in life expectancy at birth is modest. Towards the end of the 20th century, almost all of the increases in life expectancy at birth in the United Kingdom are due to decreases in mortality at relatively high ages. However, late-age mortality is an increasingly important component of overall mortality and it is changes in these mortality levels that could still confound population forecasts, as they have done in the recent past.

It was originally thought that social class differentials in mortality were understood mainly in terms of material deprivations and environmental hazards such as inadequate nutrition, overcrowded living conditions, poor sanitation and personal hygiene, and hazardous working conditions, all strongly associated with poverty. By the 1980s however it was evident that despite the considerable improvements in the standard of living of the lower socio-economic groups, there was still a large gap in life expectancy. Attention thus turned to the *social gradient* in mortality risk, whereby lower income groups within a society have a higher mortality rate, despite being well above the poverty line. Socio-economic status (SES) rather than poverty has become the central concept for investigating social inequalities in mortality.

Key theories at present focus on

- Life style factors (Van Rossum et al, 2000; Balia and Jones, 2008) particularly smoking and alcohol (Law and Morris, 1998)
- Psychosocial stress: from having a subordinate status in social and occupational hierarchies of power and esteem (Marmot, 1994)
- Neighbourhood deprivation or deficiencies in social capital (Smith et al, 1998)

2.3 Migration: there is consensus that migration patterns will most certainly change with the UK, as with most countries, becoming a stepping stone as part of international migration flows for self-enhancement. We thus discuss this in more detail under uncertainties.

Currently, however, the foreign population in European countries amounts to approximately 23 million persons comprising approximately 5% of the total European population (ie residents outside their country of origin). Bearing in mind the unreliability of such data in Eastern Europe, it is estimated that Eastern European countries accounted for less than 1 million of this total. Since the middle of the 1990s, the size of the foreign population resident in Western Europe has increased by almost 12%. Three countries account for more than 60% of the total foreign population resident in Western Europe outside their country of origin: Germany (35%), France (15%) and the United Kingdom (12%). In Eastern Europe too, three countries, namely Estonia, the Czech

Republic and Hungary account for approximately 60% of the foreign population resident in that region.

Prior to enlargement, within the EU15, approximately 19 million foreign residents were living in a country, which was not their country of origin, and approximately one third of these were from other EU15 member states, with 17% from Africa, 12% from Asia and 17% from Central and Eastern Europe (Salt, 2003). The diversity in foreign population composition across Europe is striking. In Ireland and Belgium, for example, over half of the foreign population resident is from other EU15 countries; in Spain, France, the Netherlands, Sweden and the UK, the proportion of foreign population from the EU15 is between 30 and 40% (closer to the EU15 average of 30.6%), while for the rest of the countries, the large majority of their foreign populations are from countries outside the EU15.

Central and Eastern Europe provide substantial shares of the foreign populations resident in particularly Finland (46.8%), but also in Germany, Greece, Italy and Sweden and to a lesser extent Denmark. Africa is a key source of the foreign populations resident in Portugal and France and a significant source for Italy, Spain and the Netherlands followed by Belgium and the United Kingdom. Finally, Asia is a key source of foreign population for the United Kingdom (mainly from the Indian sub-continent), Denmark, Italy, Greece, Sweden and Finland. The immigration of foreign-born workers and their families to the UK is a trend which appears set to continue in some form.

2.4 Population Ageing: The population of the world aged 60 years and over increased from 205 million and 8% in 1950 to approximately 688 million and 11% in 2006. By 2050, the number will have increased to around 2 billion and 22%. By 2030, half the population of Western Europe will be over 50, one quarter of the population of the developed world will be over 65, and one quarter of the population of Asia will be over 60. This is historically unprecedented. Indeed, it make the 20th century the last century of youth, the 21st century heralds a new demography- that of maturity.

These dynamics are the result as much of falling fertility as of increasing longevity as across the world women are choosing not to have large numbers of children, to delay or even reject first childbirth. This coupled with increasing longevity sees ageing flood out across the globe. Indeed the scale of ageing over the next 50 years is immense. According to the United Nations forecasts, the population aged 60 years and over is expected to increase from 20 to more than 30% by the year 2050 in the more developed regions, from 8 to 20% in the less developed regions, and from just 5 to 10% in the least developed regions. And these are projections from incremental longevity. What will be the demographic consequences if radical longevity becomes a possibility for entire generations? The prospect of a relatively long and healthy life is real for most of us and there lies the challenge and the opportunity for every individual, country and government in a world of increasing longevity.

For the UK, as for most other countries in Western and Northern Europe, the demographic situation is defined principally by the combination of three dominant trends: a fertility rate that has been below replacement level for several decades now and is thought unlikely to rise above it, unprecedented and continuing declines in late-life mortality, and relatively high levels of inward migration. This has already resulted in a UK society which is characterised by a decline in the proportion of younger people (through falling fertility), an increase in the proportion and number of older people (through both falling fertility and mortality), and a more ethnically diverse composition (through increased migration).

The challenges posed by these trends can be grouped into four main categories: those that arise from the changing age structure of the population – specifically the increase in the proportion of older people and the decrease in the proportion of younger people (ie changing dependency ratios); those that arise from the ageing of the older population (ie more people surviving in 'late old age'), those that arise from inward migration and the growth of migrant communities within the host society, those associated with persistent below-replacement fertility (ie population decline as opposed to population growth). It is evident that these challenges are not independent of each other, and furthermore that trends in one driver of demographic change may offset or compound the impact of trends in another. For example, changes in the age structure of the population are driven partly by the ageing of the older population and partly by below-replacement fertility. Large-scale inward migration is likely to have a temporary effect on the age structure of the population and will delay the trend towards natural population decline inherent in below-replacement fertility. Policy makers need to have an understanding of the challenges and opportunities of population change that fully integrates all three of the main drivers of change. Furthermore, the challenges that demographic change pose for the UK cannot be understood, however, solely in terms of the demography of the UK. In an increasingly globalised world, we cannot suppose that the UK will be immune from the impact of global patterns of demographic change. Nor can the demography of the UK be understood apart from these same patterns of change.

The UK's past experience of mortality, migration and fertility is written into its age structure. Like the rest of the EU, it has moved from positive demographic momentum (growth) into negative demographic momentum (shrink) (though in practice mediated by inward migration). This *second demographic transition* is being mirrored in other parts of the world, particularly Asia as fertility falls from the replacement levels of classic demographic transition theory. A *third demographic transition* driven by international migration is also beginning to change regional and international population structures. It is currently uncertain how low fertility will fall in Europe and some of the more advanced Asian countries. A combination of further declining family size ideals, continued postponement of childbearing, and bio-medical factors affecting both men and women may well lead to fertility levels so far below replacement level as to have dramatic consequences for the social and economic structures of society. The recently proposed "Low Fertility Trap Hypothesis" assumes a bifurcation among industrialized countries under which the lowest fertility countries would see further fertility declines while another set of countries would experience stable fertility only slightly below replacement level. Alongside these lie new perspectives on mortality forecasting, which acknowledge that there is much greater scope for reductions in mortality at higher ages than previously acknowledged.

UK population change also needs to be seen in the wider context of globalisation. It is essential therefore to understand the ways in which global patterns of demographic change are likely to present both policy challenges and opportunities for the UK. A key question, for example, is whether we should expect demographic convergence to accompany socio-economic convergence and the role that migration has to play in this process. Yet, globalisation also needs to acknowledge the powerful dynamic of global ageing. As restrictions on the movement of human and financial capital around the world are eased, demographic change becomes a potent force for change in the global economy. Exactly how these changes will play out remains poorly understood, though some of the outlines are clear. Large shifts in national age distributions are likely to affect national saving patterns, capital requirements and international capital flows, particularly between the more and less developed worlds. The demand for health and social care workers in more developed countries is already increasing, and is set to increase further at the same time as the supply of younger workers will tighten. The implications for the host and source countries' welfare systems, and for the family and

social support structures in the source countries, are considerable. National provision of education, health and social care, housing, transport, and basic infrastructure will all be affected.

The future promises many similar scenarios across many different sectors of the national economy, with skilled labour being pulled out of the country as well as pulled in. The whole question of UK identity becomes important here, for example, the tension between multiple identities with allegiance to both source and host country, and between ethnic and national sentiments. Broader questions include to what extent can and should immigration mitigate certain negative effects of demographic ageing, what policies should be developed for better integrating these migrants, in particular young people, and how could the legislative and financial frameworks and incentives combat discrimination and promote integration of immigrants.

As the UK demographically ages, one of the main policy challenges is to enable individuals to maintain their health and productive capacity for as long as possible. We need to consider how the organisation of work be best adapted to a new distribution between the generations, with fewer young people and great numbers of older workers, to take into account the specific needs of different age groups; how parents' integration in working life can be facilitated and how they can achieve a balance between flexibility and security to bring up their children, to train and update their skills to meet the demands of the labour market. We need to decide what is an appropriate balance between investing in early education, and in adult and lifelong training schemes. There is also concern over the intergenerational contract and changing patterns of intergenerational solidarity as societies age.

Section 3: Uncertainties in the challenge area of Demographic Change

3.1 Uncertainties around the drivers of fertility

- **There is uncertainty about the future of human fertility** – especially in those countries which already have fertility rates below replacement level – as to whether it will continue to fall or to 'recover' and then stabilise at the kind of level that the UN assumes in its medium-variant projections.
- **It is uncertain how low fertility will fall** in Europe and some of the more advanced Asian countries.
- **Will low fertility countries fall into the Low Fertility Trap?** The "Low Fertility Trap Hypothesis" proposes that a combination of further declining family size ideals, continued postponement of childbearing and bio-medical factors affecting both men and women may well lead to fertility levels so far below replacement level as to have dramatic consequences for the social and economic structures of society. Some demographers (Lutz, 2006), for example, have suggested that countries with very low fertility could get stuck in a low fertility whereby social and economic adjustments by institutions and individuals would make it difficult for fertility to rise to replacement levels again.
- Do the new patterns of fertility in Europe suggest that we have moved beyond the former **relationship of fertility and female employment**? Cultural change has resulted in young women prioritising economic employment over childbearing, so that given the choice, a growing number will remain childless. Thus those countries which make it easier for women to combine economic activity and child bearing are seeing a rise in fertility, those in which it is still difficult to combine the two are seeing a dramatic decline.

    - For example, Southern Europe has both low fertility levels, and relatively low female labour force participation. In part this is because it is difficult for

mothers to maintain economic activity and thus many withdraw. In Italy, for example, where total fertility is approximately 1, only 60% of females aged 25-49 are active in the labour force.
    - This compares with the Scandinavian countries where 84% of women 25-49 are in the labour market in Denmark where fertility is 1.73. The experience of Sweden shows that extensive social policy measures to reduce the opportunity costs of having children, and help women to remain in employment after giving birth, maintains or even increases fertility levels.
- **How important a role is the postponement of childbearing?** This operates in two broad ways.
    - Firstly is the argument that current low fertility cohorts will eventually increase their cohort level though late reproduction.
    - Secondly it is asserted that postponement of childbearing reduces the actual number of children born. In England and Wales, almost 10% of the 1946-generation of women were childless by age 40. This had risen to almost 20% for the 1960-generation.
    - Lesthaeghe detailed analysis of five Western European countries (Germany, Switzerland, Netherlands, Austria, Belgium, and France) examines the influence of postponement on cohort fertility rates. This study points out that all six countries reached period total fertility levels of 2 or below (that is replacement) by 1975. From thence onwards a new pattern of fertility emerged, characterised by postponement at younger ages, with varying degrees of catch-up at later ages. Indeed, those countries in which current cohorts postponed first birth, had a rapid catch-up during their 30s, while those who had earlier first births had a much lower rates of births post-30. This thus accounted for the very similar period total fertility rates of between 1.3 and 1.7 for all five countries.
- **How does fertility relate to desired family size? The** European Commission in 2004 reported that Europeans would like to have 2.3 children on average, but they are in fact having only 1.5 children. In 2005 a second communication from the Commission states that European families do not find the environment in which they live conducive to child-bearing (European Commission, 2005).

3.2 Uncertainties around the drivers of mortality reduction

- **There are many uncertainties around the relationship of socio-economic status (SES) and mortality**
    - Is the association between SES and well-established lifestyle risk factors for cardiovascular disease and cancer the key to understanding differential mortality rates?
    - Are differences in lifetime access to the rewards and privileges of social life independent determinants of the mortality gradient?
    - At what stage in life are these various causal factors operative?
    - How important are childhood influences on future health or development in utero when compared with adult socio-economic status?
    - Does the social gradient in mortality persist into retirement and old age?
- **There are many uncertainties around the relationship of gender and mortality**
    - Although most scientists take the view that biological factors play an important role in explaining this sex gap in life expectancy there is as yet no consensus about the nature of the biological mechanisms involved (Austad, 2006, Luy, 2003).
    - Gender differences in lifestyle may be a strong contributor. For most of the century men were more likely to be heavy drinkers or smokers than women. It has been estimated, for example (Waldron, 1986, 1995) that

about 50% of the sex differences in mortality in heart disease can be explained by differences in smoking behaviour, and more than 90% of the differences in lung cancer mortality.
    - However Rigby and Dorling's (2007) study of mortality data for 22 countries over 150 years suggests that although cigarette smoking may account for the rise in excess male mortality for cohorts born in the first decades of the 20th century, it cannot account for the relatively slow improvements in mortality in younger males across all the rich countries of the world in recent decades.
- **There are uncertainties around the contribution of various diseases.**
    - **What is the role of decline in CVD/circulatory disease?** The contribution of declining mortality from CVD/circulatory disease to overall mortality decline has been significant over the past few years. It has been estimated, for example, that reduced CVD mortality added more than 5 of the 8.8 years added to life expectancy at birth in the USA since the middle of the 20th century (Cutler, 2004). In Germany, between 1962 and 2002, reduced CVD mortality accounted for about 60% of the increased expectancy life of both men and women aged 65 years (Klenk et al, 2007). In the UK, over the last ten years (1995-2005), the age-standardised mortality rate for CHD fell from 94 to 48 per 100,000; with death rates falling by about one half in both the 55-64 year age group and the 65-74 age group. However a recent analysis of trends in CHD mortality in younger adults – they appear to be flattening out – suggests that increases in obesity may be starting to offset the decline in other risk factors among younger cohorts (O'Flaherty et al, 2008).
    - **What is the role of decline in stroke?** Ten years ago there was not much evidence of declining incidence of stroke. Now, however, there is an accumulating body of evidence of reductions in age-specific incidence rates for both CHD and stroke (Goldacre et al, 2008) Certainly some of the decline in stroke mortality is caused by delayed onset, and reflects reductions in pre-morbid risk factors (Rothwell et al, 2004). In Japan, a dramatic reduction in stroke mortality is the main contributor to the increase in life expectancy at birth between 1970 and 2000 (Yoshinaga, 2005). In the UK stroke mortality has been declining more slowly than CHD mortality in recent years
    - **What is the role of decline in cancer?** Taken as a whole, UK age-standardised mortality from cancer changed very little in the second half of the 20th century (Quinn et al, 2001). More recently however, mortality rates have declined substantially (10-15%) among both men and women (Westlake and Cooper, 2008). Cancer incidence, however, declined by only 1% between 1993 and 2004, and it actually increased among women (with breast cancer accounting for much of the increase)
    - **If cancer incidence continues to increase will mortality still fall?** The fall in mortality from lung cancer is due mainly to a fall in the incident of disease. The fall in mortality from breast cancer in women and from prostate cancer in men has occurred in spite of increasing incidence. The fall in mortality from colorectal cancer is occurring against the background of stable incidence. Much of the fall in the incidence of lung cancer in men has been offset by a rapid and substantial increase in the incidence of cancer of the prostate.
- **What is the changing impact of healthcare on mortality?** Will it continue to have an impact? How much life expectancy can we expect to gain in rich societies without the intensive application of scientific medicine? It is argued that modern medicine is now the main contributor to ongoing mortality decline, and it is as a result of continuing improvements in medical care that we should expect

mortality reductions in the future (Cutler et al 2006). This was not the case in the recent past when emphasis was placed on nutrition and public health .

- **What is the role of drugs?** One recent analysis of the relationship between national variations in levels of pharmaceutical expenditure (within the OECD) and mortality estimates that a doubling of drug expenditures adds about one year of life expectancy to a 40 year old male (Shaw et al, 2005). The effect, they reckon, is comparable to what may be achieved by modest changes in smoking behaviour or in the consumption of fresh fruit and vegetables.
- **How much of the gains are due to cohort effects?** Sceptics about the likelihood of repeating over the next 50 or so years the reductions in late life mortality that were seen in the second half of the 20th century ask whether or not we should regard some of these gains as 'one-off' effects (Carnes and Olshansky, 2005). Willetts (2004) is one of several researchers who have looked at UK data and found strong evidence to suggest that people born during the period 1925-1945 have shown higher rates of mortality improvement at all ages than the cohorts born before them or after them. They are, on this view, a lucky cohort; they appear to have benefited from various social changes in a way that is unlikely to be repeated.
- **Can we ever eliminate cause of death altogether?**
    - Olshansky et al (1990) estimated that hypothetical cures for all circulatory diseases, diabetes and cancer would increase life expectancy at birth in the USA by 15.8 years for females and 15.3 years for males (beyond 1985 levels) – equivalent to a 75% reduction in mortality from all causes.
    - It was the sheer magnitude of this requirement that led Olshansky et al (2001) to reaffirm that life expectancy at birth was unlikely to exceed 85 years.
    - Olshanksy and Carnes (2004) argue that "a repetition of the large, rapid gains in life expectancy observed during the twentieth century is extremely unlikely" in this century without the technological capability "to slow the rate of aging".
    - Alternatively Oeppen and Vaupel (2002) have insisted that with the mortality data now available to us it does in fact seem more likely than not that we will see a repetition of the gains in the second half of the of the 20th century.
- **Can the gains in human longevity be maintained?** Will the increase in active life expectancy continue throughout this century? Are we reaching the point of diminishing returns? Mortality reductions in the oldest-old – the population over 85 – have shown no sign of slowing down in recent years. In Japan, annual mortality among female centenarians declined from 50% to 35% between 1975 and 2000 (Robine et al, 2003).
- **Does the data on the oldest old show any signs of a compression of mortality?** In an analysis of Japanese mortality from 1950 to 2000, Cheung and Robine (2007) show not only that there has been a strong and linear increase in the modal age at death over the last 50 years, but that the standard deviation of ages at death above the mode stopped decreasing in the mid-1980s for women and the 1990s for men. In other words, data from the country with the lowest mortality in the world show no sign of a compression of mortality.
- **Are there limits to longevity?** There remains a widely accepted common belief that there exists a maximum human life span of around 120 years. This has if anything been confirmed in the public imagination by the death in 1997 of Jeanne Calment,- a French women of 122 years - the world's reliably verified oldest living human. The fact that the reliably verified oldest man died around the same time at 115 also confirms another widely held belief that women are in some way programmed to live longer than men. There are thus a number of questions

concerning this pace of increasing life expectancy, and whether there exists a limit to the span of a human life.

3.3 Uncertainties around the drivers of migration

The United Kingdom had a net immigration of approximately a quarter of a million annually at the beginning of the 21st century. There is an inherent attraction for potential immigrants to the economically affluent countries of most of Europe, which as we have seen have relatively low levels of fertility. There are considerable uncertainties, however:

- It is uncertain as to whether migration for work will result in increased immigration or out migration of labour
- The role of environmental refugees in the migration flows to the UK are uncertain
- The ability of migration to mitigate the effect of population ageing over the next twenty years is uncertain.

In particular, the migration flows to/from/within the Central and Eastern European countries remain difficult to register, which is particularly frustrating as since 1989 there have been dramatic increases in migration flows within and from these countries. In the period 1960-1990, it is estimated that the annual average number of net migrations (officially recorded) from Central and Eastern Europe to western countries was less than 450,000 (Frejka 1996; Okolski 1998). By the early 1990s this figure is estimated to have reached approximately 850,000 (Garson, Redor and Lemaitre 1997).

Similarly, there are dramatic differences between countries in terms of levels of immigration and emigration but also between the levels of immigration and emigration for individual countries and thius is likely to continue. For example as we entered the 21st century, immigration levels exceed emigration levels in each EU country giving positive net migration in all cases. Only four countries – Germany, Italy, Spain and the United Kingdom – had annual immigration levels in excess of 250,000, with France at around 120,000 and all other countries less than 100,000. Only two countries – Germany and the United Kingdom – had significant levels of annual emigration with Germany losing approximately 500,000 persons and the UK just less than 200,000. In all other countries, the level of emigration amounts to less than 50,000 persons.

- **What is the role of migration in mitigating other demographic effects?** Many authors have considered the demographic impact of immigration in populations with below replacement fertility levels.
    - For example, Lesthaeghe et al (1988) show that for the twelve members of what was then the European Community overall population decline in the first part of the 21st century could be averted if immigration levels of approximately 1 million per annum could be attained.
    - Ulrich (1998), however, showed that even with relatively high levels of immigration, the German population would begin to decline in the near future.
    - Wanner (2000) revealed that without migration the Swiss population would decline to 5.6 million in 2050 rather than the projected 7 million.
- **To what extent can and should immigration mitigate certain negative effects of demographic ageing?**
    - Le Bras (1991) explored the consequences of post-war migration on the populations of a number of OECD countries and concluded likewise that only modest rejuvenating effects on the population could be observed. The average age of the population in these selected countries had been lowered by between 0.4 and 1.4 years as a result of immigration.

- **What is the role of migration on the labour force?** It is often assumed that international immigration rejuvenates the labour force and offsets age-related dependency costs, simply because immigrants are young economically active persons. However, contemporary migration experience does not support this assumption.
    - Coleman (1995) states that the cumulative effects of migration alone on the population's age structure had been rather limited because the age structures of immigrants and emigrants were quite similar and because the level of migration after all is quite small in relation to the size of natural change in the population.
- **Will skilled labour be pulled out of the UK as well as pulled in?**
    - Migration flow data are problematical especially with regard to emigration, which if registered at all is often underestimated (Salt, Singleton and Hogarth 1994; Salt, Clarke and Schmidt 2000).
    - In the case of the United Kingdom, for example, Coleman (1995) showed that post-war immigration simply neutralized the previously dominant pattern of emigration. Furthermore, without this immigration from the Commonwealth countries, and without the additional births of these immigrants, the population of the United Kingdom would have been 3 million persons less than was the case in the early 1990s.
- **What are the ways in which global patterns of demographic change are likely to present both policy challenges and opportunities for the UK?** A key question, for example, is whether we should expect demographic convergence to accompany socio-economic convergence and the role that migration has to play in this process.

3.4 Uncertainties around population ageing

- **What will be the impact of population ageing on the intergenerational transfer of resources?** Most countries in the world have developed public institutions for transferring resources and support between working generations to dependent younger and older generations. Population ageing is bringing about such large changes in the relative size of these generational groupings that policy-makers have to re-consider the operation of the institutions that channel public resources and support between generations. In addition, declining fertility affects the collective capacity of society to provide these goods and assist with the problems that face the ageing individual.
- **How will these trends develop over the course of this century?** In the developed world, for example, there are relatively large birth cohorts now in mid-life, that are longer-lived and have lower fertility than their parents. These three factors mean that their entry into old age will generate what is sometimes described as an 'age wave' or 'demographic shock' that will subsequently subside as smaller cohorts take their place. Old age dependency ratios will increase sharply as the consequences of rapid and large declines in fertility work themselves through the population. However, the continued increases in longevity, including potential radical increases due to new generation technological advances, accompanied by persistent falls in fertility, mean that the population structure of both the developed and developing regions may well dramatically alter over the course of this century.
- **There is considerable policy-relevant uncertainty.** Current assumptions on longevity, for example, may turn to be too conservative due, for example, to the speed of technological advance in biomedicine, or indeed, too optimistic due, for example, to the increasing prevalence of obesity. The extreme scenarios we now have to consider include the possibility that biomedicine will enable young

children today to remain active and healthy as centenarians as well as the possibility that their life expectancy will be less than that of their parents

- **What adjustments have to be made to a low-mortality and low-fertility future?** While policy makers recognise that they have to help their societies adjust to a low-mortality and low-fertility future, they are unclear as to how large these adjustments will have to be. The adjustments required in order to finance the additional consumption of longer-lived population under conditions of declining fertility clearly pose major allocation and distributional challenges.
    - As individuals we may be required to reconsider the way in which we allocate consumption and resources between different stages of the life course.
    - As societies, we have to decide how to allocate the burden of adjusting to demographic change across (i) different parts of the life course and (ii) different generations.
- **How will the powerful dynamic of global ageing affect globalisation?** As restrictions on the movement of human and financial capital around the world are eased, demographic change becomes a potent force for change in the global economy. Exactly how these changes will play out remains poorly understood, though some of the outlines are clear.
    - Large shifts in national age distributions are likely to affect national saving patterns, capital requirements and international capital flows, particularly between the more and less developed worlds.
    - The demand for health and social care workers in more developed countries is already increasing, and is set to increase further at the same time as the supply of younger workers will tighten.
    - The implications for the host and source countries' welfare systems, and for the family and social support structures in the source countries, are considerable.
    - National provision of education, health and social care, housing, transport, and basic infrastructure will all be affected.
- **How will governments and employers enable individuals to maintain their health and productive capacity for as long as possible?** The labour market will face increasing skills shortages and a large proportion of older workers, and will have to adapt to train and retain older workers. New cohort will expect and demand increasingly flexible working patterns. Home is likely to develop as a as a place of work, education and health care.
    - We need to consider how the organisation of work will be best adapted to a new distribution between the generations, with fewer young people and great numbers of older workers, to take into account the specific needs of different age groups
    - how parents' integration in working life can be facilitated and how they can achieve a balance between flexibility and security to bring up their children, to train and update their skills to meet the demands of the labour market.
    - We need to decide what is an appropriate balance between investing in early education and in adult and life long training schemes.
    - There is also concern over the intergenerational contract and changing patterns of intergenerational solidarity as societies age.

It is clear that population ageing will lead to hitherto unseen consequences:

- More generations will survive next to each other than ever before; people will increasingly pass income, care and support down as well as up through the generations

- **What will be the new forms of intergenerational solidarity** as intergenerational transfers and justice move to the fore of policy concern and influence the new ethics of our societies
- **How will individual life courses** change, both professionally and personally, as we recognise our personal longevity? Individuals will have to rethink their own personal life courses and when and how they wish to mix education and work
- **How will societal structure and organisation change to keep up with the new demographic reality?** We will move increasingly into second, third and even fourth partnerships with extended families of a complicated and demanding nature. The family as a supportive environment will change, though how is unclear. Communities will change both spatially and socially
- **How will social and economic behaviour adapt?** Consumption will vary between ages groups and generations and will not be the same as previous generations People's disposable income will need to be distributed between increasing leisure, education, health care, mobility, and other demands
- **How will infrastructure and services,** such as housing and transport, education and health care provision, adapt to a large percentage of older adults. needs and capacities?

Section 4: Trends in the challenge area of Generations and the Life Course which we can reasonably confidently expect to continue to 2025

In recent decades, Britain, like many countries across the developed world, has witnessed an evolving pattern of change in the nature of family structures, roles and relationships. In particular, there are significant demographic changes taking place that are having a direct influence on patterns of family formation, as well as on relationships between family members.

These include shifts towards fewer marriages, more cohabitation and more births outside marriage, increases in divorce, remarriage and reconstituted families, and an increase in the proportion of lone parent and smaller families.

In addition to these broad trends, population ageing and the extension of the life course point to a renewal of multigenerational family relationships, particularly regarding the role of grandparents.

It can be argued that *the* major trend in current 21st century families has been transformation in relation to marriage. Today's family picture reflects a shift away from the married couple family that dominated for much of the 20th century. While it remains that over half of adults still live as married couples, their percentage is declining. Census figures over the second half of the 20th century show marked declines from 68% in 1971 to just over 50% in 2001. Alongside this, and as in many European countries, the average age of marriage has increased. Parenthood is also occurring later. Kiernan (2004, p118) has shown that in the mid 1970s, the average age of first time brides in Britain was clustered in the 22-24 years old range, whereby by the year 2000 they are clustered in the late 20s, predominantly at age 27. It should also be noted that this masks considerable variation in the age of first time mothers by social class and education.

One of the important drivers behind these trends is the concomitant rise in cohabitation, which doubled between the 1991 and 2001 censuses. While men and women living together outside marriage is certainly not new, there are clear rises in incidence since the 1980s in young people living together for sustained periods either as a precursor or instead of marriage. A proportion of cohabiting couples are same sex couples. Since the Civil Partnership Act came into force in January 2005, there have been over 20,000 such

partnerships. The number of people living alone has also more than doubled between 1971 and 2005, from 3 to 7 million (Social Trends, 2007).

One change which has received much political and media attention, and which also forms a central aspect of arguments around family breakdown, relates to patterns of divorce. In Britain, rates of divorce have increased steadily since the 1970s culminating in the current disbanding of around 40% of marriages (Harper, 2003). Although, as Harper (2003) goes on to state, this is counterbalanced by the fact that those marriages that do not end in divorce will be longer because of increased life expectancy for both women and men. Accordingly, divorce, along with the greater degree of children born outside marriage, has contributed significantly to changes in household and family composition. On one hand, the proportion of children living in lone parent families in Britain more than tripled between 1972 and 2006 to 24% (Social Trends, 2007). On the other hand is the rise in the number of step- and reconstituted families. Although precise figures are difficult to come by, there is little doubt that numbers have been growing as a consequence of divorce and remarriage (Allan and Crow, 2001).

Demographic changes along with new family forms are also impacting upon the position of older people within families. It is increasingly argued that families will be increasingly characterized by multigenerational bonds beyond the household, particularly between grandparents and grandchildren. Recent UK figures suggest that around a third of the population are grandparents and will remain so for an average of 25 years (Harper, 2005). Moreover, three-quarters of the UK population will at some stage attain grandparenthood (Dench and Ogg, 2002). With the expansion of the grandparent role across the span of an individual's life, it is likely to occur while people are still engaged in numerous other social roles including work, associational and other family roles. In the United Kingdom, this context is reflected by current policy concerns over the role of grandparents (Dench and Ogg, 2002), particularly around childcare (Wheelock and Jones, 2002) and as a resource allowing lone mothers greater participation in the labour market (Harper et al, 2004).

Taken as a whole, these trends illustrate the point that ever fewer people live in a household characterized in terms of a "simple" nuclear family comprising of a heterosexual couple and their two dependent children. In attempting to make sense of the increased diversity and fluidity in family relations, at least two key ideas from family sociology emerge – "individualization" (Beck and Beck-Gernsheim, 2002) and "negotiation" (Finch and Mason, 1995). According to the individualization thesis, individuals, over the latter half of the 20th century have been gradually emancipated from traditional norms and, as a result, are able to exert a greater degree of control over their lives. This may be reflected in changing normative understandings about when the "right" age to marry is, about greater sexual freedom, challenging gender norms, and increased opportunities for educational, labour market and social mobility for women. Evidently there is much more flexibility in becoming a couple and whether people co-reside. Younger people are marrying less and are doing so at older ages. There also appear to be more choices around family and work, albeit choices which are gendered. People are far more able to choose the kinds of intimate relationships that are important to them, and are more likely to end them if they no long accord to their personal preferences and objectives.

Increasing numbers of families live with the reality of their members being dispersed across a wide geographical area. Research has shown that geographical distance between older parents and their adult children has, on average, grown over the past decade or so, in response to growing demands for a geographically mobile workforce in the wake of globalisation (Hoff, 2006b). Young families move where jobs are – from rural areas across Britain to the metropolitan hubs of London, Birmingham, Manchester,

Glasgow, or Edinburgh. Although still a rare exception when seen in relation to the total population, growing numbers of highly-qualified workers have moved abroad.

4.1 Families will continue to change in size and extent. The relationship between household and family will continue to evolve; family roles and relationships will continue to evolve and be substituted by both kin and non-kin.

- **Postponement of life transitions.** A combination of factors has resulted in contemporary Europeans delaying a number of life transitions, which has knock-on effects for other life transitions. Young adults are on average leaving the parental home later than in previous cohorts, forming their first stable adult unions later, are getting married later, and postpone the birth of their first child.
- **Marriage/divorce.** Parenthood has become increasingly detached from the institution of marriage. Marriage rates have steadily decreased in England & Wales since the early 1970s, from about 420,000 in 1970 to 275,000 in 200. The declining popularity of marriage was accompanied by a trend towards postponement of marriage. Not only have the absolute numbers of marriages declined over that period. An increasing number of existing marriages were prematurely dissolved through divorce and this is likely to continue.

The above-described changes in the age structure of the population and in family formation have resulted in subtle changes of intergenerational relationships within the family.

The combination of an extended lifespan and the existence of fewer family members due to lower fertility have resulted in a narrowing of the more recently born generations and a verticalisation of family structures, which were dubbed 'beanpole families' (Bengtson, Rosenthal and Burton, 1990). "Individuals will thus grow older having more vertical than horizontal linkages in the family." (Harper, 2006, p181).

Children and parents can now expect to live in very long-term relationships, spanning half a century or even more. Recent research found a number of positive effects of increasing longevity on intergenerational solidarity (Bengtson, 2001; Silverstein, 2006).

On the other hand, the above-described trend towards increasing geographical distances between ageing parents and their adult children diminishes the potential for instrumental support (Shelton and Grundy, 2000; Hoff, 2006b).

Grandparenthood has been influenced by these changes in a complex manner. On the one hand, longer life has heightened the likelihood of grandchildren having four living grandparents at birth, as well as at the transition to adulthood. The percentage of Americans having at least one grandparent when the grandchild reaches the age of 40 has increased from 1% in the year 1900 to 21% in the year 2000 (Uhlenberg and Kirby, 1998). The other side of the coin is of course that grandparents see their grandchildren growing up, in many cases having children of their own.

On the other hand, declining fertility has resulted in fewer grandchildren: in the US, the number of grandchildren per woman has declined from about 12 in the year 1900 to about 6 in the year 1980, with a further declining trend (Uhlenberg and Kirby, 1998). The combined effects of rising life expectancy (more years spent with grandchildren) and falling fertility (fewer grandchildren) may even have unexpected side effects, such as fit and wealthy grandparents competing for the attention of fewer grandchildren (Uhlenberg, 2005).

4.2 The complex adaptations required at both individual and social level as reconstituted family structures become the norm will continue.

Plurality of family forms. 'New' family forms include lone parents, cohabiting couples with children, families 'living-apart-together', and so-called 'patchwork families' or 'reconstituted families'. 'Patchwork' or 'reconstituted' families provide an excellent example of the growing complexity of family life – they refer to the combination of more than two family networks following separation/divorce. Individuals may end up having children with partners from different relationships, with each adult union adding a new set of relationships with members of another family network while (at least to some extent) trying to maintain contact with those from previous relationships.

These trends towards plurality of family forms have influenced the relations between ageing marriage partners, old parents and their adult children, and between grandparents and grandchildren. Although couples may have the chance to grow old together, there is a higher percentage of divorce at advanced age than before. Consequently, relationships with children have changed as well. Older parents may have relationships with biological as well as with stepchildren. This may result in a larger variety of parent-child relationships, but could also imply decreased reliability of support at times of need. Grandparents may become more important to grandchildren when parents separate. Grandparents' rights to maintain the relationship with their grandchildren after divorce has become a hot legal issue, arguably to be considered in divorce settlements (Ferguson, 2004). The rising proportion of single parent families has lead to more responsibilities for grandparents in respect to financial transfers and (grand-)child care provision.

Childlessness. Another challenge to family life is the growing prevalence of childlessness. As many as a fifth of Americans aged 65 years and over is without spouse and child and this looks set to continue. (Dykstra and Hagestad, 2007a). Although childlessness has become less stigmatised than in the past, people without children still have to justify themselves for not having children. "Stereotypes suggest that those who remain childless in marriage are avoiding social responsibility and are being self-indulgent." (Dykstra and Hagestad, 2007a, p1284). The pathways leading into childlessness vary. People can be without children for very different reasons – involuntary or as a matter of choice and the timing of life transitions is crucial for having children. Postponed lifetime transitions have knock-on effects and effectively blocks second chances for having children. In addition, childlessness makes more of a difference in men's than in women's lives, ie the differences between childless men and fathers are more pronounced than those between childless women and mothers

4.3 The immigration of foreign-born workers and their families to the UK is a trend which appears set to continue in some form.

As a consequence, transnational family relations have become a reality of family life in Britain. Long-distance relationships between ageing parents and their adult children, as well as their grandchildren can still be maintained thanks to communication technologies (telephone, email, VoIP, etc.). But such relationships are different from face-to-face contact and cannot substitute physical contact. Moreover, long-distance family relations change the nature of family solidarity. Whereas financial or emotional support do not require physical presence and can be provided across long distances, instrumental assistance can no longer be given by the family.

4.4 Generations

- The eroding of conventional intergenerational superiority will continue as children as well as young adults question the rules laid down by older adults, in particular given possible differential cohort psychological development. Individualization,

the priority of the individual over the collective, enhanced by technological advances may well move down through the age groups to very young children.
- New digital technology will continue to enable and encourage individualization and introduces a complex array of peer and other reference groups beyond the traditional hierarchy of parent and teacher.
- Generational cooperation and competition will continue in some form, though this will probably be modified as the blurring of boundaries between individual identities continues.
- Technology and communications, differential access to social capital, urbanization, labour market factors and health technology, will continue to impact upon including intergenerational relationships in both the private (family) and public spheres.
- It is clear that future cohorts will continue to be different from present ones. However the influence of life course factors on modifying cohorts behaviour is unclear.

4.5 Life course

- The fixed boundaries between childhood, adolescence, young and older adulthood will continue to blur along with other identities, however scientific knowledge of development may introduce new boundaries.
- The increasingly complex worlds and the collapsing of life stages away from current chronological barriers will continue to allow individuals to adopt a more extensive perspective across the life course.
- Technology and communications, differential access to social capital, urbanization, labour market factors and health technology, will continue to impact both upon individual life experiences and upon the contexts within which we experience these.
- The development of social and cognitive skills in childhood is likely to remain crucial as a foundation for all other types of learning across the life course.
- Our understanding of mental capacity, development psychology and how this is being affected by interaction with the new digital world from a very early age, will increase in the light of new scientific advances,

4.6 Identity

- Identity boundaries - gender, cohort, generation, age, race, ability, health, capacity - will continue to blur
- At the other end of the spectrum, poverty and social inequality may increase for those groups unable to access such capital, or new technologies may eradicate the social inequalities we see today.
- Inequalities drawn along new lines – gender, cohort, generation, age, race, ability, health, capacity – may arise, or be removed.
- Adulthood will continue to be a time of luxury to delay transitions into responsibility. This gives more time to explore and expand each life stage and the demand for education to help fulfill these desires may increase.
- Negotiation will continue. Coupled with the notion of "individualization" is the idea of "negotiation". Relationships between men and women, parents and children, to a greater degree involve negotiation. Families are not simply "givens" but need to be worked at, particularly when who is and who is not "family" is fluid and subject to change over time.
- Relations between parents and (adult) children will continue to be increasingly characterized by democratization, mutual agreement, respect and reciprocity and disclosure of information. Like individualization, the breakdown of ascribed social norms, provides a degree of space within which to negotiate.
- Multi-generational relationships will move to such patterns of negotiation. The current generation of grandparents are healthier and wealthier in their later life.

This provides opportunities for them to develop meaningful and reciprocal relationships with their children, not least around education and learning. However, these bonds, whilst strong, still require negotiation. Most grandparents want to help out, but they do not necessarily want to be providing child care on a full time basis. This is exemplified in recent debates around grandparents' rights as well as grandparent support groups offering advice as to how establish ground rules with parents around childcare.

- Despite the differences between them, all ethnic groups, including South Asians, are viewed as moving towards the "modern individualism" end of the continuum, with lower rates of marriage and higher rates of cohabitation and single parenthood, albeit at different rates. Berrington (1994), over a decade ago, finds that whilst almost all Asians do get married, the second generation are marrying later than their parents, suggesting some assimilation in patterns towards those of the white population. Arranged marriage is a common form of marriage amongst South Asian groups. However, these patterns are also impacted upon by "western" notions of individual choice, with the individuals who are marrying being given more opportunities to influence partner selection than previously (Crow and Allan, 2001, p60).

4.7 The Role of Science and Communication Technology in Shaping Contemporary and Future Family Relations

Developments in communication networks and information technology are already shaping family relations, not least amongst minortised families dispersed by international migration. The rising availability (and affordability) of air travel, telecommunications and other new digital forms of communication are further encouraging the development of transnational ties on a global scale. This is occurring, however, not just amongst those with a history of migration, but amongst a wider range of families whose children, siblings, parents and/or grandparents are living and working for varying amounts of time abroad.

In some families, we will see the internet and other new and advanced telecommunication systems acting as a principal means by which family members and friends establish frequent and regular contact. Recent developments such as SKYPE and VONAGE may be responding to, as well as normalizing, these demands. SKYPE claims to have 309 million registered members worldwide and 12 million users at peak times (BBC News, 2005). Like SMS messaging previously, SKYPE is becoming part of the everyday terminology of family and friends. Again the availability and affordability of this software is key. Increasingly these facilities will be used by both children and parents to contact each other.

One tangible impact of technology on family life is the shift in the work-home relationship. For example, as a result of digital forms of communication people are increasingly able to take their work home, and to combine working from both office and home to suit their family and caring obligations. This has become a particular trend within dual earner families. It conversely may lead to a colonization of family space and time by work space and time, for example in "mum is working" times or working during the post-bedtime shift. At certain moments, the space between working and not working becomes blurred, for example, internet searching, reading newspapers and magazines. Work and family domains are also blurred by the expectation, generated by these technologies, that individuals are, and should, be available all the time.

There will also be transformations in the relationship between emotional closeness and physical contact. Family members scattered across continents will view themselves as emotionally close because they are making the effort to stay in touch despite their considerable spatial barriers. In turn, the possibility of video calls, which already account

for a quarter of all traffic on SKYPE, could change the way in which family members perceive and understand intimacy and the link between physical contact and emotional closeness. It is interesting to note that people who use these facilities regularly will use terms and phrases like 'intimate', 'close', 'just like being in the same room' to describe these forms of communication.

The rise of more democratic forms of parent-child relationships means that children are having an even greater interest and input in decision making. New forms of digital communication will represent a key medium through which these decisions are made. For example, parents may already be encouraging the purchase and use of mobile phones by their children at a young age to the extent that they allow them greater control and monitoring of the children's activities and whereabouts. They may allow parents to act as "virtual chaperones", monitoring activity and safety within an increasingly "risky" environment. On one hand they imply more equal partnerships. On the other, the control and monitoring of children's behaviours may be extended, beyond the physical, at the virtual level.

Section 5: Uncertainties in the Challenge area of Generations and the Life Course

Inevitably, visions of possible futures will draw selectively from the range of evidence available. Any predictions around the particular direction that families will take are questionable to the extent that they overlook the scope for diversity. Furthermore, the degree to which current trends represent sharp qualitative breaks with the past is highly questionable. In focusing primarily upon change, we risk overlooking significant consistencies and continuities that would be equally important in understanding how families in the future will unfold. However many questions remain.

How might the different trends interact? While there is more scope for ethnic diversity within families, the cultural effects are not certain. It is not certain, for example, to what extent immigrant groups will become assimilated and acculturation will take effect so that the values, the culture and the customs merge with the majority population with time. Conversely, some communities might retain a strong heritage cultural identity. There may be further tensions in retaining identity if family members are dispersed geographically because of economic demand and globalisation. How will family members continue to balance conflicting demands, and will families remain as coherent cohesive units? We do not know whether grandparents will continue to have the time for childcare and that special bond and, for that matter, whether grandfathers rather than grandmothers will have to play a greater role.

Will the move to individualisation continue? Future generations of families may not continue to move towards "modern individualism". This is especially the case with minority populations who may not continue to assimilate to the norms and values of the host society. As has been noted, close transnational links may actually be increasingly sustained by both the greater social mobility of young Caribbeans and South Asians in Britain, as well as by further developments in communication technology.

Will families continue to be rooted in a local place? If these trends around the globalising of family relationships continue, then one would expect individuals and families to be less rooted around local place, and in relation to the communities in which we were born or grew up. They will involve the maintenance of ties across greater distances between Britain, Europe and the world.

What will be the impact of globalization? There has also been a parallel rise in the importance of the local, the increase in ethnic group solidarity and different forms of

project identity which emphasizes active family and community togetherness, not free floating individualism. In this sense, physical contact may become even more rather than less salient in the form of family gatherings, celebrations and the passing on of traditions and rituals. The global fascination with genealogy and family trees may stem from the need for self-understanding and belonging in a globalizing world where identities can become easily blurred and where choices seem overwhelming.

Will there be a decline in the importance of family? That family responsibilities based on ascribed traditional norms of responsibility can no longer be assumed is only one side of the story. What all the research evidence shows is the considerable hard work, time and effort people put into maintaining their connections to other family members across boundaries and differences and who may live in other countries. Rather than changes driving people apart, making the family more fragile and people more self-focused, we see people continuing to invest considerable energy and value into their personal relationships. As the boundaries of family life become more complicated, we see a greater emphasis upon the communication and "display" (Finch, 2007) of familyness, as the means by which families are established. We also see more attempts to seek out family histories through genealogical software and historical societies, and an interest in resemblances and heritability (Mason, 2008).

Will mainstream changes in British society also impacting upon minority families? Is their influence more or less similar or different to that identified within majority families? Currently those families headed by a person of non-white ethnic background are much more likely than white families to have children living with them. Nearly 80% of Bangladeshi families had dependent children compared to just 40% of white families. Bangladeshi and Pakistani families tend to be larger than families of any other ethnic group. Mixed, Black Caribbean and White families with dependent children had the largest proportion of cohabiting couples, but cohabitation is less usual amongst Asian and Chinese populations. In turn, over 45% of Black Caribbean, Black African and mixed families were headed by a lone parent, compared with 25% of white families. According to the 4th National Survey of Ethnic Minorities in Britain (Modood et al, 1997, Berthoud, 2005), only 39% of Caribbean adults under the age of 60 are in formal marriages compared to 60% of white adults under 60. Conversely, South Asians are characterized by higher rates of marriage with around three-quarters of Pakistani women in partnerships by the age of 25, compared with about two-thirds of Indian women and just about half of African-Asian and white women (Berthoud, 2005).

Will minority ethnic families follow the path of "individualization" (rising patterns of cohabitation, divorce, less children, lone parenting) that is seen to be characterizing white majority families? Berthoud (2005), for example posits a single scale running from "old fashioned values" to "modern individualism" as a way of interpreting ethnic variations with Pakistanis and Bangladeshis at the traditionalistic end and Caribbean's at the individualistic end and ahead of whites. Berthoud goes as far as to say that "the Caribbean family, in the traditional sense of a Caribbean man married to a Caribbean woman, may be dying out" (2005, p249). In contrast, South Asians remain strongly adhered to "old-fashioned values" with very few people cohabiting from an Asian ethnic background. This said, whilst South Asian adults are less likely to be living outside marriage, there is and has been a good number of Indians, Pakistanis and Bangladeshis living alone temporarily due to migration processes which go unreported in surveys. For instance, men may be separated from their families by lengthy immigration procedures and in these cases women may become *de facto* lone parents for several years and, as a result, not in receipt of the support and benefits available to them.

Will ethnic minority families continue to differ in relation to norms of responsibility towards older family members? Currently among some of Britain's Asian population in particular, greater priority is given to parental ties in adulthood than to partner and children. There is much more sharing of the home across three generations, often in the form of common housekeeping. Multigenerational ties, both within and beyond households, have particular resonance amongst South Asian families, and to an extent, Chinese families, in which couples continue to live with their parents after starting their own families. For example, around two-thirds of British resident Indian elders live with one of their adult children, compared with just 15% of white elders (Berthoud, 2005). However young Asian families tend to live more often with the father's rather than the mother's family, meaning that, unlike the dominance of maternal grandparents commonly observed amongst whites, it is the widowed paternal grandmother who is most likely to live with the family.

How will technology affect family relationships? While we know that technology will form an increasingly important role in how family members communicate, there remain uncertainties as to the extent of this change, how it will affect the nature of relations, and the meanings people ascribe to family life. How will potential technological developments by Google around live satellite pictures at street level shape this? How are new forms of communication shaping the democratic openness of how monitoring and supervision works in families?

What role will technology play in how people form relationships? Do they produce necessarily more fragile relationships? Will they enable people to sustain relationships that would otherwise breakdown and end? Families are creating a 'networked' sense connectedness, for example, by making and sending videotapes and emailing distant relatives, family histories recorded and distributed across the globe. These are already occurring, but we see them happening on a much grander scale, leading to more fundamental shifts in what being intimate and being close means.

How will work patterns affect what goes on within families? Apart from the possibility of a longer active life having career implications, the demands of the labour market in response to shortages of particular skills will mean that patterns in work, training and education will change when viewed from a life-long perspective. The blurring of boundaries between living, working and learning currently experienced may continue to progress; particularly as new technologies and mobile communications and global business practices can keep people electronically connected at all times of the day and night regardless of whether they are at a place of work, home, or on holiday (Harrison, 2008). Perhaps the biggest challenge to families in relation to this context is managing the balance between work and leisure – or, indeed, a new order of family life. Although flexible working patterns could assist this process there is also the possibility that the more traditional opportunities for family and intergenerational interaction, such as in the evenings and at weekends, may disappear.

How will developments in flexible working conditions impact upon family life? On one hand, they may provide people with choices in order to resolve work and family conflicts, allowing more and more people work from home and in locations that allow them to combine responsibilities. On the other hand, they may encourage employers to put even more pressure on workers to work further away and spend more time away from home. These developments will undoubtedly impact upon domestic gender divisions and decision making processes within the family. Time pressures can lead to stress for working parents and how people negotiate work and family roles becomes an increasingly important issue.

Section 6: The potential future challenges or opportunities these trends and factors might present for education.

The 'knowledge society' produces new knowledge at ever-increasing rates, within ever-shorter periods of time. As a consequence, previous knowledge is getting outdated and is devalued at a rapid pace. Skills and knowledge have to be refreshed every couple of years. Professional qualifications obtained two or three decades ago do no longer guarantee a job. Increasing global competition adds to uncertainties about future career prospects. The emergence of these new risks demands new solutions.

The best coping strategy to survive in this uncertain social environment is life-long learning. Life-long learning is required to continuously adapt one's skills and abilities to a rapidly changing environment. Life-long learning also helps to adapt to changing labour market demands, which may make certain qualifications obsolete and offer opportunities for others.

Therefore, early education in the parental home as well as in nurseries and pre-school facilities lay the foundation for future success or failure. Failure to acquire basic educational skills, including learning how to learn, will result in reduced life chances, and ultimately deprivation and social exclusion throughout the life course. A forward looking educational policy should therefore invest maximum effort at the early stages of life to equip everybody with the tools for life-long learning. Furthermore, people who did not get this opportunity during their school years need to be offered specific training for acquiring these skills. This is precondition for realising the full benefit of life-long learning as an adaptation strategy throughout the life course. Educational investments in the early years of life will reap the highest returns throughout the life course, eventually also working to the benefit of older people.

The internet is an example that shows how new technologies can be used to the benefit of older adults, if they are educated and trained in using it. The internet has the potential to smooth the transition into older adulthood, and much more so than the invention of the telephone, since it "…allows expanded opportunities for communication, accessing information and resources, and performing routine activities such as shopping." (Czaja and Lee 2007: 241) Internet can help to mitigate social isolation – particularly for people from isolated rural areas and with transport issues – by making communication with friends and family easier, as well as engaging with internet communities. A recent European study shows that grandparents are partly using the internet for keeping in touch with their grandchildren – but only if they live a long distance away (Quadrello et al. 2005).

Moreover, the internet can enhance educational and employment opportunities for older workers by enabling them to access work-related information without physically being in the workplace, thus offering new options of working from home. The internet gives easy access to health care information, and to infrastructure (e.g. banking, shopping, or libraries) not easily accessible otherwise, which would particularly benefit people living in remote areas or suffering from physical impairments. In short, educating older people to use the internet carries all the hallmarks of 'successful ageing', in particular in rural areas.

6.1 Intergenerational Learning

Another form of learning – intergenerational learning – can become part of the answer as well. Until today, most intergenerational learning still takes place within the family, where thanks to ever rising life expectancies grandparents and grandchildren can engage in leisure activities very different from the past. What is new, however, is the idea that intergenerational learning works in both directions (Luescher and Liegle 2003). Not only

do parents and grandparents educate their children and grandchildren – children teach their parents and grandparents too. Common examples refer to the use of internet and computer technology, mobile phones and how to write text messages, how to download music from the internet and to transfer it to a MP3 player, etc. But the exchange of skills and knowledge goes well beyond such everyday examples. Grandparents were identified as guardians of family history (Reitzes and Mutran 2004) who pass on this knowledge to the younger generations. Grandchildren, on the other hand, share their view of the world with the older generations, thereby helping grandparents and parents to keep up with new developments in our rapidly changing societies.

The emergence of new family forms and increasing numbers of single and childless households have resulted in public concern about the future of intergenerational relations. Intergenerational projects run by voluntary sector organisations can play an important role in educating older people in using the internet/computer technology. As examples from all across Europe show, young people are only too often happy to volunteer teaching older adults these skills (examples of such projects can be found in Hoff 2008).

Life-long learning has become the key to continuous adaptation of people of all ages to ever-changing demands in the labour market. Precondition for success are specific skills – the skills of learning how to learn. It is one of the main challenges of our dynamic knowledge societies to transfer such skills to older and younger workers alike to avoid the persistence of old or the emergence of new social inequalities. Intergenerational learning can make a significant contribution to the transfer of such skills – in families, in the voluntary sector and in formal education. What is needed in future is intergenerational co-operation rather than intergenerational conflict. In the workplace, age-integrated work teams of older and younger employees working together appear to be best suited to provide the required mix of skills and knowledge (Boersch-Supan et al. 2005).

Intergenerational learning is also an essential precondition for the preservation of local knowledge, such as local history or rare craft skills (Hoff 2007). Such local knowledge can be re-vitalised and used to a local community's advantage, for example, by creating tourist attractions. But it also helps scientists to better understand the evolution of domestic animals or technologies – to mention only a few examples. In some cases, this can lead to new employment opportunities. Yet the relationship between local, traditional, lay, and expert knowledge is a very complex and dynamic process, as the local knowledge is embedded in the local context.

In short, education policy will have to be adjusted catering for the needs of an ageing society. This implies a change in the ways of teaching for all generations, not just for the older ones. Learning how to learn would enable individuals to help themselves throughout their lives, thus reducing reliance on state support and public expenditure. Additionally, teaching curricula for students of all ages will have to be changed in the light of the current transformation of Britain into an ageing society. Among many other things, this could include information on older people's specific needs, the benefits of intergenerational interaction, the reconciliation of employment and care for older as well as for younger family members. Education in an ageing society would also mean making sure that professionals working with older people are appropriately trained in using state-of-the-art technologies like the ones described above. Likewise, people working in care for many years already should be offered the chance to update their knowledge and skills on a more frequent basis than commonly practice. In the long run that could – and ought to – result in caring becoming a more highly-qualified occupation.

Intergenerational learning, the intergenerational *exchange* of knowledge and skills, as well as adjusting school and training curricula to the needs of an ageing society can become a vital adaptation strategy for young and old in the knowledge society. A mix of experience and openness toward new developments is most likely to generate this adaptability. The young, the middle-aged and the older improve their employment prospects by learning from each other and by teaching each other, thus sharing their specific strengths. This intergenerational exchange influences the employment chances/choices and the working capacity of all generations, individually and at the workplace, and thus the potential of our societies for generating economic growth.

6.2 The family and intergenerational learning

The family can be a hub of mutual support, influence and learning in a multitude of ways. Although some of these may be systematic and intentional, much of what may influence each family member can be informal and incidental. Shared values, expectations, aspirations, knowledge, beliefs, skills, behaviours and the language we use develop around the variety of domestic activities that family members engage in. These activities can range from playing together and talking to each other about each other to more specific pursuits such as sport, gardening, reading, shopping and watching TV. We are also living at a time where new information and communication technologies are finding their way into homes and lives at many different levels.

In one sense it is easy to characterise the role that older family members can play in handing down knowledge and wisdom as if these are fixed entities that can be passed down through generations. While certain skills and knowledge may be passed from one generation to the next, other things are continually changing. Not only are we living at a time of rapid scientific and technological development but we are also living at a time of rapid social and cultural change. In turn the demands made by society change in relation to these and what is valued and seen as relevant can influence how each individual develops.

The phrase 'intergenerational transfer of learning' carries with it the idea that learning results from something that is transferred from one generation to another or, at least, a series of such acquisitions. Taken on its own this, of course, reduces learning to a quantitative increase in knowledge or procedures familiar to behaviourists; a one-way transaction thereby ignoring the agency of the learner. Constructivist or sociocultural approaches are well known in that they allow for learners acting on what they receive in their own way; building modifying and often discarding earlier mental structures so that learning can also become a way of seeing and understanding things differently; a qualitative change (e.g., Fosnot, 1996; Wertsch and Tulviste, 1996). Acknowledging this creative potential in the learner not only transforms the idea of learning and what can go on amongst family members but also what society contributes to families as well as what families can contribute to society.

Family members respond to each other; each in their own unique way. In view of this there is a contribution that all family members, regardless of their generation, can make towards each other's development as well as to the family as a whole. Even if a more experienced other plays a scaffolding role (Vygotsky, 1978) so that with this assistance a task can be carried out by a learner that would otherwise not be attempted successfully alone there is still scope for mutually helpful collaboration. This is, for example, inherent in Rogoff's (1990) use of the term 'guided participation' which suggests a more active role played by children so they can collaborate with, as well as be guided by others. Intra-generationally, research carried out amongst siblings by Gregory (2001) suggests an evenly balanced interplay or 'synergy' where understandings can be developed mutually rather than primarily in one direction. If the idea of transfer is to be considered more generally in the family setting then, firstly, its scope as a multi-way

intergenerational phenomenon should be taken into account and, moreover, its relationship to learning considered in relation to a creative interplay or synergy.

The scope for intergenerational exchange and support between families can be seen to be compromised for children with lone or working parents, migration and economic relocation. In view of this there have been developments in provision aimed at purposeful extrafamilial support that do not rely on the family. Newman and Hatton-Yeo (2008), for example, characterise these in terms of either educating the young or being concerned with the welfare of older adults. In particular they focus on the teaching and learning roles that can be played by bringing together the different age-groups. The perceived benefits of this enterprise include shared learning positive attitudes among generations and social cohesion (ibid.). The underlying theory is drawn from Erikson's (1963) idea that parallel developmental needs of young and old result in a special kind of synergy between these generations. In view of this participants in intergenerational programs are usually populated by those who are younger and older while missing out a middle generation. The idea that a generational synergy can be developed outside the family setting is, of course, fundamental to such programs.

Dissatisfaction with the idea of learning as acquisition has been expressed by Hodkinson and his coworkers (Hodkinson, 2005; Hodkinson et al., 2007) who see this as separating the learner from the process of learning and what is learned. In particular, they argue that 'the processes and products of learning are deeply intertwined, and neither can be understood without considering the positions, dispositions, and identities of [the] learner' (Hodkinson et al., 2007: 14) with no clear separation between learning and identity. For some people, each is part of the other with learning not just about becoming but also about being. A more recent characterisation of this has been cited by Plumb (2008) in the phrase 'learning as dwelling'. Here it is also argued that learning is not about the intake of external knowledge into the mind of an isolated individual but a 'process through which learners forever weave themselves into the fabric of their natural, social and cultural worlds' (ibid.: 62).

A view of learning occurring as part of practice and the social interactions that take place in the associated settings has been developed by Lave and Wenger (1991). They argue a distinction between the approach to academic learning taken in schools or other education institutions and learning that occurs more naturally as part of day to day social activity. Academic approaches towards learning focus on representations of the world that have been abstracted from the real life setting where they would normally occur. These representations can then be manipulated theoretically and can be helpful in developing explanations and predictions about the world. As McCormick (1997) has noted, knowledge derived in this way is applicable more generally to a variety of situations whereas practical knowledge is limited to particular situations. While academic approaches can focus on more conscious systematic forms of teaching, by way of contrast learning may arise within the practice occurring in an everyday setting (Lave, 1989). In this way learners engage less formally from their own perspective rather than from an external perspective that might otherwise characterise a teaching curriculum. In this way learning is situated within rather than isolated from the practical setting and the social relations that form part of this (Lave and Wenger, 1991).

Learning also occurs within a community comprised of participants who make a range of contributions. A key point is that the contributions can be at different levels depending on those who happen to be participating in an activity where understandings and purposes are shared. Lave and Wenger (1991) use the term 'community of practice' in relation to individuals who participate in a common purpose and share understandings about their actions in relation to this.

The family can be likened to a community of practice in the sense that there is mutual support with members playing complementary roles in the practice of day to day living without any external systematic learning agenda. Even with children growing up as part of a family in business their early experiences of the social practice within the family and the knowledge and skills associated within this are inextricably linked (Hamilton, 2006). On some occasions what is shared and learnt can be more systematic and focused while in many other respects learning can be incidental and informal.

Families are not formal learning institutions and although they are populated in part by adults the learning space can be very different from the more uniform and target-driven demands that have to be managed within the confines of a learning initiative. If intergenerational programs and extrafamilial paradigms (Newman and Hatton-Yeo, 2008) are being implemented in response to a perceived deficit in some children's lives then a key challenge for the future is to preserve some of those qualities of the family learning space and the associated diversity.

In contrast to parents who are working and busy with a variety of day to day responsibilities, grandparents can spend more time with their grandchildren and develop a special bond (Weissvourd, 1998). Children and their grandparents each have their own vulnerabilities and were able to offer mutual support for each other. There is scope for a more relaxed and hands-on relationship when engaging in activities (Jessel et al., 2004). The home setting, can offer scope for a more evenly balanced learning relationship, or 'synergy' (Gregory, 2001) than might occur in more formal educational contexts. In particular, synergistic learning relationships may occur between children and their grandparents. This may give scope for reciprocal social relationships and joint interaction in learning and contrasts with the role of the teacher as controller rather than as learning partner (Bruner, 1985). In the context of the family, mutual trust and respect for each member's perspective (Rommetveit, 1974, 1979) is important to this process. The value given to an activity within a culture in which learners identify can also influence learning interactions (Goodnow, 1990).

Families can play a key role in the development of literacy. A parent reading books to children is an everyday part of life in many families. Although this can involve both mothers and fathers, it has been found that mothers tend to do this more (Nichols 2000; Connie and Sharen, 2004). Grandparents also make important contributions to their grandchildren's education (Strom and Strom, 1995) and with regard to literacy performance, grandparents' reading skills and practices are reflected across generations (Parsons and Bynner, 2006). This was also evident from the work carried out by Kenner et al. (2005). A further focus on the story-reading within Bangladeshi families revealed how the multiple worlds inhabited by a grandchild during story-reading were transformed 'syncretically' on a number of levels (Gregory et al., 2007). The idea of syncretism as a creative process where people reinvent culture, drawing on familiar and new resources is argued to be of central importance in that it allows for cultures to develop rather than remain frozen. This was evident within the books that were used, such as through the pictorial illustrations, as well as linguistically in the story reading (ibid.).

6.3 Ethnicity and Intergenerational learning

The increasing amounts of time children spend with their grandparents raises direct questions about education and its relationship to intergenerational learning that takes place within families as well as in schools (see also Gregory et al 2007, Kenner et al 2007). The role of grandparents can often alleviate the time pressures faced by working parents, and in certain situations may substituting parents' time investments in promoting children's education. While intergenerational transfers of time, care and money tend to work downward – from grandparents to grandchildren – the nature of

intergenerational learning is a reciprocal one. There has been anecdotal evidence for some time regarding how children teach their grandparents to use computers, internet and other technological developments.

We know that the family provide opportunities for frequent interaction between young and old, and this has become an important aspect within debates about age segmentation and segregation. A key area is to consider is the role of schools in fostering this. Evidence from intergenerational programmes also suggests that schools need to be more aware of the opportunities available for mutual learning between children and older people, and the wider societal benefits this provides. Changing attitudes towards older people, including grandparents, need to be recognized within educational and learning paradigms – not as conveyors of out-dated traditional forms of knowledge but as agents with skills and knowledge that compliment children's formal education.

Intergenerational learning also has particular implications for minority ethnic families and citizenship. Previous conventional understandings of citizenship had assumed that acculturation of minorities to the host society values was an inevitable process. The orientations of 2nd and 3rd generation migrants would be firmly orientated to the host society as opposed to the country of origin. Most of the UK research evidence has shown this to not be the case. The mutual learning that occurs between grandchildren and grandparents can also act to promote citizenship amongst older people. The current government has initiated a number of policies aimed at citizenship education and the better integration of new citizens to the UK.

Schools represent the key domain through which the state is able to actively foster national values to its citizenry. Yet as patterns of migration change, for example, people migrating during middle and later life, then citizenship education needs to be broadened, in order to form part of lifelong learning. To what extend will previous migrants, such as those who came during the 1950s and 1960s act as role models for more recent migrants of a similar age group? The adaptation of new migrants also requires a much broader notion of citizenship education – not simply with regard to civic values, democracy and Britishness – but less abstract forms of knowledge which impact directly upon their mobility – e.g. qualifications, labour market issues, entitlements and service provision, and issues to do with intercultural communication.

Globalization has extended and intensified the flows of migration between societies and this has been met with concerns over the integration and needs of the new and diverse migrants. A good deal of their societal adaptation can be learned from previous and existing migrants, thus there need to be spaces for mutual learning within civil society, for example, through community and adult education centres.

6.4 The role of new technologies

Although the parts taken by human beings as key players in family life have been outlined, there is another element that is finding its way into people's relationships: new information and communication technologies (ICTs). If we regard these solely in terms of such functions as storing and retrieving information and communication to others then they may not appear to be so new. However, what marks out the present day developments in this field are their portability and accessibility and affordability.

New technologies and family communication: The number of older as well as younger people using mobile phones and the internet to communicate has increased in recent years (Haddon, 2004; Age Concern, 2002; Mobile Data Association, 2005). Attitudes amongst elderly towards internet use have been found to vary from the 'users' who were open to learning something new regardless of their age and 'non-users' who

did regard age as an obstacle (Blit-Cohen and Litwin, 2004). Health factors such as deteriorating eyesight also marked out users from non-users. Active social communication was found to take place over the internet. The extent to which people own and use technology also has a bearing on the availability of social support. From their European study Mante-Meijer et al. (2001) found that in countries where the technologies have penetrated less there was greater reliance on settings where the relevant skills could be learnt formally. Informal learning, more evident in high-penetration countries, was found to take place in a variety of contexts such as within families and between work colleagues. Although Selwyn (2004) has found that the extent to which children influence their parents' take-up of computers was slight, children were able to play a more active part in this with their grandparents. The situation has, of course, been rapidly changing over the last few years as new technology has penetrated and proliferated. More recently, Gatto and Tak (2008) have reported increasing use by older adults of computers for communication as well as entertainment and access to information.

New technologies and family learning: Based on a survey of the views of parents of children from 3 to 5 years of age attending nurseries in Scotland, McPake et al. (2005) have identified three types of competence developed through the use of ICT: technical (basic operational skills), cultural (understanding of the social roles that ICT plays) and learning. The latter, seen to be of particular significance to young children, refers to their ability to use ICT for social and cultural purposes, including communication, self-expression and entertainment as well as their work. ICT was used in the home to support early literacy and numeracy, communication and musical skills, as well as in helping children learn how to learn. Importantly, the degree of competence children had acquired appeared to depend on such factors as access to equipment, support in learning to use it, and the particular interests and aptitudes of older family members. The authenticity seen to be afforded by technological activities can aid learning (Murphy and Hennessy, 2001). This has been followed up in the family context by Jane and Robbins (2004) who have also reported on the potential benefit of such activities to grandparents in that it allows them to revisit and explore technology in a new and fresh way as a result of interacting with their grandchildren. Kenner et al. (2008) noted the role of the computer as mediating artefact (Crook, 2001) and participant in learning activities with grandparents and grandchildren. In this context, however, the importance of the role of the grandparent in structuring the approach to the activities was also noted (Kenner et al., 2008).

The implications arising from the possible blurring in chronological divisions of education (Harper, 2008) for intergenerational learning are widespread. Segmentation of education may be less distinct. For example, the role of the university could become a more continuous one where people remain connected as part of a life long learning community. With regard to children's learning and development, another challenge is for teachers to know more about the learning that goes on within families so that they can learn from this as well as allow their own institutional approaches (which will be different) to interface in a sensitive way. This is still an under-researched area. While studies such as the Teaching and Learning Research Programme's Learning Lives (Hodkinson et al., 2008) have begun to contribute to the literature on the kind of learning going on throughout people's lives both formally and informally, further attention will still be needed in understanding the different kinds of learning, cultural practices and development taking place in a variety of out-of-school settings including the family.

Older people, of course, are not fixed entities. The older people of 2050 will have been the younger people of today who will have taken with them not only the practices we associate with young people today but also some of the attitudes to change and

flexibility that we may consider a hallmark of our time. Assuming the infants of today will be the elders of the future then, to survive as a responsive and flexible community in a changing world, what they will take with them into that future will not just be the transferred remnants of yesterday but also the ability to play their part in creating the culture of tomorrow.

6.5 A new education agenda

Ageing societies require the transfer of educational resources between young and old. There is a concern that in using national resources for education and training for older people, we may penalize the young. However there are demographic and societal reasons for such a transfer in resources. As the UK, like the rest of Western Europe moves to over half its population aged over 50 by 2030, so there will be a general transfer of resources from younger to older populations, these will include health, education, housing, employment etc. This will be matched by changing societal needs, as individuals adjust both to the reality of longer lives, and to the fluid life courses which are emerging at the same time.

- Life long education of adults will move to the fore along side early learners, and the division of education along chronological age lines will blur.
- Education is likely to be a mix of formal group teaching (akin to current early learning in schools and universities), self-promoted learning using information and media technology, community learning, work-place learning and skills development.
- It is likely to be pluralistically funded by individuals, communities, employers, governments, private enterprise.
- The separation of education to enable personal development, to enhance employability and career progression, to develop skills, and to successfully contribute to wider society is likely to disappear.
- Education is likely to continue through-out the life course enabling individuals to draw on a portfolio of options to personal development
- The role of "qualifications" will need to be re-examined.

The new demography and new social forces are likely to result in the move of life-long education of adults to the fore alongside formative learners. In particular the division of education along chronological age lines will blur. While there will always be a demand for formative education, it is now recognised that the education of adults, including older adults, is both intrinsically important and important for society as whole. Education gives people the chance to face the rapid changes in the society, in the labour market (particularly through skills upgrading) and in their personal and community life. It enables them to participate in complex democratic societies on all levels, and gives the society a chance to pursue its social and economic development supported by socially integrated adults of all ages. UK policy on education has been developed in the context of a traditional pyramidal population structure, and linear life courses, which result in a large investment by the individual in early year's formal education, and a rapid decrease in such education in young adulthood. The population ageing identified above, resulting in mature societies and elongated active lives for a growing number of the population, leads to the challenge of devising education for the new demography – both individual and societal. A new framework is required to cope with the following issues:

There appears a clear distinction between formative and foundation education.

- formative education
- education as a lifestyle-choice
- education to enhance employment prospects
- education to enable full citizenship
- education as a public health initiative

The Challenge team proposed that as the demands for education across the life course grow, so foundation education will be available not only during formative education, but also as a component of other types of education which might be taken at varying times.

Formative education: there will still be a requirement for structured formative education, but increasingly here there will be a mix of "teaching" and "group learning" with self-promoted learning using information and media technology even for the very young. The relationship between state and private structures for determining access to social and economic capital will remain blurred. Inequalities drawn along new lines – gender, cohort, generation, age, race, ability, health, capacity – may arise, or be removed. At one end of the socio-economic spectrum we may see the rise of the buyer as parental purchaser power comes to the fore and families with high economic and social capital increasingly buy out a new education agenda. At the other end of the spectrum, poverty and social inequality may increase for those groups unable to access such capital, or new technologies may eradicate the social inequalities we see today. Changing ethnic and cultural norms will increasingly influence society with implications for the status of formal and family based types of learning.

Education as a lifestyle-choice: new technology enables the blurring of leisure and education, education becomes a life-style choice enabling mental enhancement and enjoyment. As the relationship between mental capacity and physical health becomes clearer, so education will form a growing element of personal enhancement. Research indicates that mental development, brain capacity, and longevity are closely associated, so education contributes to active health life. Life long learning and adult education cannot be developed within standard models of delivery but requires more flexible approaches. Older adults are more diverse than younger adults. Alongside standard variables of gender, class, ethnicity etc, older people have accumulated a variety of other biological, psychological, historical and social attributes which are unique to their personal life histories. This will structure the resources they have access to (social, biological, cultural, mental and economic) and the frameworks within which they make decisions. The UK government policy has tended to think of demographic ageing as leading to large numbers of old people, rather than large numbers of people who are simply living longer, many of them with increasingly active healthy lives. Conceptualized in this way, mature societies provide the opportunity for the first time for multi-generations to live and work alongside each other, contributing their own experiences and expertise. As people age throughout their lives they accumulate a wealth of experience, knowledge, skills, memories, wisdom and creativity. Life long education opportunities provide for this wealth to be distributed throughout our society. Within this frame, education across the life course may become a social responsibility, either through enlightenment, or through evidence that life long learning is having significant health and well being effects

Education to enhance employment prospects: our traditional thinking of skills upgrading and employment will change. As new cohorts enter the workplace, they will increasingly be accustomed to regular/continual skills upgrading to keep pace with technological developments and demands. This form of education will become an essential requirement of the modern workplace, and its provision needs to be negotiated between employers, governments and individuals. Employment related education of the future will increasingly focus on language, life skills, and the global arena, to enable full mobility of highly skilled individuals in an increasingly open international labour market. Clearly the world economy will influence the demand for skilled and unskilled international labour and this will impact on the willingness of the state and the individual to purchase such training. One impact may be that that the expansion of global economic activity will increase the demand for educated labour, this will lead to greater upward social mobility for working class students via education but those with lower

educational qualifications will need to re-educate and re-train for more cognitively demanding work Alternatively given a downfall in global employment, the middle class will then come under increasing pressure as professional jobs are off shored, and we may find the skills divide is not between the middle and working class, but cuts through the middle class itself.

However, regardless of these two contrasting futures, Europe is now moving into a period of redefining late life work as governments, employers and workers begin to come to terms with the implications of demographic ageing and the far reaching implications this will have for institutions and individuals alike. There are now growing moves to recruit, retain and retrain that generation of men and women in their 50s and 60s who are increasingly being seen as essential to retaining Europe's economic competitiveness as the upcoming skills shortage washes across the region.

While some argue that the requirement for new skills, particularly abilities in information and communication technologies, increasingly excludes older workers, it is also clear that technological innovation and flexible working patterns will increase opportunities for older workers. Indeed, the inherent training component of new technological labour means that future cohorts of older workers will have experience of continual training and skills updating throughout their lives. Supplemented by vocational and life long learning, adult education and training, this will significantly enhance the employability of older people and address upcoming national skills shortages. It is important that such education and training is targeted, builds on previous experiences and skills and properly evaluated. It is important to engage the business community in this, and to do this, far more research and evaluation of the effectiveness of different types of life-long learning and training is required from a business stance. There is likely to be a move from classroom training in workplace and already rapid growth in 'desk-top' training for all employees using CD-ROM, videoconferencing, the Internet and electronic performance support. Also we will see a shift from trainer led training to employer led training with trainers as "enablers". Work related education shifting to create interventions that allow employees to decide what to learn and when to learn it, employing user-driven technology: multimedia training, training technology and performance support systems. There is already growing use of technology to provide training and (technology-based training) and to support workers' performance on the job through electronic performance support systems (technology-based support) – it is likely that both will play and increasing role, not just in the work place but across all educational activities. In addition a wide range of technology now provides both technology-based training and technology- based support: computer software, CD-ROMs, videoconferencing, computer networks, multimedia training technology and performance support systems. The trainer's role is changing – trainers need to become supporters and enablers, particularly when dealing with a older experiences workforce. There will also be a growing role for Human Resources to move to employee-dialogue approach, whereby employee is positively encouraged to identify training and skills updating needs.

Education to enable full citizenship: this will be required to enable people to cope with complexity of life, to plan their lives, and to care for others. Modern complex democratic societies will not be able to function without well education individuals at their centres. New inequalities will arise between those who are educated into modern living, and those who do not have the skills, knowledge or capacity to cope with these new demands and ways of interacting, contributing and behaving. There are current concerns over the role of migration and immigration and the special needs of new migrants: in particular there is current acceptance that people from different cultures may have very different expectations of what learning is from the traditional British experience. Education currently can play a key role in the arrival and integration of new migrants, employability, recognition and updating of qualifications, cultural and social

adjustment, social integration and cohesion. However, given the likely tremendous increase in international migration for all, it is likely that many of these challenges will have disappeared and or changed by 2030 as we move into a mobile more culturally integrated world. It is likely that individual preferences and experiences will dominate the learning experience, need and demand, as with other groups.

Education as a public health initiative: it is now widely accepted that keeping the mind active is as important to health and well being as physical activity. The role that education may play in keeping down national health costs, especially in older age groups, will increasingly come to the fore. Mental capacity does not necessarily decline with age, and almost certainly not until late old age for most adults. Research suggests that fluid intelligence (ability to carry out higher level cognitive functions) may decline from the mid-60s, though not at a standard rate, and possibly due to lack of use; while crystallized intelligence (acquisition of new skills though education) continues to grow throughout adulthood. Indeed, it may be that reduced mental activity among current older adults - in part due to lack of new mental opportunities and activities, and lack of focused training and educational opportunities - actually contributes to apparent decline in mental capacity. Indeed few physical capacity changes are directly related to age. Most are heavily influenced by environment and life style. Those that are age related, such as sensory change, can be adapted for through aids (declining eyesight and glasses etc); others though a change in the physical environment. There is thus little which does deters an individual taking part in and benefiting from educational activities throughout their lives. And an implication would be that, if we want an active older population, we need to encourage such participation?

The role of digital and bio technologies: these will be significant. New technologies are already playing an important role in educating a diverse range of employees in the corporate world. These need to be considered as tools for enabling education across the life course for all in the community and home as well as the workplace. Technology and training delivery include electronic on line training with on-line certification; videoconferencing allowing simultaneous video and audio interaction between multiple participants across the globe; CD-ROMs providing interactive video and audio capabilities, easily used by all ages, and which enhance learning and retention; local area network (LAN), wide area network (WAN), or "Intranet" learning. Technology to enhance learning includes electronic performance support systems (EPSS). These are electronic tools that enable individuals to access support, coaching or information to perform better. These systems have considerable potential in for other education activities. EPSS are being seen as making significant impact on productivity, performance and employee learning in the world of work. This area is likely to develop rapidly over the next few decades with real potential for education.

There are several broad aspects of children's relations with technology that are likely to become increasingly significant in the coming years. These include the convergence of technologies and forms of communication; the ability to 'multitask', or engage flexibly with a diverse range of media; the individualisation of access to media; the potential for communication and participation in creative media production; the changing role of media in identity formation; the difficulty in establishing the credibility of online information; the growing influence of commercial forces.

Section 7: Summary of evidence to support the identified factors, trends and uncertainties

Howse's review on Longevity sets the demographic scene for this challenge. As he points out forecasts of future life expectancy have been revised upwards *both* in the medium term *and* in the longer term. Over the next twenty years female life expectancy at age 65 is forecast to grow even more quickly than it has done over the last 20 years (3.4 yrs as against 2.6); and there will be only a slight dip in the rate of increase for men over the same period (3.6 years as against 4 years). However, he warns that it would be complacent to discount altogether the risk of a ***pessimistic*** scenario in which life expectancy actually starts to fall as younger (and more obese) cohorts start reaching later life, say from 2030 onwards. Two key factors to consider are the gender gap in life expectancy, and the socioeconomic disparities in life expectancy. The worst-case scenario is that the relative difference in mortality rates between high and low socioeconomic groups will continue to increase. Of similar importance is to consider the issue of healthy later life or of frail later life, as this will impact upon demand and need for late life education.

- a ***no change*** scenario which assumes that the age-specific prevalence of disabling chronic disease will remain unchanged.
- a ***poorer health*** scenario assumes that current trends in obesity will continue (which means an increase in prevalence of about 2% per annum). This problem will be compounded by the ageing of large ethnic minority populations, which will add to the prevalence of CHD and stroke. Preventive strategies will only partially offset these trends.
- an ***improving health*** scenario, which is not that different from the ***fully engaged*** scenario for life expectancy. There will be a decline in smoking prevalence and obesity as individuals take their own health more seriously. Health services will be responsive to demand with high rates of technology uptake for disease prevention and excellent rates of diffusion of treatment. Mortality will decline quickly.
- Howse concludes by combining these factors into 2 possible scenarios which could frame the demand for late life education.
- The *pessimistic* scenario assumes that the increasing prevalence of obesity in cohorts that are still relatively young or in middle age will have a very substantial impact on their mortality in later life, large enough in fact to reverse the long-term trend in life expectancy.
- At the other extreme there is what we might call a *super-optimistic* scenario, which reckons on our ability to develop and apply the means of overcoming whatever limits the process of biological ageing puts to human longevity *soon enough to have an impact on the evolution of human longevity in this century*. Should this happen, then we should expect to see a rapid acceleration in gains in life expectancy, and there is no reason why the average age at death should not exceed the maximum observed human lifespan (approx. 125 years) before the end of the century.

At the other end of the life course spectrum, Lee addresses future changes to childhood. The first section of this paper describes the child-centred social investment thesis which has had a strong influence on UK government educational and child-related policy over the last decade. He notes that the resulting policies have involved the increasing integration of health, welfare and educational resources in the common purpose of increasing children's social and cognitive capital. He then considers the guiding social, technical and economic assumptions currently made about the future need in the context of major global trends and signals. These include issues of demographic change in less and least developed world regions, climate change, energy and food security and

financial conditions. He argues that despite an ageing of the population, childhood education remains critical as remedial interventions targeted at adults are unlikely to be effective unless these adults developed sufficient social and cognitive skills in childhood to make full use of them. Lee considers the future impact of climate change, resource allocation, market instability, and changing life course investment, concluding that childhood will remain "special" and a particularly wise site of investment in human potential for two reasons:

- The earlier the investment is made the longer dividends will be paid out
- The earlier the investment is made, bearing in mind that advantage accrues advantage, the greater compound interest effects will be
- Burnett, Sebastian & Blakemore's review on understanding the changing adolescent brain also highlights that adolescents are a distinct sector of society with specific needs. They show how recent brain imaging studies have demonstrated that the human brain continues to develop throughout the adolescent years. Although there are differences between male and female teenagers in terms of the time course of neural development, similar brain areas undergo significant restructuring in both sexes. Research is currently exploring how the brain changes and how these changes might help to explain certain aspects of typically teenage behaviour, such as risk taking and emerging competence in interpersonal interactions. For example, research on decision-making and impulse control might influence questions of criminal responsibility and anti-social behaviour. These findings might contribute to improving the quality of education and pastoral care for this age group, and have implications for the way young people are seen in the eyes of the law and are treated by the medical profession Future research might thus play a role in shaping educational and social policy, with a view to encouraging a more socially competent and responsible generation of teenagers.

Taking a different stance Michaels' work on adolescence points out that the family remains crucial to adolescence transitions, and that increasing rates of family dissolution may particularly impact upon adolescents. However, the role of schools, communities and peers also play a key role in this stage of development.

Leeson considers the role of learning across the life course and how this will change in the light of different futures. He argues that we are seeing a combination of forces which are resulting in the *ageing of some life- transitions*, with ageing societies displaying an increase of age at first marriage and at remarriage, at leaving the parental home, at first childbirth. While public and legal institutions may be lowering the age threshold into full legal adulthood, individuals themselves are choosing to delay many of those transitions which demonstrate a commitment to full adulthood – full economic independence from parents, formal adult union through marriage or committed long-term cohabitation and parenting. Leeson argues that this process is likely to continue with a blurring of chronological barriers to access to cultural capital including education. As individuals increasingly combine periods of economic and biological reproduction with rest, so learning for citizenship, social and self enhancement will become more commonplace. Following a review of current EU policy on life long learning, Leeson covers aspects of education for personal enhancement, employment, and citizenship, highlighting the ways in which these may evolve.

The impact of changing family structures both on investment in children and on individuals across the life course forms the key focus of the reviews by Mann, Hoff and Jessel. Both discuss white families and minority ethnic families. Mann lays emphasis on science and technology as a driving force behind aspects of family change. Developments in communication networks and information technology are already

shaping family relations, not least amongst minortised families dispersed by international migration. The rising availability (and affordability) of air travel, telecommunications and other new digital forms of communication are further encouraging the development of transnational ties on a global scale. This is occurring however, not just for those with a history of migration, but also amongst a wider range of families whose children, siblings, parents and/or grandparents are living and working for varying amounts of time abroad.

As both Hoff and Mann point out, one tangible impact of technology on family life is the shift in the work-home relationship afforded by these technologies. There remain several unanswered questions around how these developments in flexible working conditions will impact upon family life. On the one hand they may provide people with choices in order to resolve work and family conflicts, allowing more and more people work from home and in locations that allow them to combine responsibilities. On the other hand they may encourage employers to put even more pressure on workers to work further away and spend more time away from home. These developments will undoubtedly impact upon domestic gender divisions and decision making processes within the family. Time pressures can lead to stress for working parents and how people negotiate work and family roles becomes an increasingly important issue.

Mann also argues that the rise of more democratic forms of parent-child relationships means that children are having an even greater interest and input in decision making. New forms of digital communication will represent a key medium through which these decisions are made. On the one hand they imply more equal partnerships. On the other, the control and monitoring of children's behaviours may be extended, beyond the physical, at the virtual level, for example, technological developments by Google around live satellite pictures at street level. Thus new forms of communication may affect the democratic openness of how monitoring and supervision occurs in families.

Jessel focuses his review on the actual delivery of education by the family. He points out an important distinction between the approach to academic learning taken in schools or other education institutions and the learning that occurs more naturally as part of day to day social activity. Jessel also considers in some detail the importance of new technology to both unite and distance families, and the possibility for the development of more complex relationships involving different generations. He points out that what we regard as a 'virtual' space today may take on a more tangible coherent and connected life of its own as we are able, through communication technologies, to maintain, sustain and develop relationships. The space in which we live and learn may no longer be defined by four walls and a roof. In this context the challenge for 'family' members may be one of identifying and contributing to a group identity, even if this identity is dynamic in nature.

He points out that with regard to children's learning and development, the challenge will be to combine institutional and family based systems of learning, increasingly influenced by varying cultural practices. The older people of 2050 will have been the younger people of today who will have taken with them not only the practices we associate with young people today but also some of the attitudes to change and flexibility that we may consider a hallmark of our time. He agrees with Lee that formative education will remain crucial. Assuming the infants of today will be the elders of the future then, to survive as a responsive and flexible community in a changing world, what they will take with them into that future will not just be the transferred remnants of yesterday but also the ability to play their part in creating the culture of tomorrow.

Hoff's review on families, care and work also highlights the importance of new technology and life long learning as an important mode of family adaptation to the changing demands being placed upon it.

In addition he points out that faced with the prospect of a shrinking workforce, the British economy cannot afford to loose too many employees due to unemployment, early retirement or family care commitments if the UK is to maintain economic growth and to preserve existing levels of individual wealth.

As globalization extends and intensifies the flows of migration between societies, concerns over the integration and needs of the new and diverse migrants will increase. Their societal adaptation can be learned from previous and existing migrants, thus there need to be spaces for mutual learning within civil society. Demivera, Mann, Leeson, Heath and Jessel all address the issue of ethnicity. Intergenerational learning has particular implications for minority ethnic families and citizenship. Previous conventional understandings of citizenship had assumed that acculturation of minorities to the host society values was an inevitable process. The orientations of 2nd and 3rd generation migrants would be firmly orientated to the host society as opposed to the country of origin. Most of the UK research evidence has shown this to not be the case. The mutual learning that occurs between grandchildren and grandparents can also act to promote citizenship amongst older people. The current government, for example, has initiated a number of policies aimed at citizenship education and the better integration of new citizens to the UK. Schools represent the key domain through which the state is able to actively foster national values to its citizenry. Yet as patterns of migration change, with people migrating during middle and later life, then citizenship education needs to be broadened, in order to form part of lifelong learning. To what extend will previous migrants, such as those who came during the 1950s and 1960s act as role models for more recent migrants of a similar age group?

Heath provides an overview of current understanding of minority attainment in education. He suggests that at GCSEs Indians and Chinese tend to somewhat better than the majority, while students of Caribbean, Bangladeshi and Pakistani heritage do somewhat worse. Gender differentials though are the same among minorities as among the majority, i.e. girls do better. Some, but not all, of the ethnic disadvantages can be explained by social class origins. At upper secondary and beyond minorities tend to have higher rates of staying on after the end of compulsory schooling – including Caribbean's and Bangladeshis. Minorities are also over-represented in tertiary education compared with the majority group. Different explanations are probably needed at different stages of the educational system: at lower secondary, there are hints of the kind of 'oppositional culture' among some Blacks; at upper secondary, higher staying-on rates may be due to expectations (or experience) of discrimination in the labour market, making the 'opportunity cost' of staying in education lower. Traditional family structures and parenting styles may give some minorities advantages in the educational system. Heath highlights the intellectual challenge: while there is plenty of descriptive material of attainment patterns, convincing explanations, particularly for the diversity between minorities, are largely absent. In particular we do not really understand what part is played by actual or expected discrimination, and how much is due to properties (eg social capital) of the communities themselves

Leeson raises a key point when he argues that increasingly migrants will see host countries as but a stepping stone in their life progression. The concept of providing citizenship education to enhance the acculturation of migrant populations will not work in a context when individuals increasingly see themselves as part of a global rather than national community. The adaptation of new migrants thus requires a much broader notion of citizenship education: not simply with regard to civic values, democracy and Britishness, but also less abstract forms of knowledge which impact directly upon their mobility such as qualifications, labour market issues, entitlements and service provision, and issues to do with intercultural communication and global issues. These however, will enhance the global community, but not necessarily the UK.

Kelan and Lehnert explore the changing educational needs and expectations of Generation Y, people born roughly between 1977 and 2000. Generation Y is a prime example of how changes in the economic mode of production are intertwined with changes in technology, society and education in that Generation Y demand different styles of teaching and learning. Generation Y has grown up in a world that has been transformed by new technologies that make new ways of communicating, working and exchanging information and creating knowledge possible. Generation Y has a unique vantage point on these changes because they are coming of age in a time when they still are faced with institutions shaped by the old model but their way of behaving is more in line with new ways of behaving. While institutions change slowly, Generation Y already lives the new lifestyle predicted by theorists of the information and knowledge society. Generation Y is said to be special, sheltered, confident, conventional, team oriented, achieving and pressured. It was highlighted how central technology is for Generations Y and that the learning style of Generation Y is said to be collaborative, multicultural, and visual. In the workplace Generation Y are assumed to work to live and not live to work and to value respect and judge people on merit. In the work context, flexibility is regarded as a key skill, and the transferability of skills is seen as a central personal asset Generation Y's life paths are increasingly spent in a global networked economy, one in which information gathering is facilitated by new means of technology and bureaucratic organisations are replaced by network organisations, which require flexible and individualized labour. In conclusion Gen Y is said to be significantly different to previous generations, particularly in their understanding that jobs are not for life. Life-long learning is therefore not only a necessity for this cohort, but due to the integration of work and life, an enjoyable, challenging and achievement-oriented aspect of everyday life.

Another key factor will be that of class. Social inequalities in health and life expectancy have already been covered by Howse; Brown and Lauder take up the issue of social class divisions in education. After reviewing current knowledge on education attainment and class and social mobility, they turn to the future. The first scenario they consider is that by incremental policy measures social class inequalities in education and social mobility will be reduced. Crucial to this scenario is the expectation that the expansion of global economic activity will increase the demand for educated labour. This view suggests that the key to greater upward social mobility for working class students will be through education. By the same token, those with lower educational qualifications will need to re-educate and re-train for more cognitively demanding work. They point out that lifelong learning will contribute to this mobility as people change career paths at crucial times of their lives in order to remain upwardly mobile. Given that we can expect older workers to remain in work for much longer than is now the case careers will be extended and consequently this will require greater provision for lifelong learning. Secondly, Brown and Lauder consider a downfall in global employment. The middle class will then come under increasing pressure as professional jobs are off shored to China and India. Moreover the corporate strategy for creating an elite of the 'talented' while much other 'knowledge' work is routinised means that the middle class will be divided between the fortunate few and the majority who will not see their life chances improve. Indeed there may be a decline as what were once seen as middle class occupations both in the number of jobs on offer and polarization in terms of income. In the third scenario, the state rebalances the economy to generate high end manufacturing in renewables. This creates the possibility of more high skills jobs, leading to greater upward mobility. This enables a high proportion of high earning taxpayers to fund state expenditure. It also creates the possibility that the values underlying education may change. In particular, as in the Nordic countries, there is a greater sense of collectivism as opposed to individualism. This means that the society will extend the concepts of worth and reward beyond the current labour market to funding careers for those in care-giving. There will in effect be a citizen's wage which guarantees income in return for active participation in society.

Challenge 2: Identity, Communities and Citizenship

Professor Helen Haste, Visiting Professor, Harvard Graduate School of Education, USA. Emeritus Professor of Psychology, University of Bath

Section 1: The Agenda of the Challenge

This Report addresses three overlapping and interlocking domains; identity, community and citizenship. The Challenge will also explore the intersection of identity and community, and identity and citizenship, and the ways in which changing technologies are likely to impact all.

Common to all three domains is communication, between persons, persons and institutions, and persons and information sources. It is here that new technologies are central; as well as changing forms of communication, they make highly visible how pervasive is communication in our lives. Core elements of all three domains are collaboration, participation and engagement with, and within, both the real and virtual worlds, in which we are active agents intersecting with other agents. Information is not just something we access via a conduit; it is negotiated, actively communicated – and modified through our engagement with it.

The implications for future education are that educational policies, practices and institutions need to equip young people with the critical and technical skills to interact with technology effectively, to facilitate the development of positive and empowered identities and relationships and to be responsive to barriers or resistances that may conflict with or impede such agendas.

The Challenge's key terms have multiple, nuanced and ambiguous meanings: as such, working definitions are necessary:

By identity I shall mean, broadly, the ways that feel authentic for describing one's self, which include multiple 'selves' appropriate in different contexts. Such identity may, or may not, include a sense of efficacy and agency. Identity politics, for example, is the pursuit of empowerment among people who are disadvantaged or marginalised but nevertheless firmly committed to their personal identities.

Within this definition, this Report will explore:

- the ways in which identity develops through individual self-exploration and experimentation in relation to ideas, others and the external world
- identities associated with group memberships, including gender, disability, generation, value-based, ethnic, regional and national.
- sense of efficacy and agency associated with such identities and the implications for facilitating empowerment, for managing disempowerment, and for identity politics – social support and action, including resistance, designed to give voice to the identity group
- how each of these intersects with technology

By community I shall mean groups whose association has coherence, function and meaning to its members. The term 'community' is contested and it is changing as a consequence of social, political and technological developments. Exploring these changes is part of the agenda that this Challenge has addressed. Community will be explored in relation to:

- theories of what community means, its functions and practices and the ways in which a community builds and sustains those functions
- the core features that subjectively comprise membership of a community and an identity related to that community; these may include shared values, sense of place, lifestyle, locality
- the criteria, and means, by which a community includes and excludes membership
- how communities communicate and respond to members and how technology is changing this
- how a community is defined externally and the implications of this for members
- how intergroup relations are connected to the development and maintenance of group membership
- the relationship between communities, identity politics and social change
- the role of technology in these

Citizenship is also a contested domain. The Challenge explores some issues around citizenship status but primarily in this Report I will address questions around the changing boundaries of 'civic participation', and the factors which contribute to both the extent and forms of young people's engagement, specifically;

- how the definition of civic participation is changing, from conventional activities to a wider range of action
- how changing technologies alter the means of participating and therefore the definition of 'active citizenship'
- what factors, including identity and community factors, contribute to a sense of agency and motivation for young people's participation
- what factors create or perpetuate inefficacy in relation to civic participation
- the changing boundaries of the domain within which persons are 'citizens' including participation as part of a self-identified community, whether local or global, and the relationship of this to the traditional citizenship of a nation state.

1.2 Thinking about the future

Any exercise in prediction must be predicated on recognising its core limitations and therefore what its purpose can usefully be. What WILL change? There are things that will not change. There are things that will not change fundamentally, but the way they are practised, or the form they take, may change. There are things which, as a consequence of technological, social, political or economic developments, will change quite considerably. Some changes we can predict. We know that the relative proportions of generations will tilt upward. As 'youth' diminish as a proportion of the population it is probable that 'youth culture' may become even more distanced from the adult world and more marginalised. As work patterns and the life cycle of work increasing fragment, identities associated with work, and its communities will adjust. Education will need to facilitate the competences for managing such identities.

In the three domains addressed in this Challenge, values play an important role. Our current values guide our thinking about preferable, as well as possible and plausible, futures. The dominant social values of Britain today are essentially 'liberal'. They include diversity, equality of opportunity, religious tolerance, non-violence and participatory citizenship. However we should not take contemporary values for granted, nor assume that their public support will continue in its present form. In looking forward twenty-five years, we should be aware of the uncertainties of history. Twenty-five years ago Thatcherite neo-conservatism changed the face of British values and had a large impact on education. The current economic recession could have major consequences for how the public view our objectives.

While it is likely that educators will continue to have the objectives of overcoming inequality, exclusion and injustice, potential obstacles to their implementation might easily include emergent religious fundamentalism, neo-conservative values that re-emphasise competition, increased social disruption due to economic privation, and fears about immigration. 'Threats' from marginal groups – such as religious fundamentalists – tend to be seen currently as issues of 'diversity' and the management of minority interests. If major political and economic forces – national or international - tip the balance of public opinion towards a more defensive position for liberals, a different agenda may emerge.

Currently, we see both highly optimistic and highly pessimistic predictions, rooted in contemporary value concerns but which may miss out whole areas of relevance. For example, some have argued that individually-controlled information retrieval and communication will make schools redundant, as students can access knowledge at their own pace, from their own homes, with minimal guidance and monitoring by teachers. This prediction makes huge assumptions about the function of the school as a social and moral community, and the mechanisms by which young people learn - and deal with obstacles to understanding. This Report reviews material that does suggest the need to transform the current school system but the 'death of the school' narrative fails to take account of the identity, community and citizenship functions served by a school-like institution[1].

Section 2: In what ways is technology salient to the three domains?

The core questions of the Challenge concern how technological developments precipitate, facilitate or impede development and performance within each of the three domains. Some new technologies do not alter relationships or social practices, only the ways that these are conducted. In other cases, the new technology transforms social practices and social institutions. For example, despite the different skills involved, the social function of emailing friends may be little different from writing them a letter. However, using the same skills to organise a mass demonstration may represent a transformation of practices. Phoning from a mobile is still a form of telephone conversation, but a landline is in a static place and a mobile is an individual body prosthesis so friends and family can be in perpetual connection, with very different boundaries of access and privacy.

I will focus on four developments, specifically relating to communication, that are central to the three domains of this Challenge.[2]

- One is the media, by which I mean professionally produced information, fact or fiction. The conduits of traditional media have proliferated enormously. They play a vital role in reflecting, reproducing and indeed modifying cultural narratives, values and norms, and will continue to do so, and so contribute to the formation of identity.
- A second development is the capacity of everyone who has the equipment and skills, to access information. Barring censorship, in principle all areas of human knowledge are universally accessible.
- A third development is that access is interactive. The individual can add, create and modify information, and can set up communication networks. She can do this anonymously, or within her own identity or that of one or many avatars. This creates opportunities for exploring and experimenting with identities and communities.
- Gaming is one manifestation of this development, providing huge scope for playful-but-serious explorations of identity and community, but also providing an interactive mode of cultural transmission via the narratives in the games and the

way that they are played; Ian Bogost for example argues that games are rhetorical persuasive tools[3]. Numerous 'educational' games are being produced to purvey desired cultural messages[4]. Because interactive technology facilitates influencing others in ways that were beyond the scope of most people until today, it has a major impact on citizenship. This may be democratising as it removes control of the flow of information (in either direction) from the traditional gatekeepers; however open channels can equally give more power to technocratic filtering[5].

- A fourth technological development concerns prostheses. Developments which can counter disability (for example deafness) have implications not only for diversity and inequality, but also for identity. We cannot assume that all persons with disabilities will wish to be 'cured', particularly if the 'cure' is only partial. Conceivable prostheses in the near future include pharmaceutical enhancements of mental function, which – whether legally available or not – would require a radical rethink of the time-pressured unseen examination. More exotic projections include implanted prostheses– for example tagging children's and vulnerable adults' bodies to keep track of them.

2.2 Technology, life spaces and adoption

How does new technology enter life space, and how do people in different roles respond to it? Where are new technologies located in young people's life spaces? How have they been transformative? What might or might be durable? By 'life space' I mean how the individual interfaces with the external world through social and technological intersections, language and social practices.

A new technology initially performs existing social practices; it is an enhancing adjunct to current tools. In due course the potential of the new technology becomes apparent, and new social practices develop. However, what seems to have potential to an 'expert' does not necessarily mean it will be taken up in the way predicted. Unpredicted uses of new technology happen, and the way that social practices are transformed does not necessarily accord with the scenario of the designer [6] [a].

Mobile phone penetration for adolescents in most industrialised countries approaches 100%. As the first widely used hand-held prosthesis it is the first experience we have of wholly individual agency in managing communication and sending digital information amongst one's community – pictures, music, and other software. Even before possessing machines that could access the Internet, young people have become used to actively, instantly and autonomously mastering information digitally. As Justin Reich's review shows, Web 2.0 has substantially increased informal communication in the hands of young people[7]. Adoption is rapid; two years ago over 50% of US teenagers had created pages on Facebook and MySpace; the number is undoubtedly higher today. Reduced costs and improved technology have transformed communication. Sharing information, whether personal or not, is possible for everyone, conversations can be global and blogs enable one to keep a 'public' diary and to monitor those of others.

This places young people as active agents in what they add as well as take from the virtual world. It removes geographical boundaries of communication, and it blurs the traditional boundaries of public and private. As hand-held devices become increasing less expensive, this will expand. Reich points out that in February of 2008 over 112 million blogs were tracked worldwide, with probably over 70 million more in China. As we shall

[a] One case is texting, incorporated in the design of mobile phones for use by the engineers who would maintain the system. It rapidly became the primary communication function for young people, and in consequence social practices of communicating, arranging meetings, dating and dumping and keeping into touch parents, have substantially changed.

explore more in the context of citizenship, Obama's campaign depended on the blogging activities of millions of supporters – with very low cost and extremely rapid transmission of information.

The 'life space' opened up by new technology transcends previous boundaries, even before the individual enters the alternative virtual world of avatars, games and fantasy. A major life space activity is gaming. Half of UK children between five and fifteen play computer or video games daily. Millions of people aged over fifteen are engaged in large-scale interactive games, often internationally. Gaming offers entry into an alternative culture in which values are played out in the game, and the intellect is challenged to multi-layered information processing. This has stimulated creative thoughts on how gaming could be used for new ways of learning or to foster moral, social or civic awareness[8].

Eva Vass's review documents how gaming requires "attention, motivation and perseverance for long stretches of time, quite often coupled with extensively delayed rewards."[9] Gaming also requires multitasking, cognitively complex and rapid problem-solving and information-processing, all of which take place within a collaborative and interactive context. Play has always been seen as essential for children's development, and in the contemporary urban world free play is constrained by various physical and social risks. The world of gaming offers aspects of free play, including bridging thought and action, and engaging emotion as well as cognition.[10] Vass concludes, "due to its fundamentally interactive and participatory nature, new technology provides a platform for the free exploration of a virtual landscape and participation in shared activities in virtual space." Gaming is relevant to all three domains of the Challenge.

The potentially transformative nature of new technology is also explored by both Reich and Vass. Vass reviews the question of whether our minds (and possibly brains) are being altered by interaction with new technology; James Flynn for example argues that the accelerated IQ scores in industrialised nations over the past century are due to changing 'habits of mind' consequent on 'cognitive habituation' to a more scientific way of thinking[11]. Vass summarises the 'new mindset' in terms of habituation to complexity, propensity for experimentation, multimodal content, information foraging, democratic forms of social practice and growing capacity to collaborate with others.

First, thinking is embedded in the cultural context. Thinking involves negotiating meaning and understanding in continual interaction with others. It is not just a private act going on inside one individual's head. Second, new technology requires different skills from those rooted in traditional formal education and the individual's deep reading of hard copy texts. We now must work with a more complex interplay of written text, images, and graphics and sounds. Media material, including drama, is presented in faster more swiftly changing units (such as the length of film takes) and the plots of soaps are multi-threaded.[12] Information gathering and processing are participatory. As Reich discusses, the ability to modify wikis requires new skills of editing, and also opens up engagement with the text that is not present in traditional media.

2.3 What are the contours and constraints of adoption?

These ways of thinking are practised in the world of leisure, and some are becoming increasing routine in the business world. However, adoption of new technology is both surprising and uneven. Some assumptions about who might be slow adopters, and why, have proved ill-founded; costs are dropping all the time and although there are still large sectors of the population who cannot afford the equipment, this may moderate considerably in the near future. In the history of most technology that becomes routinely part of our lives, we have seen barriers of age or gender, lack of technical proficiency dissolve once the user interface becomes simpler, and the technology's uses become

more salient to one's life space. As we shall see when exploring how technology intersects with identity, community and citizenship, 'need to know' and changing social practices promote surprisingly rapid acquisition of both tools and techniques.

It is frequently asserted that gender is a 'problem' for new technology even though two variables that have long been known to contribute to gender effects are in fact highly malleable; the first is the nature of the material or task, the second is level of confidence in one's skills. Both matter in women's and girls' performance with new technology.[13] Louise Madden's review of gender and the Internet explores some of the factors and myths, about women's 'resistance' to technology[14]. Both location and the context of technology and its use are salient.

Any new expertise is best acquired through engagement in everyday activities, therefore those who have legitimate use of a machine are more likely to become experts. The person who purchases a tool is frequently its 'owner' in the sense of determining is primary use and location. The more routine the technology, the less formal the space in which it is located. Home television sets initially were centrally located within the family's main social space, they then migrated to other leisure areas of the household as they became routine possessions. Computers, because of their mixed functions as 'work' and leisure' follow a slightly different path,

Computer technology tends to be purchased by men, although a prime reason for the purchase is children's use (ostensibly educational but in practice also leisure use). 'Ownership' is also invested in expertise, which is likely to be shared by fathers and children, rather than mothers. Women's use of a computer depends also on its location. A computer in the paternal 'den' locates the machine as the province of the father, with limited access to both spouse and children. A computer in the children's bedroom limits parental access after their bedtime.

These territorial tropes have been used to explain women's later adoption of technology and their identity as 'non-expert'. However many activities involving technology rapidly become widespread as their cost drops – online banking has spread fast. Some areas of shopping are becoming routinely online, for both sexes. Women's use of computers is expanding rapidly, particularly email which is replacing letter writing and telephoning – traditional community-maintaining activities of women. A clear implication is that the spread of technology beyond the 'young male geek' stereotype is happening faster than some predicted. 'Obstacles' disappear once people find a 'need to know' reason to acquire the skills, especially to perform routine tasks.

Ellen Helsper's review of young people's responses to risks and challenges on the Internet also unpacks some assumptions – and pitfalls – about the take-up of technology[15]. One narrative locates technical expertise as a generational phenomenon, comparing 'digital natives', those born after 1980 who grew up with technology and have – it is presumed - no problems with it, and 'digital immigrants', those born before 1980, who had to acquire new skill profiles.[16] Helsper argues that this is both misleading and shortsighted.

Many inequalities in access to technology still remain and there is a wide range of actual skill, and also of confidence in one's skills. One consequence is that young people who lack skills may adopt an 'ostrich' tactic both in relation to their limitations, and also in relation to the wide variety of risks that the Internet poses. Helsper argues that a 'digital native' model militates against both skill acquisition, and the development of the competence to deal with managing risk and negative experiences. Such assumptions may create further obstacles to technological advances in education. Also today's

'digital natives', insofar as they truly exist, will rapidly become 'immigrants' in the face of new developments.

Section 3: Identity

For the future of education, identity is salient in the following ways:

- how young people locate themselves vis a vis social groups, which is likely to have a role in their motivation to learn, their identification with the dominant values purveyed within education, their sense of agency with regard to participating in society and their preparation for this via school
- the extent to which the marginalisation of groups on the basis of various forms of diversity is managed effectively within education, whether this means challenging discrimination and/or positively affirming difference
- how is identity development facilitated within the educational context; how can alternative and multiple identities can be explored
- what messages the educational agenda and curriculum convey about culturally normative, or desirable, forms and expressions of identity; what are the dominant values, narratives and explanations inherent both in the curriculum and in how it is purveyed by teachers and by the structure of educational institutions.

What does new technology do for identity? First, it opens up new avenues for developing and expressing one's identity, through new ways to connect with others, and new ways to communicate. It expands the people and groups with whom one can communicate. These experiences may facilitate:

- agency and choice; that one can be an active agent in developing, maintaining – and ending – one's networks, and that one 'belongs' to a social group by choice not entirely by default. One value message is that one has choice and should exercise it. The consumer's right to choose, and to expect that choice to have outcomes, is a strong thread of some forms of youth culture, as Sarah Riley's review explores[17]
- the boundaries of identity and how these may be expanded or altered, physically or in other technological ways
- the expanded limits of identity including the management of multiple selves, in real as well as virtual life, and effective movement between these. This applies to multi-layered local and national identity as well as to movement between different social groups with whom one's affiliation rests on shared values or interests.

Three things operate in the formation of identity. The first is the script. Who we become as persons requires imagining possible future selves; throughout our development we make choices that steer us between the implicit scripts offered to us and modified by us, or those choices are made for us by circumstances. Cultural resources for scripts have expanded with the range of media available. As Sarah Riley's and Thalia Magioglou's reviews point out, the prolongation of financially dependent adolescence into a phase of 'youth' which may last well into the twenties allows young people a longer time to make such choices, and also, more time to try out alternatives[18]. The addition of virtual role-taking and identity-playing activities, whether in fantasy games or in how one presents oneself on Facebook and in blog interactions, increases the potential for hands-on experiences of scripts and imagined selves.

A second dimension of identity development is social group membership, whether chosen or contingent. How strong is one's identification with the social group, what are the reasons for it, and what are the consequences? A third dimension is location, and

key experiences of that location are significant components of identity. Places have familiar memories and associations as well as symbolic reference. There are potential tensions around the relationship between this place and others. An oft-cited rhetorical example regarding immigrants and national identity was the 'cricket test'; which team would an immigrant support if their 'home' team was playing a British one?[19] This is a trivial example of a non-trivial point; to what extent does one's attachment to one place, or national territory, create tensions with other attachments?

Identity is also about competence. For what demands of contemporary identity should education equip the growing person?[20] One competence relates to mobility and to flexibility. Career patterns increasingly require relatively short-term commitment to a post, and often, career path changes through life. Many careers require relocation. Among other implications, this impacts on professional identity as such identity expressions as 'I am a lawyer' may come to mean more a domain of applicable knowledge than a job description. Planning one's education for a lifelong career has become less salient than preparing the foundations for a range of options.

Mobile identity takes several forms. An increasing number of people will be working in several different regions and nations during their career, either physically moving or working via virtual means in several cultures. This will increasingly be the norm especially for the professional and managerial sector. Such people retain their national identity but must be flexible and sensitive to the identities and perspectives of others. In addition, there is a pressure towards developing a wider or multiple, identity, being both British and European, engaging both with local and global issues [21]. The practice of participation in international conversation, via blogging and wikis, as Reich describes, can lay the early foundations of these skills.

Another kind of mobile identity, that is likely to grow considerably over the next 25 years, are young people whose parents may be of different nationalities, and who themselves have grown up in a series of locations as their parents move with the requirements of multinational employment. Currently, these young people tend to be educated in international schools but this may change as their numbers increased with multinational capitalism[22]. Such young people learn early to be flexible, adaptable and multi-lingual and to have a broad imaginary of their career options. However there is the question of their national identity and to whom do they feel civic commitment? They may be effective global citizens – but for whom do they vote?

A third category is immigrants. We are seeing the largest human migrations in history. In addition to questions of citizenship status, or discrimination from the host community, immigration has identity issues. National identity rests, for the 'native' population, on characteristics which are deemed inherent to the nation. This may include specifically defining as 'other', groups whose inclusion in the nation's citizenship is resisted – for example the rhetoric around the 'cultural threat' of Islamic minorities. For those who enter the nation, whether as voluntary immigrants or as the colonised or invaded, acquiring a sense of, and commitment to, national identity means negotiating the adoption of 'national characteristics' in tension with retaining core features of the immigrant culture[23]. For nations (such as Britain) for whom, as Denis Sindic's review argues, multiculturalism is a central ethic of national identity, both these operate in tandem. In some other models, for example France, diversity is managed by attempting to subsume all identities to the dominant culture[24].

3.2 Scripts and experimenting with multiple selves

New technology does not invent imaginary space or media but it does make active participation with the imaginary possible. A question central to our imaginative lives is, 'what if I did such and such'. This becomes testable and its consequences managed,

even if restricted by the parameters of a game. First, this allows us to 'produce' an identity and explore it, and engage with others in playing it out. This is an active performance which also requires active management of the responses of others. While this can be seen as positive agency, as Sarah Riley points out it could also mean that "communication technologies are creating a situation where people understand aspects of themselves as only truly meaningful when offered up for the consumption of others".

Broadly, there are three ways in which new technologies facilitate playing with alternative identities. There is reality self-presentation, interacting with others 'as oneself' even if there are several edited versions of this. This is the world of Facebook, and MySpace. This is 'public' to a degree not available before such technology. A second type of identity exploration comes from sharing narratives. Kyoko Murakami's review describes 'digital storytelling'[25]. Whether as an orchestrated or a spontaneous activity, technology-mediated interaction shares the description of an experience, creating collective memory and history. Meaning and a shared identity are co-constructed through the recollection and creation of the narrative. Murakami argues that this is a potential medium for giving disaffected and alienated youth empowerment and ownership of their identities.

Other initiatives using new technology have similar goals, One example is the World Film Collective, a group of young film makers working with disadvantaged young people in various parts of the world (Brazil, South Africa, Palestine) to make films using mobile phones as cameras. The young people make a DVD which presents their own experience authentically, as in digital storytelling. This has a citizenship component, making their voices heard, but they also acquire basic film-making and editing skills[26].

A third dimension of role-playing and identity experimentation is in gaming, where acting out an avatar role usually within a complex scenario, involves many other people, requiring collaboration, teamwork, planning and considerable perseverance and attention[27]. The key identity element is the interaction of the avatar with others, shaping and maintaining of one's alternative identity so that it works in the context, and the management of interaction with others in the sometimes threatening virtual world. Aubry Threlkeld's review for example describes both bullying and unpleasant imaginary encounters in a queer virtual identity. On a more positive note, activities such as Second Life can be a sophisticated playing out of a complex alternative identity with positive products and outcomes.

3.3 Place and Nation; identity and the experience of location

Because 'place' is concrete it is a seductive explanation of identity. In one metaphor of place, virtual communities of the future are contrasted with the 'real' places of the past. Heike Doering's and Nick Nash's reviews show that this is a false distinction, and that it is highly likely that people will continue to define themselves in terms of a place-located identity and community[28]. Place identity is as likely to be strengthened as weakened by the development of technologies. In diaspora societies, attachment to the 'home' town or region is largely sustained by a virtual network.

Nash argues that it is only when people engage in something that acts upon a place that it gains meaning – whether this is the physical or the social domain. For some, this 'action' is the conscious choice to locate to somewhere in particular. The meaning of that choice is located within, and contributes to, identity. Heike Doering's review explores the concept of 'elective belonging' which is one manifestation of the ethic of choice.

The core question is, how do we make sense of a 'place'? Making meaning of 'place' may arise from threat, whether natural or human. The work on risk perception provides a rich example of how people construct their local environment. They have clear ideas of

what and where risk lies, how they will respond to it and what is tolerable within a local perspective. Air pollution for example may be acceptable where it comes from the factory that is the main source of income for the community[29].

National identity is problematic. A nation is a 'place', geographically but we largely experience our nation through metaphor, narrative and symbol – even if we claim that its familiar physical aspects are the source of our attachment. Denis Sindic's review reminds us that national awareness arose in the 18th century when print media became widespread, both purveying 'national' news and invoking the experience of sharing that knowledge with others who read the same media. National identity can be fostered by threat, creating solidarity based on the boundary between 'us' and the (alien) other. National identity also depends on heroes, as Sindic shows with regard to Scottish and Welsh devolution, who are invoked as icons that reflect national qualities of the nation, in narratives and stories through which members of the nation find an identity[30].

Will national identity survive in the changing world? There are several different discourses around this. First, globalisation may be either a goal for those who want to transcend nationalism, or a more gloomy prediction for those who see it as a manifestation of capitalism. Second there is the EU; is it a desirable transnational state, or the maw into which 'our' identity is lost? Third, there is the virtual world, where because there are no boundaries, will people generate new communities defined by elective belonging based on common interests and values – or will they become de-individualised because they have no longer any roots?

While globalisation expands the scope of identity, it seems paradoxically, that this is dependent on a secure base of national or regional identity. Globalisation can be a perspective that allows for exploring a larger universe of discourse, within which it becomes easier to see, and care about, one's own space. Sindic's review shows us that people feel both European and attached to their own nation. In the virtual world, it appears that people identify themselves as representatives of their nation, while entering into open dialogue across national boundaries. However, local national identity trumps EU identity even though increasingly our routine actions upon our environment confront us with our larger connection to Europe.

If the idealised goal is to create supra-national young people, it would seem doomed. If the goal is to use the opportunities of new technology to obviate the more negative aspects of nationalism there is more hope. The enthusiasm with which many young people are already routinely interacting with other nationals via new technology suggests that this may be fostering open and multiple identities. The more positive conclusion is that people are managing multiple identities comfortably and on the whole are not trapped either by place or nationalism.

We should be somewhat wary however; political, economic and social change can rapidly create nationalistic and xenophobic retrenchment. The perceived threats from immigration continue to fuel the BNP (5% of a sample of young people in a recent study supported the BNP)[31] and the fear of terrorism can so easily be translated in anti-Islamic sentiment. While this is currently at bay, over twenty five years we may expect to see considerable fluctuations. We have also seen transnational 'localisation' based on values, including religion. The World Wide Web plays an increasing role in transnational evangelism and fundamentalism.

3.4 Identity and community; chosen social groups and 'elective belonging'

Sarah Riley's review of youth cultures explores one aspect of 'chosen' social groups and identities. She argues that communication technology, a consumer society and an extended period of financially dependent (or financially uncommitted) youth all facilitate

a 'playful pick and mix approach' to 'a kaleidoscope of temporary, fluid and multiple subjectivities'. Within this there is scope for practising multiple identities and for managing easy movement between them. Furthermore, these are desirable skills for twenty first century life. However, young people are exposed to considerable commercial pressures and to identities which are heavily loaded with commercial interests – whether in terms of clothing, music, or body style. The 'choice' therefore is a choice between identities of consumption.

These choices are made also within the wider cultural value of neo-liberalism, which Riley argues emphasises individual freedom and an ethic of choice even though these are largely illusory. Within this value system, to be able to make a choice is a right, and by making a choice one is understood as being an agent and taking responsibility for one's self. It also has the moral connotation that one's appearance and one's lifestyle are within one's control, so a well-toned body reflects responsible choices, flab does not. Even if the choice is potentially damaging, the act of choosing is a freely made rational act. This includes entitlement to excess, to the voluntary pursuit of hedonism and intoxication and even the right to choose a dangerous 'lifestyle' of anorexia.

The contemporary cultural value of neo-liberalism, manifested in political as well as youth consumer circles, is likely to remain a dominant value unless quite a substantial cultural shift occurs. Even if the recession cuts back consumerism and the display of goods becomes less acceptable, the personal value of freedom of choice may still remain, an ethic with which fluid identities and youth cultures is consistent. An alternative (though not necessarily conflicting) explanation of multiple and fluid identities is neo-tribalism, a concept developed by Maffesoli.[32] This argument is that young people form, and move through, small groups joined by values or interests. These groups communicate virtually but may also congregate physically. They provide a sense of belonging but also a sense of being an island of sovereignty, in which only the group's rules prevail in the here and now. Once the person moves to another group – and there may be numerous such transitions within a single 24 hour period – the new group's rules apply. Again the dominant value here is freedom to choose and to define one's identity.

3.5 Managing unchosen identities and social groups

By 'unchosen' identities I mean those that arise from contingencies of one's body or environment that present potential challenges for identity. How is an identity constructed amongst a marginalised social group, to what extent is this a consequence of the dominant social groups' positioning, in what ways do marginal groups affirm a positive identity, and what are the likely effects on the culture of 'identity politics'?

One example of the cultural construction of an unchosen identity also demonstrates the role of traditional mainstream media, which are often overlooked in discussions of the implications of new telecommunications tools.. The media's role as a cultural resource and framer of our narratives, metaphors and explanations has been extensively researched and theorised at least since Marshall McLuhan's classic work forty years ago[33]. This is likely to continue even if in a form increasingly moderated by more interactive media. Mainstream media reproduce culture and by implication have the potential to modify culture. This will probably continue even as media diversify. Mainstream media are already increasingly in competition with other channels of entertainment which offer other cultural messages.

David Weltman's review paper presents a case study of the media representation of the British white working class, especially males[34]. Whoever holds power over communication sets the terms of reference for the cultural story. Current media control is held by the middle class, and Weltman argues that the white working class are seen through a middle class perspective, frequently pathologised as moral failures and lacking

self-management. They are seen primarily in leisure and family contexts, in work or in political activity only in extreme circumstances, such as industrial disasters, when individual 'working class heroes' emerge, while the conditions that caused the disaster remain unaddressed. In contrast, the non-white working class are often presented as economically deprived and oppressed – fitting into the contemporary agenda of recognising diversity.

Two other kinds of marginalised social groups having several commonalities are covered in the reviews. Ruth Gwernan-Jones considers three types of disability, and Aubry Threlkeld explores non-heteronormative sexuality[35]. Both domains are characterised by marginalisation, stigma and the management of identities in reaction to those societal positionings. They have both also been subject to a 'medical model' of explanation and de-legitimation as well as, or in tension with, a social construction model.

The groups are marginalised because the dominant society positions them as 'different' or 'deficient'. This marginalisation is not only through language but also manifests itself materially and structurally. For example, for disabled people, a world of tools and mobility that has been built for the abled, excludes or limits their engagement. For other marginalised groups, routes to personal growth and adult fulfilment are thwarted by the absence of publicly recognised and valued models of, for example, their sexuality, and/or the absence of legal recognition of their relationships. It is not only a matter of 'I am not able, or allowed, to be what I authentically am' it is also a matter of 'How, as a growing person, can I find out what it means to be what I authentically am'.

Within such a framework, when the dominant group tries to overcome marginalisation it tends to be by addressing discrimination and 'diversity' issues. However, the minority group's response may affirm an identity which denies the 'disabled' label altogether. Such identity politics aim to overcome not only discrimination but also the labelling as 'other'. In response, the structures that support the normative may adjust to include the hitherto marginal and so normalise it – an example would be if in all new buildings the transit between levels is never by steps but only by ramps, escalators or lifts, as is indeed the case in many airports.

Gwernan-Jones addresses several kinds of 'disability' in these terms. As she writes, the 'disability model' challenges the medical model, "encouraging a trend toward active, vocal disabled people, many of whom perceive their disability as a part of a positive personal and social identity and….would prefer to keep their disability rather than have it 'cured'". The case of d/Deafness is a strong example. The Deaf community positively assert that theirs is an alternative linguistic culture with a rich language, and not a 'deficit' situation. Cochlear implants for example make them less than completely effective members of the hearing culture; technology does not necessarily 'help'. [b] Dyslexia is slightly different; there has been a cultural shift. Partly because of the technologies that compensate for aspects of dyslexia, it has become a much less marginalising condition. However, these technologies are not targeted at dyslexics, or not only; they are part of cultural changes which have, almost incidentally, reduced the exclusion, marginalisation and stigma of dyslexia.

Threlkeld explores the way that heteronormativity still prevails in education, despite the significant changes that have taken place within the dominant culture in the legitimation of queer experience. He argues that anxieties on the part of the education

[b] I am reminded of H.G.Wells'story of the sighted man in the kingdom of the blind. Contrary to the 'dominant' platitude, 'In the country of the blind the one-eyed man is king', the sighted hero's sense is regarded with bewilderment by the inhabitants and he is pressed strongly to remove this unnecessary attribute. What he can see is either experienced by them through other senses, and so is routine, or is incomprehensible and irrelevant.

establishment regarding teaching about sex, prevent appropriate teaching about sexualities. By prohibiting discussion of, or exposure to, alternative sexualities, a culture of heteronormativity, with homophobia and bullying, is perpetuated and young gay people have no legitimate framework within education for developing their identity except as marginals, defined by the dominant group. Censorship about gay identity also operates within the world of video games geared to children. In contrast, even the mainstream media have greatly expanded and normalised the representation of queer life and identity, although with a rather restricted and glamorised stereotype of 'gay lifestyle'. New technology and the virtual world provide extensive resources for defining and developing a variety of queer identities. Queer identity politics have successfully normalised gayness such that homophobia is – at least in some circles - the new 'pathology'. Nevertheless, this is still in definite tension with the message that young people get about the marginality of gayness and it is a far from universal message.

Section 4: Community and identity

In the foregoing discussion of identity, much of what has been covered which applies to 'community' because so much of identity derives from community participation and membership. For example one's social group is a primary source of identity, and the management of identity through technologies such as Facebook and MySpace is in fact a community activity. Youth subcultures, as described in Sarah Riley's review, are communities. The discussion of 'place' and identity, as discussed by Nick Nash and Heike Doering, are also manifestations of community.

The reviews by Doering, Nash, Magioglou, Riley, Gwernan-Jones and Threlkeld all present examples of how elective belonging to a community may be empowering. Identification with a group with common experiences of marginalisation can affirm an identity that resists and redefines the construction by the dominant group – as we saw in Gwernan-Jones' and Threlkeld's reviews. Nash and Sindic describe how perceived threat or risk – whether natural, of human origin or political – lead to community solidarity both in constructing a shared meaning, and in promoting collective action. In intergroup relations research, the importance of external threat in shaping both ingroup identity and ingroup solidarity is widely documented, as Sindic discusses. The creation of new states, and the reconstruction of states that have been suppressed through invasion or annexation, are marked by a combination of collective memorialisation of a former community, and explicit rejection of the oppressor/enemy[36].

This narrows somewhat the discussion of community as a distinct entity. I will focus on broad issues of technology in the context of definitions of community.

4.2 Community – a contested concept?

'Community' is a diffuse concept, made more messy by its values baggage. Idealised versions of community as a place of safety, support and empowerment exist alongside perceptions of communities as pernicious agents of conformity. Each rests on a somewhat different analysis of what community members do to and for each other. The centrality of community is also problematic; behind liberal (and neo-liberal) enthusiasm for individualism and autonomy lies the assumption that the individual can transcend or resist his or her community, a position critiqued by communitarians and also by cultural psychologists who argue that we are inherently 'social' in all aspects of our lives[37].
But what constitutes a community? David Studdert's review, for example, asserts that community is more than contiguity – whether local or based on common interests; a community involves shared 'beingness together', an interaction that carries commitment and mutuality, not just sociality[38].

What are the processes of 'community' and how may they promote public or individual 'good'? The basis of Robert Putnam's communitarian stance is that communities are bound together by groups engaging in leisure activities, they create bonds and bridges that both empower members within a common identity, and lay the foundations, through local engagement, for the larger stage of national civic participation[39]. The community is therefore the source of social capital which is in Putnam's view the infrastructure of the democratic process.

4.3 Communities and new technology

It has been a recurrent almost moral panic that new technology destroys community. The flight, supposedly, to individualised communion with machines or to technological communication stripped of face to face interaction and warmth reflects some of the value baggage described above, and to some extent, Studdert's critique also. However, technology in the form of telecommunications has been sustaining community for over a century. The key questions commonly asked are whether digital technologies enhance community or lead to atomisation, and whether online communities replace or reinforce offline communities?

Manuel Castells for example takes a structural – and radical - view, that the 'network' is the basis of all societies, and what new technology does is to speed up, facilitate and make more explicit what has been around throughout history (and prehistory)[40]. We connect to others through sharing information. This is a two way process between persons and a multi-way process amongst social groups. We can expand or contract our network by adding people with whom we share information. We can exercise power over our information and over persons by inclusion and exclusion, and selective information-sharing. This is the basic structure of any community. In early history when communities were small and face to face, the reciprocity was obvious. With greater distance and larger groups, the apparent vertical, and controlled, passage of information arose from the long time-lag between sending and receiving, but Castells argues that the basic structure was the same. Modern technology restores the swift reciprocity of the network. This can be democratising or it can lead to control.

To create online communities requires effort and skill, and individual agency to join them. The extent to which these confer the sort of 'belongingness' that Studdert's definition requires is open to debate, but there appears to be consensus that one basis for community – on or off-line – is shared values or interests. People join groups because they like being with people like themselves. This is something easily facilitated in virtual space. Doering argues that a 'cosmopolitan' identity derives from a community – whether face to face or virtual – that is really the concatenation of people from different nations who have common lifestyles and experience and who are probably not entering into the 'local' community in the geographical space they inhabit.

Two further examples challenge the anxieties about the 'death' of the face to face community. Keith Hampton describes the difference between dystopians who consider that new technology is destroying face to face life, and utopians who see the virtual world as the new location of thriving communities; he points out that the 'loss' of the community as it is described by dystopians long preceded new technology, and that in fact relatively small numbers of internet users describe themselves as members of a virtual community (though this may be changing)[41]. Online communities often overlap with off-line communities. Hampton's ethnographic study of a small, newly built community in which 64% of residents were 'wired' from the start of their occupancy found that those who were wired were more likely to interact with their neighbours on and off-line and were more connected to their community.

In a review of studies of young people's use of the Internet over two decades, Valkenburg and Peter found that, in contrast to fears that it would be socially isolated young people who spent more time on the Internet, it was the more socially competent who became active in using the internet as part of their social networking[42]. They integrated Internet interaction into their social lives. However, more socially anxious young people do prefer the more distanced, less face to face aspects of computer interaction. The authors conclude that in general Internet connection makes it easier for young people to self-disclose – and self-disclosure is an important part of establishing connection. This benefits boys more than girls, and social isolates more than the socially skilled. But the overall conclusion is that Internet connecting strengthens and expands social networks and communities.

Section 5: Citizenship – what is it and how do we foster it?

Like 'community', 'citizenship' is a contested term. This is for two distinct reasons. First, the changing landscapes of nationality, immigration and globalisation have raised questions about what constitutes entitlement to citizenship status, alongside the moves made by governments to both include 'new' citizens through various hurdles of 'integration' and to exclude potential new citizens. Second, civic participation, as the mark of 'citizenship', has become contested. Much research and policy writing around participation concentrated until recently on conventional forms of participation, especially voting and party support activities. Both the realities of young people's civic engagement and changing theoretical perspectives about 'participation' have extended 'participation' to include community action and making one's voice heard through collective action[43].

Globalisation does not offer citizenship and is unlikely ever to do so, but arguably, secure national citizenship enables the pursuit of global goals. The concept of the 'global citizen' is not therefore a status but a way of managing multiple layers of identity and having responsibility to multiple communities. Globally mobile and migratory people require the legal stability of clear national citizenship to protect and support their interests, their entitlement to participate in the democratic process, and also their identity. The EU creates another layer of citizenship status bringing with it additional rights and responsibilities. Whether or not there is tension or synergy between national and EU identity, EU citizenship status extends certain freedoms to members (eg the freedom to work, the range of institutions to which the individual can appeal for support). However this also has the potential for increasing social and legal controls.

5.2 Civic participation[c]

There has been much hand-wringing in many countries at the drop in young people's voting in national elections. Gloomy prediction of 'threats to democracy' abound. How far the USA election in November 2008, in which 53% of young people voted compared to 37% in 1996, reflects a trend or a blip is uncertain[44]. At the same time, young people's increasing participation in other forms of civic engagement besides voting is being taken seriously. These data give a considerably more positive picture of young people's civic engagement.

The shift in perspective began forty years ago as social movements such as civil rights and other forms of social protest emerged, and their role in political life was recognised[45]. Increasingly we are seeing research on the role that making one's voice

[c] In addition to the reviews by Magioglou, Murakami, Reich, Ververi and Vass, I will draw upon data from the IEA 28 nation study, my own 2005 data on British young people, and studies from the Macarthur Foundation program on civic participation and new technology[c].

heard through collective action plays in the development of young people's political identity. Additionally, community action has come to be included in 'participation' both as a consequence of communitarian theory and also in the light of data that youth community action participation predicts adult engagement[46].

What promotes or fosters participation is also a contested field. Many writers have argued that knowledge is the key. However the evidence suggests that knowledge by itself does not promote motivation to engagement. Participation in hands-on civic experience especially if it can be seen to make a difference and is accompanied by reflection on the experience, appears to promote civic engagement as does experiencing a democratic classroom. As Reich notes, data relating specifically to new technology suggest that using blogs and wikis to make one's voice heard, and gaming opportunities for proxy experiences of participation facilitate civic engagement. There are caveats; making one's voice heard via blogging may be as much about media self-expression as about really trying to have an influence on public opinion; more research on this is needed.

5.3 Alienation – what is it?

We need also to consider what creates political alienation and a sense of civic inefficacy. As one example, in a 2005 British study, 25% of over 1000 11 – 21 year olds had not participated in any of the diverse civic activities listed (the list did not include online activities)[47]. Thalia Magioglou's and Kyoko Murakami's reviews explore the sense of civic inefficacy - powerlessness and disengagement - amongst many young people. One source may be that education in many countries still is based on authority and hierarchy which is sympathetic neither to the cultures of disadvantaged youth, nor to those youth who experience a different way of interacting with the world through new technologies. In addition, as Sarah Riley also points out, the extended period of 'youth', the ephemeral nature of much work, its associated insecurity and also mobility, are destabilising, and may contribute to uncertainty as to which community constituency one belongs. The research data strongly suggest that individuals for whom group identity is more relevant are more likely to participate in civic activities. A consequence of this, Magioglou argues, is that many young people expect to participate in the future, rather than now; they feel like 'citizens in waiting'.

5.4 The overall pattern of civic participation

The most comprehensive picture of youth involvement internationally comes from the 28 nation IEA study which involved over 90,000 young people aged 14-17[48]. The data were collected in 1999. The countries included England, the USA and Australia, and several European countries, both 'east' and 'west', also two Latin American countries.

- 80% expected to vote in national elections in the future
- 59% expected to collect money for social causes
- 45% expected to collect signatures for a petition
- 44% expected to participate in a non-violent protest march; the figure for England was 28%
- about 15% expected to participate in various forms of illegal protest; the figure for England was about 11%

In current civic action;

- 28% had been active in a school council; 19% in England
- 28% had collected money for a social cause; 55% in England
- 15% had participated in an environmental organisation
- 6% had participated in a human rights organisation

Three-quarters of students claimed that the strongest messages they received from school about civic participation concerned cooperation with others, understanding people who have different ideas and how to protect the environment. In comparison, 64% had learned to be patriotic (54% in England) and 55% had learned the importance of voting (41% in England).

5.5 Types of civic engagement

Four distinct patterns of current civic action emerged among the 2005 British study; conventional participation (such as voting), making one's voice heard, helping in the community and 'active monitoring'. The latter involves paying attention to the news and discussing current affairs with friends and family, but did not involve current civic action. It was however associated with expectations of future engagement[49].

Joseph Kahne and Joel Westheimer identify three kinds of civic engagement which both incorporate types of action and the political intent of the action[50]. These are 'ideal types' but they overlap with emergent data. The personally responsible citizen obeys laws, acts responsibly, volunteers in times of crisis, and believes that to solve social problems, citizens must have good character. The participatory citizen is active in organising community efforts and knows strategies for accomplishing collective tasks. They believe that to solve social problems, citizens must actively take leadership positions within established structures. The justice-oriented citizen critically assesses social, political and economic structures, seeks out areas of injustice, and knows how social movements can effect systemic change. They believe that to solve social problems, citizens must question and change established systems and structures.

This model reflects a strongly liberal version of democratic action and goals. As a contrast, Olga Ververi's review critically describes the OECD's parameters of 'civic competence' currently being drawn up for the direction of civic education in the EU[51]. These include desired 'intended behaviours', knowledge and values, mostly deriving from work on civic engagement including the IEA study. She argues however that the emphasis in the EU proposals is on the local community as the place for addressing social problems, which avoids collective action or seeing issues in the larger political and economic context.

This derives from an explicitly communitarian perspective in which, according to Ververi, 'social capital' is located in the face to face community. The proposal specifically removes from the list of goals anything relating to protest (which includes lawful demonstration, boycotting products or signing petitions), and 'positive attitudes towards immigrants' – on the grounds that this is 'sensitive', being linked to right or left politics. In conclusion, she says "it seems that the EU perception of citizenship is about a citizenship modality which does not aim at radical social changes but it intends to perpetuate the current order of things." As we shall see, this is even more evident in how the EU perceives e-citizenship.

Participation in some form of service activity, or other contact with 'real world' issues, appears to facilitate engagement as long as students have an active role in planning the project, and in directly reflecting on the experience[52]. As an example, Westheimer and Kahne compare two projects. In one the task was to gather data on local opinion about community services; in the other, the task was to find out about deprivation, inequality of access and violence in their community. Both programmes 'worked' but in different ways. Both groups increased their sense of civic efficacy and their belief that the government had responsibility for those in need. The first group, however, showed increased knowledge and social capital. In contrast, the second group developed much increased interest in politics, leadership efficacy and personal responsibility, and structural explanations for poverty.

5.6 New technology and engagement

New technologies have greatly expanded the scope of participation. As Reich and Vass describe, wikis and blogs have become a major means for making one's voice heard. The Obama campaign capitalised on new technology, in distributing its message, in recruiting and mobilising an online community of support, and in disseminating news. Many argue that this has transformed campaigning forever, the entire process reflecting a grassroots model, being bottom-up not top-down[d], even though the 'bottom-up' engagement was orchestrated in part by the Obama campaign machine.

The beginning of web-based activism is often ascribed to the WTO protest in Seattle in 1999, where 50,000 people were recruited electronically to participate in a demonstration[53]. Later followed anti-Iraq War actions worldwide. Website-based campaigns and blogs proliferate, even when unaccompanied by physical protest[e]. As Lance Bennett, from the MacArthur Foundation initiative, points out, a positive interpretation is that young people are becoming more empowered via peer networks and online communication to express themselves and make their own creative choices[54]. A more pessimistic interpretation is that, despite their increased sense of efficacy, youth are becoming disengaged from conventional political activity, but more involved in consumer politics, on MySpace for example.

Bennett sees a product of new technology being a shift from what he terms the 'Dutiful' to the 'Actualising' citizen. The Dutiful citizen is the 'traditional civic education [textbook] ideal' who feels an obligation to participate in government-centred activities, to use mass media to become informed about government issues, to regard voting as the core democratic act, and to join civil society organisations or express interests through parties that typically employ one-way communication. In contrast, the Actualising Citizen has a diminished sense of government obligation and a higher sense of individual purpose, voting is less meaningful than more personally-defined acts such as consumerism, community volunteering or transnational activism. The AC mistrusts the mass media and politicians and favours loose networks of community action, often sustained through friendships, peer relations and social ties maintained through ICT.

Jeffrey Juris describes the 'cultural logic of networking' - changing the underlying metaphors of social action: "The self-produced, self-developed and self-managed network becomes a widespread cultural ideal, providing not just an effective model of political organising but also a model for re-organising society as a whole" (p. 353) [55]. This reflects the same pattern of horizontal connection, open information and decentralised collaboration that Reich in his review attributes to new technology's civic potential. But there are downsides of such developments; what happens, for instance, if no-one responds to one's blogs, or only the already converted? How can we control offensive blogs – and the communities whom they serve?[f] And how best can we develop civic curricula that enable young people to achieve the full political as well as personally-empowering potential of ICT?

Already a 'bottom-up' model of democratisation and e-citizenship may be being constrained. Olga Ververi unpacks how the OECD appears to see the potential of e-democracy for technological infrastructures to "mould citizenship into a narrow, quiescent and consumerist model of civic action". Three OECD objectives suggest e-democracy exclusively operated by government as a means of disseminating information

[d] A somewhat curious side effect has been 'astro-turfing', the creation of spurious websites that purport to present a 'grassroots' viewpoint which in fact undermines the candidate.
[e] In April 2009, young people in the former Soviet satellite of Moldova used text-messaging, Facebook and Twitter to rally 10,000 protesters within a few hours, in the capital Chisinau.
[f] In February 2009 the Dutch government struggled with the tricky question of whether, and how, to control a wild card politician who is being offensive about Islam (in blogs and other media), yet is democratically entitled to freedom of speech.

and controlling decision-making, dialogue and networking and the political agenda. These three objectives are:

- Information: a one-way relation in which the government produces and delivers information for use by citizens
- Consultation: a two-way relation in which citizens provide feedback to the government on issues that re-defined by the government, and where information s provided by the government
- Active participation: a relation based on partnership with government in which citizens have a role in proposing policy option and shaping the dialogue, but the final responsibility for policy-making falls to the government.

These are clearly extensions of current consultation practices, which have indeed recently opened up dialogue considerably, but nevertheless they reveal the assumption that new technologies will make more facile and controllable what is already happening. Management of e-democracy is explored also by Stephen Coleman within the MacArthur programme[56]. He points out that differing views reflect different conceptions of young citizens. On the one hand, in 'managed citizenship' young people are regarded as apprentice citizens in the process of transition; "they are human becomings rather than human beings" (p.191). Their 'apprenticeship' entails learning how to exercise responsible judgement in a risky and complex world, including the Internet as an anarchic realm which is unsafe for young people "not only because their social innocence might be exploited by predators but also because they are politically vulnerable to misinformation and misdirection". (p.191)

In contrast in 'autonomous e-citizenship', proponents refuse to see themselves as 'apprentice' citizens, they argue for themselves on agendas of their own making and youth is "a reflexive project in which narratives of emergence, socialisation and engagement can be renegotiated by each new generation" (p.191). The very anarchy of the Internet appeals, a "relatively free space in which untrammelled creativity and acephalous [headless] networks can flourish" (p.192).

Coleman sees the limitations of managed e-citizenship at least in part as over-protecting young people, avoiding 'sensitive' issues, distorting the political world with its emphasis on friendliness, deliberation and consensus: "a virtual community of well-trained democrats who would be lost in any real political party, trade union or local council". (p.192) On the other hand, autonomous e-citizenship can be dislocated from the structures and processes of effective power, preaching to the converted and paying little attention to opposing views or entering into deliberative debate, and focusing mainly on single issues.

5.7 Game for politics?

I will finish with civic gaming. Henry Jenkins argues that the new participatory media offer "many opportunities for kids to engage in civic debates, to participate in community life, to become political leaders even if sometimes only through the 'second lives' offered by massively multiplayer games or online fan communities"[57]. Kahne, Middaugh and Evans explore the effects of "civically-oriented video game experiences that parallel the classroom-based experiences that previous research has found to promote civic outcomes."[58]. Therefore they looked specifically at games in which players helped others, organised groups or guilds, explored social or ethical issues, learned about a problem in society, or had to make decisions about how a community, city or nation should be run. The study looked at the relationships between game-playing, civic participation and interest in politics.

The quantity of game play does not correlate with civic participation, but the characteristics of the game, and with whom it is played, do correlate. Those who play more civic-related games are on average 15% to 20% more likely to participate in civic activity than those who play fewer civic games. Playing the online game with others present is more likely to show an effect than playing online at a distance. The effect is considerably increased for those players who additionally participate in websites and discussion groups related to the game. These data are supportive of the enthusiasm expressed by several people for gaming as an educational tool.

However sceptics remain, and more data is needed. For example, it is unclear yet as to whether a pre-existing interest in civic participation leads young people to play more civic-related games, or whether participation in such games expands ones interest in real life civic participation. Nevertheless, there is a clear relationship and the potential for future educational development is there[59].

Section 6: Overview and reflection: change

I will focus on three issues, within technological development and each of the three domains:

- what will not change
- what are likely to be continuing trends and their implications
- what is uncertain, and the implications of this.

At the beginning of the Report, the question was posed: 'what will not change?' It is my view that the following will not change:

- The need for a strong personal identity and sense of self, affirmed by one's social circle. This encompasses also an identity which may incorporate as part of itself the capacity to move between versions of self and to be skilled in managing these in different social contexts
- The need to be part of a community. We are social beings and we function in connection with others. This connection includes affirmation of self, and the sharing of information. It also includes identifying with particular groups of perceived shared characteristics – be it place, work, values or shared interests. Technology has for a long time enabled these functions to be non-local, as well as enabling a strengthening of local face to face contact; new technologies extend these functions
- For many people, civic participation is primarily about maintaining one's community. For some, it is about improving (and so changing) the condition of members of one's own or another community; it is therefore about exercising influence on those with power. The targets and methods may change in future but the function, I think, will not.

6.2 What continuing trends are identified in the Challenge

Technological developments:

- Technological developments will become less expensive, with more streamlined and more usable personal devices routinely owned by young people; many existing barriers to access will go, as costs drop and skills become normalised
- Both young people and adults will quite rapidly adapt to new technologies on a 'need to know' basis, and social practices will be modified by the potential of the new devices.
- The opportunities for network communication will expand as will expectations that people will be available on networks

- Gaming will become more sophisticated and also more diversified in content
- Storing information on one's personal device will replace other forms of storage

Identity:

- People are likely to become increasingly skilled at managing 'multiple' selves, and moving between them, in part because of increasing demands for flexibility in adult life/work, in part because this is an enjoyable activity both in the virtual world and in youth social life. This could be healthy, competent management of ambiguity and complexity, but for some it may be destabilising and fragmenting
- Minority identities are likely to become increasingly less marginalised through a combination of effective identity politics, modifying mainstream cultural discourses and technological developments overcoming some of the obstacles to full participation.
- National identity is likely to remain a significant part of personal identity, but this may be less of a self bounded by criteria of 'we' versus 'they' and more a permeable self definition offered in interaction with other nationals.
- With more permeable boundaries between different aspects of self, and between work, leisure and also location, how people choose to describe themselves may become more open; the increasing 'public' and informal opportunities for self-presentation (such as Facebook) permit this.

Community:

- Community is a fundamental human structure and likely to remain in a variety of forms.
- Communities may increasingly combine off and on-line interaction and virtual communities may occupy more people's time with the development of Facebook and MySpace 'communities' where people 'friend' both known and not known people
- Face to face communities are likely to remain important where location is a significant part of identity, but communities based on common interests are likely to become more significant, both on and offline

Citizenship:

- The current ambiguities around citizenship status are likely to become more complicated with increased immigration and there will be moves to regularise, and control.
- Given international concerns, civic education is likely to gain a higher profile in the future. The enlargement of the curriculum to include innovative methods such as forms of gaming is likely, in view of the data supporting this. The 'official' civic agenda however may conflict with the already-developing goals and activities of young people who are engaged in participation.
- The use of blogs and wikis for making one's voice heard, and creating transnational pressure groups, is very likely to increase, particularly if major political issues become fore-fronted in the news and the subject of widespread blogging – such as the environment or human rights.
- At the same time, there will be more consumer-related online activism and also more partisan/interest group activism of less liberal tone, which would proliferate under perceived threats (such as immigration or terrorist action)

6.3 What is uncertain

Technological developments:

- The extent to which the gatekeepers of information will attempt to control access and use and how far will such constraints affect, if at all, young people's access to information sources

- The extent to which information overload will cause people to self-censor or limit the network universe to which they 'belong'
- How necessarily increased security both for hardware and software will be managed, to create a safe environment for communication

Identity:

- What would a 'global identity' mean, aside from the value of not being nationalistic; how will people manage the more permeable boundaries between nation, the EU, and the 'global', particularly under conditions of threat (such as increased immigration)
- How far people will wish to assert a dominant, or core, identity, and if so, in which life domain will it be. How far will traditional classifications, often coded primarily for bureaucratic purposes such as ethnicity, nationality, disability, remain useful
- Given the agency that young people have through technology to define their identities and experiment with identities, how can we equip them to do this safely
- While multiple identities will be managed, there are many ways this can evolve

Community:

- The extent to which any community is strengthened by threat or adversity, as suggested by both communitarian and intergroup relations theories, or whether adversity prompts retreat into individual survival strategies, and under what circumstances each occurs
- How far online communities develop 'sociality' and 'belongingness' leading to mutual affective support.

Citizenship:

- A major uncertainty is about values: to what extent will economic pressures in conjunction with immigration and perceived cultural threats, precipitate a shift to more a conservative, exclusionary, public mood.
- To what extent will the Islamic world become more unified within a moderate worldview, or become fragmented into factions which will affect both identity and civic issues for Muslims and other faith and secular communities
- How far might further environmental threat lead to greater resistance from young people, and how far to disillusionment
- To what extent will young people feel empowered to take risks in expressing their views, and the extent to which systems are put in place to limit their online power, or to delegitimise their use of it.
- To what extent will the increased empowerment deriving from technological access be used for civic participation, and to what extent will it be diverted into consumerist action or self-promotion
- Civic status, and the criteria for inclusion and exclusion, may become more regularised but it is not clear on exactly what basis and how much freedom people will have to define their civic status.
- The motivation for civic participation rests on a combination of personal efficacy, moral and social concern and belief that an effect is possible within the system. The political and economic situation can vary to the extent that apathy and alienation (include a retreat into individualism) may be a response, or a drive to collective action.
- The dominant cultural values may change radically. Currently these are primarily 'liberal' in the broad sense with concerns about under-privilege, diversity, rights, freedom of choice and the environment. A more hostile economic environment, perceived cultural or military threats, or a moral reaction against a consumer-hedonic culture may each precipitate a considerable value shift in the next two decades.

- What 'globalisation' means is diffuse; in all its versions it is 'uncertain', except possibly global multi-national expansion. While people may become more 'globally aware' – about other peoples and cultures, about identifying with a world religion that transcends national boundaries, about the environment, about the possibility of adopting a transnational identity – the form(s) these will take are highly uncertain.

6.4 How might schools adapt?

Interactive media provide many opportunities for opening up new ways of knowing and working, and developing new competences (such as collaborative working) which are much more appropriate to contemporary life. In education however both adoption, and the transformation of practices, has been slow. Too often into the classroom technology is used as an adjunct to traditional methods, another source of information, not as a way of transforming how information is used. Pupils often report that the school use of technology is both boring and irrelevant. Vass and Reich both argue in their reviews that the disconnect between current educational culture and new technology is huge.

Access to technology is indeed one block. Developments may be constrained by unequal access to both equipment and skills. However this may be a temporary obstacle. It is very likely that within five years hand-held devices that can access the Internet will be affordable, or available to, everyone who now has a mobile phone. But is this the whole story behind slow adoption? In part there is a perceived cultural divide between leisure/pleasure versus learning. Currently many schools ban mobile phones. This distances even more the routine 'leisure' aspects of new technology from their potential for formal learning.

The trends are also subversive. One powerful message from this Challenge is that interactive technologies subvert the fundamental metaphors and rhetoric via which we have hitherto managed our relationship with information, especially in education[60]. To a large extent, the basic metaphor of school-based learning has been that the teacher facilitates and channels information to students, in ways designed to maximise the students' ability to process and absorb it. Within that there are a variety of means. These methods include direct knowledge conduits which are top-down. They create opportunities for students to learn information through praxis or through discussion and collaboration. These however are usually choreographed to the extent that the opportunities have a known successful outcome. Another version sets up a framework in which the goal is to train students in a way of thinking itself, whether in the scientific method, in critical thinking or some other mode. In all of these, first, the teacher has a central role and is the orchestrator, even if off the scene. Second, the primary target is the individual learner's performance, as an individual.

Shared participation in an action, and the action itself changing that with which it acts (for example editing and modifying wikis) both sidestep the role of the teacher as manager and authority and blur the boundaries between expert and novice. Interactive technologies are inherently 'bottom-up', driven by the agent who is acting on the information and its source, horizontal rather than vertical, and, potentially if not exclusively, collaborative. Many quoted in the discussion of citizenship claim that the very system 'democratises'; it is a metaphor of democracy and interacting with it is an act of democracy. This applies to identity and community functions as well as citizenship. But it can also be a metaphor of anarchy. The apparently anarchic lack of boundaries, including boundaries between individual and collaborative thought and action, contrasts with conventional education and particularly with a model in which achievement depends on the individual working alone. There is a profound tension between investment in individual achievement and performance and the kind of open collaboration we see in new technology.

The tacit or explicit assumption that current institutions can graft on new technologies to existing practices is in my view misguided. In order to take advantage of new technologies, and to bring into formal education what are increasingly the routine and taken for granted practices and skills of the rest of the student's world, schools will need to rethink the top-down model of education, and find ways to facilitate, and orchestrate, these bottom-up, often collaborative, practices productively.

One adaptation must be to enable students to work collaboratively and interactively, with distributed knowledge management as the objective, so changing the teachers' role from a hierarchical conduit to a facilitator of collaboration, critical thinking and synthesising. Individual devices, whether notebook-style computers or future-generation iPhones, will need to be incorporated into the classroom as routinely as notepads and books are today.

The Report has focused on the implications for school education primarily because most of the available data referred to has been around school, or school-age adolescents. It is also in the conventional school context that most of the gaps between practices are evident. The evidence cited in the Report from a variety of out of school activities suggests that in more informal settings, the adaptation to new technology and new social practices is more flexible. In tertiary education, though the Report has not addressed this, there has always been more scope both for individually-directed learning and for novel forms of pedagogy, even if the majority of teachers in such institutions do not adjust their own teaching practices. Lifelong learning, adult education, already has capitalised on new technology in a variety of innovative ways.

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Challenge 3: Knowledge, Creativity and Communication

Dr Carey Jewitt, London Knowledge Lab, Institute of Education

Section 1: Introduction

This report considers the potential effects of social and technological change on the character of knowledge, creativity and communication over the next three decades. It draws on evidence and insights from a set of 20 commissioned reviews in order to suggest longstanding trends and major issues of uncertainty for the future and the potential implications of these for education.

The purpose of this report is to enable people to rapidly access the knowledge, evidence and ideas identified from the challenge area reviews in order to support, inform and promote debates on the possible futures of education. It does not offer a clear consensus or set out to design the future.

A set of 20 reviews was commissioned that cover a broad range of topics key to the challenge of knowledge, creativity and communication and the futures of education. These include risk, identity, global expansion, neuroscience, affect, collaboration, participation and networking, innovation, representation, multimodal design, curriculum, argumentation, information, the role of institutions, learning, community, connectivity, convergence, literacy, and knowledge construction. The reviews are written by leading figures in the area of knowledge, creativity and communication drawn from the UK, Sweden, Germany, USA, Australia, and South Africa.

Two consultative day events were held to inform the challenge. The events ensured that the Challenge outputs were informed by consultation with leading-edge science and social science thinkers from across a range of disciplines. The events included a mixture of presentations, workshop discussion and activities and were attended by participants from a variety of disciplines.

Section 2: Findings

This section presents key socio-technological trends and issues synthesised from the reviews commissioned for the challenge area. What clearly emerges from the evidence is the need to look at the interaction between the social requirements of knowledge, creativity and communication and the practices that the development and use of technology is always embedded within.

2.1. Long-standing issues and trends

A long-standing issue or trend is one that several reviews anticipate will be relevant to the landscape of knowledge, creativity and communication in 2025. This section outlines ten long-standing issues and trends for the future. 1) The practices and knowledge associated with dealing with increasing ease of access to increasing amounts of information. 2) The potential for increasing collaboration across time and space and its effects on communication and creativity.3) The ever broadening extent of connection and networking that will characterise the future. 4) The trend towards increasing personalisation and creative customisation of experiences, artefacts, learning and how this shapes communication and knowledge. 5) Changes in the availability, and configuration of representational and communicational resources in the future, and the effects of this on how people engage with knowledge, creativity and communication. 6)

The ways in which literacy and information practices are changing will impact on the role of writing and the emergence of new forms of literacy. 7) Diversifying location, space and site will have consequences for who we communicate with, and how, and sites of learning. 8) The marketization of knowledge is briefly highlighted as a trend for the future. 9) All of the aforementioned trends impact in key ways on changes in knowledge production, the role of the author and the relationship of production and consumption. 10) Finally, the trend towards the openness of ownership of knowledge is discussed.

2.1.1 Increasing access to information

There will continue to be an increase in the ease of access to the information that people have access to and control over, as well as the amount and quality of information. This will expand the possibilities for knowledge, creativity and communication. It will also place new demands and requirements on people, and the development of skills.

What information is and how adults and institutions control and exercise authority over information is shifting. Children now have access to alternative sources of information other than school and the family and this trend seems set to continue. The Internet and portable technology have dramatically increased access to information over the past decade, albeit unevenly.

There have been changes in both the quality and especially the *quantity* of information that is now easily accessible. With this technology, interaction and communication will be 'transformed by objects, transactions and places endowed with the ability to speak themselves – an ability inherent in almost all schemes for the deployment of ubiquitous informatics now being contemplated.' (Greenfield 2008:57 cited in Carrington and Marsh). The development of more sophisticated context-sensitive technologies will mean that people will have access to relevant information and texts at the point of need. Price et al, point out that intra-body interfaces that rely on proximity, can use the human body as a transition medium to allow people to store, display, and exchange information. Mobile phones and other multi-functional handheld or personal devices can be carried around, enable access to, recording of and communication of various forms of information and data, including photos, video, scientific measurements, and survey records. This serves to embed information in people's personal experiences and interests. As mobile technologies develop to provide more on-demand services 'cloud computing' will enable people to access information and 'take what they need' whilst being mobile (Price et al). Saljo and colleagues suggest that these digital tools (e.g. search engines, calculators,)serve as powerful extensions of the human mind and are increasingly sophisticated and powerful as cognitive amplifiers (Nickerson, 2005 cited in Saljo et al). Thus powerful human knowledge is built into the design and capacity of digital tools.

New types of literacy will be associated with the capabilities of accessing and handling massive amounts of textual information and the increasing significance of images and other forms of mediated communication (Saljo, Kress, Carrington and Marsh). New searching and writing processes are emerging and will continue to emerge, while some processes will remain constant (see 2.1.9). These changes have implications for cognitive processes and communication. Increases in the amount of information are likely to produce an information environment that requires increased collaboration among people with different knowledge bases and across time and space (see 2.1.2 – 2.1.3). Processes of searching this vast amount of information, and how to seek alternative synonyms for searches will become a key skill as will practices in checking the relevance of information gathered through diverse sources, and skills in the analysis, synthesis, reproduction and collation of information (Goodings).

Information on its own is not the same as knowledge: the latter involves interpretation and signification (Hendricks, 2005 cited in Goodings) which in turn pre-supposes a purpose in acquiring and using the information. The increase in information affects what is valued; in these circumstances our knowing to a considerable extent reflects our abilities to make productive use of such resources in accountable and creative ways for specific purposes (Saljo, Brown, Goodings). As well as who makes and circulates knowledge, the capacity to store knowledge electronically may well shift the central role of universities as the places where new knowledge is produced. People's engagement with huge amounts of data in meaningful ways is, in some contexts, likely to increase the personalisation of information and the production of knowledge, authorship and ownership. Digital technology provides some solutions to the problem of storing information. It provides resources for building up a collective memory of an incredible magnitude (Brown, Saljo).

2.1.2 Increasing collaboration across time and space

Socio-technological shifts will continue to facilitate a greater capacity and ease of collaboration across different locations and knowledge bases. This will involve changes in people's customs and practices and have implications for the production of knowledge, communication and creativity as well as boundaries between the physical and the virtual.

Collaboration has, Horst argues, "become a 'buzzword' which defines the ethos, if not the ideology, of the digital age". Goodings makes the point, drawing on McLuhan that technological environments are active processes that reshape people and other technologies, not passive containers. Technologies are increasing the connection and networks between people locally and globally in ways that redistribute information, roles, relationships and tasks across people's work and home lives. Eventually increases in collaboration are likely to reshape the boundaries between digital and physical, virtual and real, and notions of distance itself. Face-to-face communication will not disappear or lose its cultural value, rather it will be taken on specific roles and meanings.

Collaboration can be understood, in part, as re-thinking the connection of mind, body and environment. It marks a moving away from an educational focus on the individual internal mind. The emergence of a new participatory culture is predicted that will be essential for effective engagement with contemporary meaning-making practice. The notion of *Collective Intelligences* argues that new online communities create access to a new kind of 'knowledge space' explicitly for the production and exchange of knowledge. Sawyer argues that the majority of creative production involves *distributed cognition*. Most of today's important creative products are, he argues, too large and complex to be generated by a single individual. Collaboration enables participants to build on each other's ideas to jointly construct a new understanding that none of the participants had prior to the encounter. Collaboration thus moves knowledge, creativity and communication beyond transmission and acquisition, and engages with patterns of participation in collaborative activity change over time.

Sawyer suggests that collaboration in social networks accelerates innovation because more individuals can have more ideas. This presents the challenge of how to design effective organizational systems that can allow ideas to be developed cumulatively over time in a creative manner. This suggests the need to create learning environments that move beyond opposition or competition. Technology that connects people at a distance will change some practices previously considered individual into collaborative practices. Various information technologies, including the Internet, have enabled new forms of collaboration such as *mash-ups* and *modding.* This form of collaboration and concepts such as distributed cognition and collective intelligence are important for conceptualizing and legitimating contemporary literacy practices. For instances practices such as the

selection of elements from a variety of sources that are then incorporated into a new text for a different purpose (what is referred to as appropriation).

An enhanced participatory and collaborative framework for communication and knowledge is likely to affect social relationships in the future. For example, this may include a shift to more fluid expert-novice learning relationships linked to specific aspects of tasks and technologies rather than traditional adult-child hierarchies (Carrington and Marsh; Goodings). Horst argues that collaborating with experienced members of the community through talk cannot replace learning by observation. She argues that learning by observing, doing and talking are intertwined, and central to participatory learning, suggesting that collaboration online will need to support a range of ways of learning at a distance.

Physical and shareable multimodal interfaces encourage communication and collaboration, and the increasing move toward embodiment, external representations, and physical manipulation of 'digital objects' will put collaboration at the heart of knowledge, creativity and communication (Sawyer, Horst, Carrington and Marsh, Price). Price et al suggest that technologies can provide opportunities for interaction and learning to be more active, hands-on, and directly related to physical contexts. This they argue can lead to new forms of communication and collaboration promoting socially mediated learning. New tools that aid external cognitive support include complex interaction, sense of presence and immersion or embodiment in virtual environments, reorganising and connecting 'spaces' for collaboration. Tangible environments lend themselves to collaborative work, as usually a set of interaction objects can be manipulated both by a group and individually. They serve to increase collaboration by adding the advantages of concrete manipulation to shareable interfaces that encourage communication. Providing face-to-face interaction and multiple, simultaneous users enables the interactive properties of such shared interfaces to support productive collaborative knowledge building. How to translate some of the advantages of this kind of collaboration to collaboration across distances is a challenge for the future. One potential is that technology distributed across physical environments can be used to create collaborative dynamic simulations.

Web 2.0 spaces are significant learning spaces which support playful collaboration and support individuals to learn from others through sharing and discussing content online and scaffold people's creativity through organizational templates that structure text-making (Carrington and Marsh). Communication will become more collaborative and diverse 'affinity spaces' will develop to support more extensive means to engage in participatory activities (Horst, Goodings, Brown). Ito, et. al. (forthcoming, cited in Horst) identifies friendship-driven and interest-driven genres of participation as two motivations which structure young people's collaborative engagement with new media. These affinity groups correspond to different genres of youth culture, social network structure, and ways of learning. Finally, collaboration and affective relations built online (e.g. in MySpace), and the information and communication and networks of connection that they support, are increasingly discussed in terms of new forms of work (labour). Work that does not result in the production of a material object or output, but rather that produces a social relationship, this is often refered to as 'immaterial labour' (see Goodings, Jones, Saljo, Lauder et al).

2.1.3 Broadening connection and networking

A key trend that the reviews anticipate will continue to evolve in the coming three decades is the capacity to connect via different kinds of networks to knowledge, texts and resources, and people. Connectivity is itself seen as a key activity across a wide range of contexts and purposes, in work, education, and life. The practice of staying in 'perpetual contact' is supported by the increased availability of mobile and networked

technologies and the continual drive to hang out, or to be 'Always On' or 'link up' (Horst, Carrington and Marsh).

Networked and digital media has dramatically altered the media ecologies of young people in North America, Western Europe and East Asia (Horst). Web 2.0 social networking sites (SNS) provide opportunities and drivers for children and young people to create dense, sophisticated texts that do particular kinds of social work on their behalf (Goodings, Carrington and Marsh, and Horst). They serve as ongoing representations and commentaries on the lives of users. A profile on a social networking site also serves a commemorative function which is highly shaped by the medium (Brown).These texts mash together print, audio, animation and image and allow individuals opportunities to speak to diverse audiences across geographic locations, to craft representations of self and to reinforce intimate social connections with friends and family.

Carrington and Marsh point out that a new generation is growing up in a culture where it is normal social practice to design and deploy an avatar (or many) in a range of online worlds. They suggest that the growth in social networking and virtual worlds online as social destination for children and young people is linked to the decline of public spaces in which young people can congregate and engage in social interactions. One reason such sites are attractive to young people, Horst argues, that they are largely outside the purview of adults and parents and offer the opportunity for virtual interaction with a wide range of people.

As technologies that enable connectivity and networking develop so will the social practices that drive the need to be connected in everyday lives, and across public and private spaces (Horst). Ito, Okabe and Anderson (2005, in Horst) suggest three practices characterize the mobility of technology. These are cocooning – a personalized media environment; Camping - portable media into public spaces; and footprinting - using media to track of information and to mark presence. Changes in photographic technology have shaped this process. For example, the ways in which people exchange, tagg and annotate their own and others photographs on websites such as Facebook and Flickr has broadened the scope of visually mediated collectively remembering.

The use of mobile technology enables people to participate in creating and maintaining a range of connections using these sites that bridge offline and online contexts. The connectivity and portability of networked and digital media are tied to broader trends in the changing structures of sociability. The constant connectivity that comes with networked media has produced flexibility in schedules and enables people to coordinate and re-adjust their time. The emergence of 'social network sites', or websites and software structured to maximize the possibility and frequency of connections between people, has altered the ways youth interact and develop relationships and stay connected to other teens who are not co-present (Ling, 2004 cited in Horst).

The division between public and private contexts may be dissolving or at least becoming more porous in an age of networked public culture (Horst). This demands different kinds of work for boundaries to be maintained and managed. It has implications for the colonization of different aspects of life by other people and institutions. Goodings discusses the difficulties and ethics of combining SNS with formal learning, as people attempt to balance and maintain the boundaries between aspects of their identities.

Overall, one-to-many communication is becoming more prevalent and creating diverse social contexts that effect for example, literacy and identity construction. This trend will continue to develop and will create more opportunities for creative knowledge production by individuals and groups. One of the fundamental questions in the digital age revolves

around the extent to which new media and technology contribute to increasing connectedness, or to the atomization of society.

2.1.4 Increasing personalisation

There is an increasing trend towards the personalisation of knowledge, and experience. Although it is important to note that not all commentators are convinced by personalisation as an argument or as an achievable aim within education. One of the lessons of emerging virtual worlds is that young people coming of age as literate citizens in the early 21st century have an expectation of personalization through endless customization of experience and of self-representation.

This trend is intricately tied to changes in the social production of knowledge and the remaking of the boundaries between producer and consumer, as well as the commercial market, questions of location, space and place and the development of personal technologies. This trend is likely to continue, and is strongly associated with mobile and ubiquitous technologies that transform and re-mediate experience toward the individual and away from centralised systems and institutions (Price). Carrington and Marsh point out that this movement toward portable and personal technologies matches the ways in which adolescents engage with digital technologies outside the classroom. The use of this technology has the potential to lead to more authentic and engaging learning experiences that bridge school and community contexts, opening up new forms of inquiry.

The ways in which technologies enable data and experiences to be made, stored and manipulated by individuals serves to distribute knowledge in new ways. It is distributed over a series of nodal collaborations and networks shaped and motivated by interest and friendship rather than location (though location continues to be a factor). Thus personalization reshapes the notion of a centralized storage space from physical institution, to the institutional and commercial power of the network (e.g. Flickr or MySpace) that the individual is embedded within.

Personalization is linked with identity work. Goodings notes that the visual appearance of a Social Networking Site profile page is of great importance with many users spending hours modifying their profile page. The constant remaking and customising of a profile page exemplifies the wider web 2.0 genre that is obsessed with creativity and communication. VLEs offer many possibilities for activities that will allow students to recreate settings and experiences that promote creativity, communication and personalised routes through these (Goodings). Users deploy their avatars to create an identity, with physical, social and behavioural attributes (e.g. Second Life, MySpace.). This form of personalisation (and anonymity) offers opportunities to explore and experiment with the nature of self and identity, concepts and relationships. It also offers the potential to engage with views and behaviours of others that maybe difficult to negotiate in the physical world. This is not to suggest that interaction in the virtual world is free of the tensions of social life in the physical world (e.g. online bullying).

Creativity is positioned as a key aspect of a personalised interest driven activity (Craft). Sawyer argues that the goals of standard models of school and work, that is to ensure standardization, are becoming less relevant and that what is now required for effective learning is a move toward personalisation. A significant issue here is the need for new forms of assessment if learning is to be customized to the individual student. For example in the form of portfolios, flexible formative assessment and project based work.

Personalization is seen as a factor underpinning the design of digital environments. There is an increasing focus on learning environments as problem-orientated spaces that are flexible enough to accommodate different interests and to cultivate learning across a

range of needs (Horst). Ito et al's recent work on informal learning with digital media with young people found that personal, or individualized, interests were one of the primary motivators for using digital media for learning. Further Price et al, suggest that giving young people opportunities to express themselves through the representations they create and the use of constructive kits that allow children to build their own, personalized models, stimulating their creativity and imagination, can support deeper learning. The uses of digital technologies are recognised for their potential to promote learning that is 'increasingly more personalized, informal and emergent – rather than the outcome of highly structured institutional practices' (Ravenscroft and Cook, 2007, cited in Wolf and Alexander). This has prompted researchers to investigate how development of effective argumentation might be supported and enhanced with appropriately designed 'digital tools' that enable personalisation.

2.1.5 Representational and communicational resources

Significant changes in the representational and communicational landscape over the next 30 years is a theme across many of the reviews (Carrington and Marsh; Saljo et al; Price et al; Kress and Bezemer; Horst). Changing social demands and technological innovation will continue to shape and reconfigure existing representational resources and practices of communication.

The continued development of audio, sensory, and embodied communicational modes and technologies will alter the place of written, print mode in the communicational landscape. The use of representational and communicational resources will become increasingly reliant on a range of forms of communication, drawing image, writing, action, sound and so on, into new relationships (i.e. multimodal in character). It will offer new modes of expressing oneself, representing the world and manipulating it and new modes of articulating knowing and insight.

Despite the shift away from technologies of print writing will remain an efficient way of communicating in many contexts. Being competent in writing and speech will, however, not in itself be enough for negotiating the future communicational landscape and image, sound, and the body will be further elaborated and extended in the future communicational landscape.

Although concepts of embodiment are not new, current theoretical trends suggest that more importance will continue to be placed on embodied interaction. Sense of presence, immersion and embodiment is a trend that is connected with the emergence of mobile and ubiquitous technologies, but also with developments within cognitive approaches, multimodal theories, learning sciences and neuroscience. Increased hands on learning directly related to physical contexts offers increased cognitive external support for learning. The focus on mind is extended into the external world via a focus on interaction that moves away from mind as internal distinct and bounded and connects body and mind. There is a trend (e.g. tangible computing) for learning environments that increase the pairing of the physical, digital, social interface and human sensory systems. Through these developments technology is redefining understanding of embodied interaction, these include implantable interfaces, proximity interfaces, wearable computing, etc. It is likely, Price et al suggest, that representational resources will expand as technology develops to use of a range of sensory-specific interfaces, including olfactory, haptic and visual that focus on human senses as inputs (smell, touch, vision). The constantly and rapidly evolving relationships between the physical and the virtual body are likely to provide an increased focus on expression, affect and the body.

Increased combinations of representations require people to attend to and integrate diverse pieces of information from different data sources. The degree to which novices are able to focus on and extract appropriate information impacts on their abilities to

engage in effective knowledge acquisition activities (deGroot, 1965; Glaser, 1992 cited in Price et al). The choice of mode and thus modal affordances will become more important for the work of design with respect to knowledge, creativity and communication. The layers of visual symbols, audio, print and hyperlinked meaning-making pathways will highlight the need for a deeper understanding of how modal layers create meanings. Added to this the development of the skills to bring these modes into different kinds of configurations and relations will increase in value.

2.1.6 Literacy and information practices

Literacy and information practices will broaden in response to diverse texts, media, and new purposes for literacy. The desire and need to engage in social interaction and communication at the root of literacy practices remains, what *is new* and will continue is the range and type of media that facilitate this interaction and the emphasis that different media place on various modes. Writing will continue to be a key form of communication but other forms will emerge and become increasingly important.

It is broadly agreed that the communicational and representational landscape is changing in significant ways and that technologies are an integral part of these changes. Key future developments in literacy are likely to intersect with patterns in technological development in relation to ubiquity, convergence, mobilisation and personalization (Carrington and Marsh). The effect of these changes on how people engage with literacy and information practices is complex as the primary purposes of literacy and information have not, and are not expected to, change at the same rate or to the same extent. Saljo and colleagues make clear that what counts as literacy and change is itself contested, some argue that the use of technology might result in losses of traditional skills. Others claim that traditional literacy skills (reading and synthesizing) are more central than ever in engaging with complex and huge amounts of data. Meanwhile, others argue that there is nothing new, that scrolling, skimming and browsing is essentially the same kind of reading that we know from print.

Specific literacy and information practices will continue to become more significant, others will be reconfigured through technology, and some new practices will enter the literacy repertoires of young people and children. New purposes for literacy will continue to emerge from the ability to communicate across space and time with known and unknown people. These will be supported by developments of mobile and social networking technologies and the increasingly embedded character of these in the everyday will produce emergent and fluid sub-cultures and sharing networks which enable a broad set of practices with text. Overall, the blurring of traditional distinctions between producer (author) and consumer (reader) will escalate, and require a complex range of skills, knowledge and understanding.

The ability to understand, use, manipulate and distribute the power of images and sounds will be paramount in the 21st century. It will be increasingly valuable to be able to create multimodal texts that can operate across a range of platforms, to recognize the affordances of a mode will become a key competency, along with the choice of media, skills in use of various modes, and ability to analyze multimodal texts, and to rapidly critique information from a range of sources. To be literate will be associated with a person's potential to be a code breaker, to be a meaning maker, a text user or a text critic (Freebody & Luke, 1990, in Carrington and Marsh). Literacy practices will continue to change, if unevenly and to different extents, with the advent of digital technologies. These new practices will not replace existing literacy practices, rather they will overlay them. This will serve to increase the complexity of learning with the demands of multi-layered meanings and more complex semiotic systems (Higgins, Kress, 2003).

Letters, words and symbols will continue to be an integral part of many texts and print-based texts will continue to perform important social work for individuals and communities. Learners will continue to need to learn the principles of reading and writing print and writing will always be a significant form of communication with high cultural value. However, processes of writing will inevitably change with technological developments that will facilitate extensive on-screen writing such as the refinement of voice-recognition software. The range of multimodal texts and technologies in use are likely to lead to modes other than writing becoming pervasive when undertaking everyday activities. Likewise, repertoires of literacy practice will continue to expand and diversify across different technologies, creating a complex environment and challenging the dominance of writing.

2.1.7 Diversifying location, space and time

Location, space and time will become increasingly important in mediating, constraining and providing opportunities for knowledge, creativity and communication. New sites of learning are emerging, and old sites are being reframed and brought into new relationships with one another. Future developments and social uses of wireless, networked and mobile technologies and virtual and mixed-reality will continue to push boundaries of where and how to distribute information in ways that offer the capability to change learning environments and outcomes (Dourish, 2001; Rogers et al., 2006 cited in Price et al). In the process, the division between public and private spaces is likely to dissolve into hybrid configurations. This may have significant impacts on the production, boundaries and purposes of knowledge. Places and communities that people learn in will continue to be intimately connected to social practices and knowledge, identities, as well as the semiotic resources available (Sefton-Green).

Initiatives to integrate 'education' into the home, or to turn the home into a new site for conventional education are likely to continue. The home particularly the 'digital bedroom' (Livingstone, 2002, cited in Sefton Green) is positioned at the heart of the consumption and use of digital technologies and the marketisation of education and thus within a larger socio-economic geography of learning (Sefton-Green, Carrington and Marsh). Differential access within the home to technological, economic and social capital will continue to shape future models of education.

The re-distribution of the function of schooling across other kinds of sites to form a network of learning is one vision for the future (Sawyer, Sefton-Green). This places significant responsibility on the learner in a further elaboration of personalisation of learning trajectories across a wider 'ecology' of education diffused across a variety of sites- schools, homes, play grounds, libraries and the museum – each of which has the potential to contribute in different ways to education (Sawyer, Sefton Green, Horst). These networks of sites provide potentials for educators to mobilize learning within, between and outside of the classroom in the future. Particularly when supported by context-based ubiquitous, wearable and mobile technologies that augment real-world contexts (e.g. museums, field trips) and geo-networking and physical web technologies that pair virtual online information from social networking sites with physical location and events in the real world (Price et al). This will have significance for the re-organisation of the time and space of education. As a result, the 'geo-social' relationships of learners to their home, communities, non-formal learning spaces, and virtual spaces are likely to be reshaped to offer different kinds of possibilities for engaging with knowledge, creativity and communication. Part of this is the remaking of home school relations and boundaries. Young and Muller drawing on Bernstein, argue it will continue to be important to differentiate learning in schools, colleges and universities from learning in homes, workplaces and communities as boundaries play an important role in creating learner identities and are part of the condition for acquiring 'powerful knowledge'.

Learners position themselves in relation to the wider community beyond their immediate locale through a range of mechanisms including online and virtual communities. Flexibility will become a key feature of establishing new ecologies for learning in the future that facilitate pockets of flexible space, time and ways of learning, reorganize across age phases, curriculum areas, and collaboration. The potential to flex and de-centre time in the school (through the use of technologies) can be used to create a range of spaces for learning that may connect more easily across sites of learning (Higgins). The deployment of technologies will continue to create flexible virtual online spaces for learning many of which are leisure or informal spaces (e.g. games, social networking sites) which may open the door to more complex interactions as well as 'mixed reality' spaces (Price et al, Saljo). The use of features of mobility and sensor embedding technologies may provide new opportunities to re-think space and place organisation in fundamental ways. The notion of network also has implications for the porous character of the classroom and the relationship between schools and the rest of society. Network technologies allow learners to interact with adult professionals outside the school. The use of such networks may lead to learning will become more diffuse and relocated, such as the on-line virtual schools in the USA and Australia offering home-based activities organized at the level of neighborhoods (Sawyer). At its most radical this is a vision of a "de-schooled" future (Illich, 1973, cited in Higgins).

Sefton-Green argues the increasing currency of informal learning describes different processes and organisational structures of knowing in alternative and complementary time-spaces, driven by particular interests and purposes, and the development of new kinds of knowledge-communities. These suggest new ways of learning, being and knowing, that challenge the epistemological conventions of mass schooling. Although, as Goodings points out these may echo learning spaces in offline contexts (e.g. auditorium lecture theatres in second life). Experiments such as on-line virtual schools (Sawyer) and the Institute of Play that merges gaming principles of design with standardized curriculum (Horst), and the Schome project (Sawyer) are likely to expand. However, the school as a site of learning, although transformed and probably diversified is, likely to remain.

2.1.8 Marketization of knowledge and creativity

Access to knowledge and capacity for creativity, in a variety of forms, is claimed to be central to a competitive future in the knowledge economy (Sawyer, Craft, Sefton-Green, Guile). Knowledge and creativity are increasingly claimed to be equally or more important than land, tools or labour in determining a society's standard of living (Sawyer, Jones). Although this claim is disputed, the direct linking of knowledge with the economy serves to reposition knowledge as a transferable market commodity and the child as a social resource for economic potential. This perspective stands behind the increased focus on generic skills and creative innovation industries and positions the development of and access to knowledge primarily in instrumental and competitive terms (Guile). Commercial market forces are powerful in many domains of children's lives and the boundary between the private market and the public sphere continue to blur and shift in significant ways (Buckingham, Sefton-Green).

Several reviews fear that the commodification of skills, creativity and knowledge, will reduce the role of education to meeting the demand for labour (Craft, Jones, Lauder et al, Saljo et al).

2.1.9 Changes in knowledge production

Authorship and ownership of knowledge are being remade by new technologies, indeed in some scenarios knowledge is seen as diffuse and networked and 'in the hands of the people' in a range of activities. The distinction between producer and consumer will

continue to blur to the point of hybridity and practices of remixing will increase toward an intensification of creative production and consumption.

The complexity and unevenness of this emphasis on the purposive action of participants in knowledge production is also noted in relation to structural inequalities that shape the parameters of participation in the new media ecology (Horst, Saljo, Kress and Bezemer). In contrast, other reviews see these changes as superficial and with little real power with control of powerful knowledge remaining located in pockets (nodes) around the globe – in the form of the super research universities, elite universities and multinational corporations (Baker, Young and Muller, Lauder et al). Thus the questions of who is creating/authoring knowledge and who is enabled to access it is key to determining whether these changes will be superficial or not.

Increasing access to digital technologies and the capacities they afford mean text production will increasingly be informed by the processes of 'remixing', 'mash-up' and 'sampling' which involves cutting and pasting, reformulating and recontextualising texts, which has implications for the development of learners' ability to judge sources and evaluate their appropriateness. This remix culture will continue to raise questions of fair use, intellectual property and copyright. Carrington and Marsh argue this will lead to the democratization of the tools of remixing media across a range of modes, purposes and audiences and to a greater expectation of individual creativity rather than static reception of heritage text forms. Goodings supports this view of a move to a more open and free authorship of knowledge, arguing that the *Convergence Culture* signifies a form of participation that perpetuates the creation of user generated content on the Web that enables consumers to archive, annotate, appropriate, and re-circulate media content. Both see this process continuing and escalating into the foreseeable future.

Social and technological changes culminate in a trend toward the intensification of creative production and consumption and these have already led to an emphasis on agency. While this may well be illusory to some degree, young people do act out of such understandings of their power in relation to design and knowledge production (Goodings). In other words, the social changes manifest themselves in an assumption of significant agency on the part of the young in the domain of their own cultural production (Goodings). This trend is not fully developed with social class, race and gender differences in the access and skills that young people have in production. More subtle shifts in the relation between reader and author are a part of this trend, attending to the ways in which readers produce and remake texts – the possibilities for remaking are broadened by the multi-directional reading paths of digital texts and environments, the unsettled genres and practices of 'reading' digital texts, and the participatory culture of online environments. These unsettled spaces offer opportunities for innovation, control, risk taking and ownership for young people – spaces that education needs to understand how to create and harness.

2.1.10 Knowledge ownership

Changes in knowledge production and authoring will intensify and raise questions concerning copyright and access to information. There will be a trend towards openness and collaborative sharing of digital information.

Web 2.0 is a platform for content creation and is built on the presumption that people will re-distribute content across the web. Goodings suggests that users are often unaware of the relevant legal, pragmatic and ethical guidelines. These sites also make use of the Creative Commons license that involves a number of re-use policies for the public to avoid being held liable for copyright infringements. Indeed the collaborative culture and Creative Commons License have enabled the production of a wide range of open educational resources. Goodings agrees with Jenkins (2006) that 'powerful

institutions and practices (law, religion, education, advertising and politics, among them) are being redefined by a growing recognition of what is to be gained through fostering – or at least tolerating – participatory cultures'. Goodings suggests that information and communication will increasingly become the currency of new Web based products and services and that a growing numbers of media industries will look to the 'meaning' that people construct in communities of user-generated content as a highly marketable resource in the new media industry. A move towards a more open and free use of information is the most likely direction for the future. Alternatively, at least in some contexts, copyright may be used as a powerful form of regulation to restrict and manage the circulation of information and knowledge and tie it to commercial interests. There are important questions about the degrees of freedom of knowledge and how knowledge will be regulated in the future. This also links with questions of authenticity and trust.

2.2. Major Issues of Uncertainty

This section of the report highlights three areas of potentially major significance but which the reviews suggest there is considerable uncertainty about their future development and direction. The first relates to creativity, and the question of whether creativity will become more widely spread across the population, become democratized or if it will become ever more elite to become the right of the few. The second concerns the management of knowledge and communication, and whether this will coalesce around individuals or communities. The third uncertainty is focused on information and questions of trust, risk and ethics.

2.2.1 Creativity - democratization or elitism

Who has access to creative work and practices is a significant issue for the future, it is also surrounded by uncertainty – will creativity be available to all or will it be only for the elite echelons of society?

The reviews focus on the empowering democratising potentials of creativity – available to all, opening up the space for being creative, the increased engagement with creative production and consumption enabled by new technologies and a shifting communicational landscape in the future (Craft, Carrington and Marsh, Horst, Kress and Bezemer). These coalesce around the economic imperative of creativity for innovation in industry and services that, together with concern with student disengagement and social inclusion have helped to raise the profile and credentials of creativity in education more generally (Craft). Banaji et al(2006) note multiple distinctive discourses circulating in respect of creativity in education.

Sawyer, Jones and Lauder however both point to an alternative scenario with an increasingly myopic focus on the efficiency of the global economic landscape of labour and the standardization of working practices. The Internet is called upon as a democratizing force for knowledge in several reviews (Carrington and Marsh, Goodings, Horst) but Lauder argues that the 'crucial point here is that data and information from the Internet needs interpreting and evaluating'. Indeed, Lauder sees creativity in the light of intensified 'positional competition' and greater elitism and selectivity. Rather than democratization of powerful knowledge and creativity, he suggests a more class-based outcome in which creativity and powerful knowledge will more likely reside with the few. Here knowledge and practice is automated and fostering creative abilities and opportunities is restricted to a small elite. Far from becoming increasingly democratized, fewer and fewer employees will be asked to exercise creative autonomy, choice and control in their work. Instead, the rise of a global elite of 'creative knowledge workers' will be complemented by increasingly standardized and routinized (highly scripted and constrained) working practices for a majority with no 'permission to think' (Lauder et al) and no room for *disciplined improvisation* (Sawyer). Sawyer and Lauder suggest that

the automization of work, combined with increased globalization and the re-location of unskilled jobs to low-wage countries may create 'a radically tiered social structure; what Lauder calls 'Digital Taylorism'

It is unclear how this tension between creativity and social inequity will play-out or inform policy and the future. In part this uncertainty is tied to the question of what the purposes of education are to be in the future in relation to work, economy, and citizenship. The future may bring further social stratification. Creativity will, Sawyer suggests, become central to the education of elite groups and restricted notions of creativity will inform the education of other groups. Democratic approaches to education employ notions of creativity to focus on the raising of standards for all to the same level. This serves to position the child as located in society/culture in which there is no such thing as a unique bounded individual. Creativity is a discourse of inclusion, empowerment and viewed as inherent in every-day activities. The other primary use of creativity is in the more competitive sense of standards and the gifted and talented. This is underpinned by a view of creativity as the uniqueness of the individual, and the self as personal project – creative genius, it draws on exclusivity, competition, and capacity to thrive in a market economy (Sawyer, Craft). If such a vision were to come to pass Sawyer (and Baker differently so) suggests this would pose the risk of a social order that reproduces itself through these imbalances in the education system.

2.2.2. Management of knowledge and communication: individual vs communal
Whether knowledge and communication will be primarily individual or communal is a key uncertainty for the future.

The extent to which knowledge and communication will be shaped by the ways in which people will be connected via communities, family and intergenerational relations, interests, identity and affinity groups. A key aspect of this is the extent to which the future may lead to an atomised or individualised society and in response how knowledge or communication may coalesce around individuals or communities/groups. This tension suggests two possible future trajectories, or configurations of these, one moving towards increasingly communal and social management of knowledge and information, and the other moving towards increasingly individualised and atomised management of knowledge and information.

Further, this remaking of communities around interests raises questions for how people maintain identities and culture across generations (Jones). One outcome that may pertain to the future is the increasing production of surveillance as a form of 'connection' where adults' roles are to protect children, in which content and forms of communication are restricted through technology or social relations. For example, parents increasingly use mobile phones and online technologies to maintain communication, monitor and control the movement of their children outside of the home and the institutionalized context of the school (Ivinson, Carrington and Marsh, Horst).

2.2.3 Trust, risk and ethics
Against the backdrop of ever increasing flow, access and storage of information and engagement in online economies, communities and identity work embedded in everyday life a number of reviews raise the theme of trust and authenticity, risk and ethics as central for the future (Brown, Goodings, Horst, Craft, Sawyer, Sefton-Green).

These issues may go in different directions in the future, which can be understood as the outcome of a combination of two factors. First, either increasing or decreasing trust, and second, increasing or decreasing acceptance with information being held via others and systems. Underpinning the question of what direction these issues may take are broad

issues of security and privacy, and attitudes regarding the potential of social and technological trends towards surveillance or empowerment.

Issues of authenticity of knowledge (that is trust in the value, correctness, and origin of information as well as who has produced or communicated information) will persist. These are likely to become increasingly important as knowledge is increasingly generated within complex systems and through collaborations and in online contexts in which it is relatively easy to find personal information. Mechanisms and strategies will need to be developed that serve to establish and maintain trust for the users of technology and equip them with enhanced skills to assess online authenticity and value. Many children are able to recognise and avoid risky behaviour (Livingstone, Bober & Helsper (2005) cited in Goodings). Here the need to understand how risk acts as mediator for interaction is key (Schillmeier).

Trust and reputation in online environments are increasingly built up over time and across people's experiences rather than on an individual basis. These are constructed from markers such as discourse styles, use of the textual practices of particular affinity groups and the deployment of inter-textual references (Davies, in press cited in Carrington and Marsh), for instance in the forms of ratings to construct online reputations. Children and young people will need to develop strategies that will enable them to manage their online identities in terms of the level of detail they are prepared to share with different audiences – and sites and institutions will be increasingly called upon to monitor and maintain the privacy of their users. Changes in the character of knowledge are likely to have significant meaning for the basis of authority of teachers and teacher professionalism, as well as curriculum and processes of knowledge production in education.

2.3 Key socio-economic factors likely to underpin future directions

This section highlights the key socio-economic factors that are likely to underpin future directions in the practices of knowledge production, creativity and communication over the coming years.

The key potential levers and drivers shaping knowledge, creativity and communication for the next 30 years are the continuing development of technology and its social use, the expansion of the global knowledge economy, the place of creative industries within this broader economy, the marketization of education, policy and technological focus on personalisation and the individual, and increasing diversity within the population.

Potential challenges that will force the trends for knowledge, creativity and communication identified in this report in different directions over the next 30 years include, legal and regulatory frameworks, tension between standards and creativity, social inequity, and the inability of education to respond to developments in technologies and changes in the population

2.3.1 Potential levers and drivers

The continuing development of technology and its take up for social purposes is a key driver for knowledge, creativity and communication in a number of ways. In particular the use of open shared resources, social networking sites, the storage and circulation of information, images, video, music etc across sites are a part of the social collaborative and participatory culture. The use of mobile, network, ubiquitous technologies and perhaps more importantly the development of innovative ways to use and deploy these technologies for social purposes will support knowledge production and communication and provide sites for creative work and its dissemination.

The expansion of the global knowledge economy, supported by the use and development of networked technology to support collaboration across time and space is a significant driver for knowledge, creativity and communication. In particular the drive to speed the cycle of production from innovation to distribution through 24 Hour production that 'follows the sun'. These socio-technological trends will drive the role of knowledge, creativity and communication in the global economy in two parallel but distinct directions. On the one hand, work that relies on automated and routinized knowledge, severely limited possibilities for creativity with no 'permission to think', and highly scripted and regulated communication. On the other hand, a circuit of 'talented' elites will be required to engage in complex knowledge production, using creative skills and requiring sophisticated communicational resources. In the past it was assumed the knowledge economy would mean creative knowledge service work in the UK, however, with the rise of cheap specialist labour elsewhere, the role of the UK labour force in this global market is not clear. This will give shape the future labour force required in the UK. The degree to which educational policy will be tied to economic policy in the future is unclear.

Educational interest in creativity as an essential skill or disposition for the future is strongly linked to its anticipated economic benefits. The success and economic productivity of the creative industries is therefore a strong driver for creativity in the UK and globally.

The increased marketization of education is a driver that will have significance for knowledge, creativity and communication. In particular the increasing unbundling of education from the state as a central provider and the move toward online educational possibilities may serve to diversify and open up education. Hybrid private-public relationships in education may increase, for example between work and education. This may result in increasing social stratification of education as a market in ways that strongly shape the kinds of knowledge, creativity and communication that people have access to.

A general focus on the individual is driving educational policy and socio-technology agenda for personalization and personal technologies. At the same time as proposing an opening up of the space of schooling to the interests of students this raises many questions for what knowledge is in the school.

Increasing diversity within the population, combined with increasing collaboration and networking is a driver for knowledge and communication. If the global economy becomes increasingly multilingual, or leads to increased circulation of global labour, this may lead to linguistic and cultural diversity within education which may have profound consequences for communication as well as curricular knowledge. This relates to issues of multilingualism and cultural pluralism, and identities across nation-states (Jones).

Anxiety and fear concerning the disenfranchisement of young people (a concern linked to diversity and the individual) is a key driver for the weakening of boundaries between disciplines and sites of learning that has implications for the status of specialised knowledge, and everyday knowledge.

2.3.2 Potential challenges

The increasing openness of technology is in a constant struggle with legal and regulatory frameworks with respect to intellectual property rights and copyright, as well as concerns for privacy and safety. This struggle is connected with political, economic, and ethical issues as well as authenticity, trust and risk. The control and regulation of images, video, music etc on the Internet is vital, but may introduce forces that have a negative effect for the future of knowledge, creativity and communication.

There is much interest in personalisation, customisation, and creativity but how this interest will play-out with respect to standardisation is unclear. These two trends may be in tension, and if the weight is given to standardisation this may present challenges for creativity.

Social inequity, especially in the context of increasing marketization of education, may have profound consequences for how children and young people access and experience education, and exacerbate the social differentiation of access to knowledge and creativity. However, the unbundling of education may serve to provide schooling for a variety of people who are disenfranchised from education.

The failure of education to respond quickly to future technological developments is a potential challenge for the future trajectories of knowledge, creativity and communication identified in this report. There are many complex forces that operate on the school that make the changes technologies promise difficult to realise. This may result in the possibilities for knowledge, creativity and communication in educational sites being in a state of stasis.

The failure of education to respond to increasing diversity (e.g. through migration and globalization) may prove a challenge to the future direction of knowledge, creativity and communication. Diversity may be erased, smoothed over, through potentially monolingual contexts (physical and virtual) that develop over time. The question of how difference will be marked in the future remains very open.

The direction these factors will take will depend on social and political decisions that will be made about the role of education in the global economy.

2.4 Potential Implications for Education

This section addresses the potential implications of the findings presented in sections 2.1 – 2.3 for education with attention to the demands of a changing landscape, the goals of education, teachers and learners, organisation and governance of education, supporting learning and learning cycles.

2.4.1 The demands of a changing landscape

The changing landscape of knowledge, creativity and communication will place new demands on education with respect to the skills needed to participate in, navigate through, connect with and interpret this landscape.

Learning how to collate, search, interpret, evaluate and transform information into salient knowledge is increasingly important, as is the ability to authenticate information from diverse sources. People will need to assess and manage risk and establish trust in virtual spaces and work with risk as well as the politics of information, ethics and legality. People will need to be creative, self-directed and curious about new forms of knowledge and be able to manage complexity and risk taking.

People will need to be fluent in working with a complex range of static, virtual and blended texts. Literacy will need to multimodal design at its centre and the interpretation and creation of meaning beyond language as its purpose, that said, the ability to write and read, and numeracy will remain relevant key skills.

Increasingly people may be expected to participate in a variety of textual knowledge production and the boundary between consumer and producer will continue to blur. The ability to engage with content creatively via experience is likely to be a growing demand for the future. This is likely to be the case in relation to finding individualised pathways

through curricular knowledge. This will also pertain to the customisation and personalisation of spaces through the use of technologies and the creative expression of identities. The ability to work across disciplinary, technological and spatial boundaries will be essential in this changing landscape. The multimodal media ecologies of young people are expected to continue to expand and diversify, particularly with the growth and development of mobile and ubiquitous technologies. How to harness (and regulate) technologies will become important questions for education.

The increasing focus on networked connectivity will require people to have the communication skills and knowledge to support effective collaboration and communication. A central element of the changing landscape is the development of resources and spaces (in education, work and home) to support people to create and innovate. This may stand in tension with the potential that the knowledge economy may lead to the demand for a work force in which the dominant requirement will be the ability to follow tight scripts and automated routines.

2.4.2 The goals of education

The future of education is likely to continue to be focused on the following three goals: the need to project learners into official discourses of knowledge; an agenda for social inclusion, personal growth and active citizenship; and providing people with skills for work. Whilst these reflect the current goals of education, it is the context and conditions of their articulation that will be crucial for the future.

The focus on official discourses of knowledge looks to continue the move of mass education towards generic skills away from disciplinary knowledge. There is growing concern that the goals of education will become subsumed by the needs of the labour market. The rationales motivating investments in life-long learning (its functions and purpose and driving forces) will continue to shift from a means for promoting social inclusion, personal growth and active citizenship in a democratic society to a strategy for increasing a person's chances to compete with others in a changing labour market in a global economy. This increasingly instrumental view has spread widely and dominates the debate in the European Union on future policies, where the prime role of schools and universities is to make people "employable". This risks education being reduced to supplying an increasingly uneven labour market and may lead to the continuing marginalization of schools as institutions within society. This concern is accompanied by considerable uncertainty as to what it is legitimate and necessary to know in order to participate in a changing global context. Conversely the shifting balance in work, life, and education may shift the goals of education towards personal growth and development.

The question of how pedagogy and curriculum should respond to and manage the tension between the knowledge of learners outside of school and the official discourses of knowledge persists. The consequences of the stability, porous or boundaried character of disciplinary knowledge is a contested issue, as is how best to design these to meet the needs of future society. The question of how knowledge should be organised, whether people should be inducted into knowledge, or the degree to which people should be free to create the boundaries of knowledge around their own experience is a perennial problem within education and one that appears to be coming to the fore. Some call for increased porosity of the boundaries between knowledge disciplines and domains and others suggest that these are already in a state of semi-collapse. Children's use of digital technologies is seen as a powerful tool in reconfiguring knowledge in the classroom, particularly through digital text production. From this perspective the challenge for schooling is, Saljo et al argue drawing on Dewey "to connect to children's everyday experiences and introduce new skills and knowledge in such a manner that they are able to bridge what they encounter in school with what they hear and see in other social

settings. Schools must be seen as a form of social life in which children and young people engage in activities that they find relevant, meaningful, enabling and that are consequential in terms of learner interests and identities." A call to weaken the boundaries of schooling can be understood, Young and Muller argue as a desire to adapt 'to global trends towards greater flexibility and openness to change from individuals'. They emphasise the social differentiation of both knowledge and institutions, and challenge the assumption that boundaries are always barriers to be overcome rather than also conditions for innovation and the production and acquisition of new knowledge. One consequence of weakening boundaries would be that schooling would become less and less differentiated from other social institutions which may lead to an 'over-socialised' concept of knowledge. This is likely to lead to access to specialist knowledge migrating to elite and private sectors and institutions and public education becoming a competition within a context of 'credential inflation'.

Concerns about emotional well-being are increasingly a focus of social policy, particularly in education settings, and the placing of new ideas about emotion and creativity and communication in curriculum content, pedagogy and assessment, in ways that are significant in redefining what it is to 'know' (Hayes and Eccelstone). This marks a fundamental shift in ideas about what education is for, and what it means to be human (Young and Muller, Hayes and Eccelstone). This focus on emotion and well-being needs to be understood in the broader context of the knowledge economy and the rising importance of creativity and the linking of emotion (e.g. low self esteem) with social exclusion by policy makers. More specifically this debate centres on the emotional well-being of youth in contemporary society, the disengagement of students from formal schooling, concerns regarding the commercialization of childhood, and the effect of ICT on the emotional development of children and young people all of which shapes educational discourses on knowledge, creativity and communication.

2.4.3 Teachers and learners

The changing socio-technological character of knowledge, creativity and communication outlined in this report will diversify what it means to be a learner, who it is that learns, and impact on the relationships between teacher and learner.

The age range of learners is likely to expand, with people starting education earlier and leaving later than before, and leading to increased diversity in the age, background and expectations of learners. This may serve to collapse some of the boundaries that separate learners and teachers in education.

Sites of learning are likely to diversify and a broader range of people are likely to be involved in teaching and learning in the future. The home will have an increasing role to play in education in a number of ways including increased connection of home to school via technology, home access to information via new media, virtual learning environments that merge the boundaries between home and school, and 'edutainment'. This may draw parents and siblings more strongly into educational relationships with one another, perhaps giving new emphasis to intergenerational learning, peer-learning, independent learning and informal learning. These new relations may solve *and* generate problems for education. The community and neighbourhood may also take a stronger role in education in the form of teaching and learning hubs, raising the significance of mentoring and out of school sites of learning. Online collaborations across networks are likely to increase peer learning and mentoring on interest driven sites and within specialist affinity groups.

The policy and technological move towards personalisation may support flexibility in school curriculum and time schedules. Increasingly the Internet and other participatory online spaces including social networking sites will supplement or substitute aspects of

schooling. There is likely to be ever increasing attention to the learner. This may increase peer and mentoring relationships and dissolve the stratification of learners by age. This flexibility may result in some shifting from linear processes of education to more iterative processes of education.

The role of the teacher and what teaching means may change both with respect to the current trend towards the personalisation of learning and the routinization of teacher's work. In addition, technologies in the school may reconfigure teacher roles as that of guide rather than the main point of access to inquiry and knowledge production. There is a growing argument for the need to move toward dialogic teaching (Wolf and Alexander). As students are empowered teachers may, some argue, be re-positioned alongside pupils (and the internet) as alternative sources of support and information, rather than gatekeepers of knowledge. At the same time this raises issues about students' competence at taking on a more independent self-generated activity or role that this demands, and teachers' ability or familiarity with facilitating learning. A particular challenge for education in the future is how to manage fluid and uncontrolled learning outcomes, and increased instances of small group interaction. Another possibility is that notions of pedagogy may change dramatically. It is becoming more common to try and merge social, cultural aspects of learning with individual notions of agency through personalisation and virtual interaction. The question that remains is the extent to which it is possible to create collaborative classrooms where personalized learning environments which are flexible enough to accommodate different interests and learning needs are cultivated and where tasks are problem-focused.

2.4.4 Organization and governance

The move towards a more diffuse and flexible ecology (and economy) of education will have significance for the organisation and governance of education. Sites of learning are likely to diversify although the school will remain although differently configured. This will raise new challenges for regulating and safe-guarding people.

The school will remain as a physical space at the heart of a diffused network of places and communities, both physical and virtual, including the home, play centred organisations, libraries and museums, and online environments. Each of these sites will contribute in different ways to education. People may flow through this network in different ways. There is likely to be increased attention on non-formal learning spaces, work and leisure spaces, and virtual spaces that offer different kinds of possibilities for learning, distinct leaning processes, experiences and activities. The potentials for mobilizing learning within, between and outside of the classroom and across school phases will most likely be enhanced by the use of a variety of technologies, in particular mobile, wireless, and ubiquitous.

Broadening the use of communication technologies within education will raises serious challenges about how to enable *safe, accessible and innovative e-Learning strategies.* Understanding of privacy and risk increases with age, and older teenagers tend to restrict access to the photos and videos, while older bloggers upload information in the context of informed acceptance or management of risk. With ever increasing access to the Internet children of all ages are going to be continually faced with some form of unwanted content. New benchmarks are needed to control the way that children are able to search the net, this stems from parental controls at home through to legislative responsibility to reduce the amount of harmful content on the Web. The paradox is that while firewalls serve an important role in protecting children from inappropriate digital content they often prevent teachers and pupils from effectively using e-Learning tools and technologies in education.

2.4.5 Supporting learning: artefacts, interventions and practices

Opportunities to engage with the complex and diverse multimodal landscape of knowledge, creativity and communication will be key to supporting learning. This will mean diversifying the kinds of artefacts that enter sites of learning and what gets done with and to them, and providing increased opportunities to engage in production. Learners will need to acquire skills in working with complex data sets and texts, particularly in critiquing and translating them into meaningful knowledge that is relevant for a particular purpose. How to authenticate information from a variety of sources and spaces in which learners need to assess, take and manage risk in virtual and physical spaces will be needed to support learning.

Increasing opportunities for learners to be networked with experts and others will support their learning skills and knowledge to support effective working across different boundaries. Online, mobile, network, and ubiquitous technologies will diversify the spaces for learning and open up new connections between school and other sites of learning both physical and virtual. Creating spaces where learners can collaborate with each other and people outside of school is central for supporting learning. In particular finding ways to support learners in working across interests and to harness these towards engaging with bodies of curricular knowledge. When it is appropriate to personalise and customise learning, and how this can be done effectively for all learners, remains a key question for education.

Designing educational uses of modularized, any-time and any-where learning may be used to 'open up' the curriculum space more generally. This may have significant consequences for what is taught in the school, the role of the curriculum, and the place of knowledge in the organisational space of the school. There is considerable debate about what (or indeed whether) disciplinary knowledge will be required to meet the needs of future society. The question of how knowledge should be organised is central, that is, whether people should be inducted into knowledge, or the degree to which people should be free to create the boundaries of knowledge around their own experience. This is a perennial problem within education and one that appears to be coming to the fore. How it is addressed is key to the organisation of education and how learning and assessment might best be supported in the future. There is an increasing call for the use of context-situated learning to embed learning content in experience (mediated virtually or physically) in order to increase opportunities for interest driven, authentic, and customised activities. The place of 'powerful knowledge' in a more porous and flexible educational system with a focus on repertoires of skills and attitudes requires consideration.

The trend towards customization will impact on the learning processes and expectations of individual students and may ultimately begin to shape, or put pressures on, the pedagogies of classroom instruction. The tension between the demand (and educational desire) for creativity and personalisation and discourses of standards may be a major tension for supporting learning and assessment. The conditions for education call for forms of assessment that are more fluid and adaptable to individual needs, and perhaps open up possibilities for a further emphasis on self-assessment. It seems that current constructions of the assessment regime are unlikely to be appropriate in the future.

2.4.6 Learning cycles in a lifetime of change

Education will need to respond to the effects of changing social demands and technological developments on learning cycles across people's life-course.

Changing demographics will serve to shift the balance between life and work and education. Further, learning must continue through the lifespan in order to survive in a changing workplace and wider world where knowledge expands and changes rapidly. It

is in part due to the increasing pace of technological and cultural change that the concept of learning to learn has been extended in recent years to encompass this expansion, and the need to become more effective, more efficient and more resilient learners. In the expansion of learning beyond formal educational systems the transition from education to work or between sites of work is reconceptualised from a matter of the acquisition of qualifications to one of the development of work related practice and entrepreneurial expertise.

The central place of education across the life course will collapse the previous separations of life into mutually exclusive phases of education, work and retirement. The increasing detachment of learning from schooling will result in the unbundling of learning from mass schooling leading to future education models that move towards greater individualisation, personalisation, collaboration and niche experiences. There is considerable debate on the viability of generic skills as transferable commodities (see Ivinson, Young and Muller, Guile). Drawing on Bernstein, Ivinson suggests that generic skills 'create a fiction that learning can be dis-embodied and disconnected from persons, bodies and communities of practice'. Guile suggests the need to move towards an in-situ mix of knowledge, skill and judgement as for example in unpaid internships or work placements. This suggests that what is required is a less linear conception of professional formation.

Summary of Review Papers

Professor David Baker , The modernizing role of schools as institutions

Formal education transforms modern society and has generated a new type of society: *the schooled society*. Formal education has expanded and intensified to the point where along with effects on individuals, formal education generates new ideas about people, new privileged human capacities, new ideas about knowledge and its generation, new expanded social and occupational, positions. This paper describes two major consequences of the schooled society on knowledge and its acquisition: 1) the unprecedented growth of a knowledge conglomerate in universities, and 2) the change towards ever-greater value placed on academic intelligence in human society.

Professor Steven Brown, Remembering and Meta-cognitive/communication skills

The review highlights contemporary trends in the study of remembering and their likely future development. The review is organised around a set of key debates on memory collective vs. individual memory, the character of memory, memory and history, embodied memory, mediated memory. The review draws out how these debates affect knowledge, creativity and communication.

Professor Anna Craft, Education, Creativity in the school

This review discusses how creativity has been seen to be increasingly significant in education, within cultural policy discussions and has appeared as a guide to other major public policies around, for example, inclusion and the economy. This ubiquitous use of the term, which rests on a 'universalized' conception of creativity, offers both opportunities and challenges in education. This paper explores the tensions and dilemmas arising from the mix of underpinning perspectives on creativity in education. The paper will consider, finally, wider questions about the nature and futures of education (Ref to Facer, Fielding, Twining, Craft etc), suggesting areas that need consideration in seeking to see beyond current horizons as regards creativity in education.

Dr John Cromby, The move from social explanations toward neuroscience

This review explores what neuroscience has to offer education, it outlines a number of 'neuromyths' that were prevalent have been decisively dismissed by neuroscientists, and calls for a more accurate assessment of its potential. It argues that despite its limitations, cognitive neuroscientists have made some striking progress with respect to the basic skills underpinning abilities such as reading and number. It also suggest that progress in applying neuroscience will be slow, and will continue to be bound up with other knowledge and events.

Lewis Goodings, Changes in knowledge construction, participation and networks

New communities that are formed around recent networking technological advances are explored for their potential to become effective leaning space. The question of what such communities mean for knowledge is addressed. Issues related to the types of ethical rules, mutual goals, dilemmas and interests can be characterised in the social practices of these new learning spaces are examined as is the wider ideas of Knowledge construction, participation and networks.

Dr David Guile, Learning to work in the creative and cultural sector: new spaces, pedagogies and expertise

This review questions the link that policymakers assume exists between qualifications and access to employment in the creative and cultural sector. It identifies how labour market conditions in this sector undermine this assumption and how the UKs' policy formation process inhibits education and training actors from countering these labour market conditions. The review demonstrates how non–government agencies – 'intermediary organisations' – are creating new spaces to assist aspiring entrants to develop the requisite forms of 'vocational practice' expertise to enter and succeed in the sector. It concludes by identifying a number of new principles for governance, pedagogic strategies and skill formation issues for stakeholders to address.

Professor Denis Hayes, and Dr Kathryn Ecclestone, Affect: Knowledge, communication, creativity and emotion

This review examines concerns about emotional well-being that have recently become the focus of social policy, particularly in education settings. This is a sudden and unique development in placing new ideas about emotion and creativity and communication in curriculum content, pedagogy and assessment, but also in redefining fundamentally what it is to 'know'. The review charts the creation of what the authors call an'emotional epistemology' and draw out implications for educational aspirations and purposes and evaluates potential implications for these aspirations and purposes if trends we identify here continue into the future.

Professor Steve Higgins, Learning to learn

This review focuses on learning to learn and future developments in education and provides a summary of evidence from leading-edge social science and science research. It identifies key trends in learning to learn (with respect to individuals, groups and societies) which are relevant to knowledge production, creation and communication to 2025 and beyond. Evidence is presented about current interventions, developments and strategies (from education and other sectors) which respond to these different trends in terms of what the implications for educational goals, structures, methods and resources.

Dr Helen Horst, Connectivity, flow, convergence and communication: Mobile, portable and personalized

This review considers the implications of digital and networked media in out-of-school settings for conceptualizing models of learning and engagement. Focusing upon the mobile and personalized nature of mobile devices and the mobile learning spaces that digital and networked media enable, it examines how innovations in connectivity, communication, collaboration and convergence create new possibilities for the future of learning and education in the 21st century.

Dr Gabrielle Ivinson, The relationship between the constitution/construction of knowledge and identities, community

This review examines how society continuously creates, recreates and reproduces knowledge and the boundary between the knowledge(s) produced within society and the knowledge that has been taught through official instruction in educational institutions. It engages with debates about whether the school curriculum should be taught as subject content or skills including 'technical skills' and 'life skills'. It argues for the need to make a distinction between the classifications of forms of knowledge - the curriculum - and how knowledge is *learned* and investigates the struggle over curriculum and pedagogy, in relation to gender, class and changes in family structure.

Professor Ken Jones, The dynamic relationship between knowledge, identities, community and culture

This review outlines significant issues in current cultural and knowledge-related change in England, with particular emphasis on their impact on education and on young people. It draws together evidence to suggest that 'culture', 'knowledge' and 'creativity' denote areas of practice whose meaning varies according to their social location, and argues that issues of inequality and social differentiation –strongly affect how young people are positioned in relation to them. It concludes with reflections on future scenarios.

Professor Gunther Kress, and Dr Jeff Bezemer, Multimodal Design: knowledge, communication and creativity

This review outlines key trends in knowledge, creativity and communication in education from the perspective of multimodal design. Multimodal design in education refers to the use of different 'modes', such as image and writing, to recontextualize a body of knowledge for a specific audience. It examines changes in multimodal design in education in the past, present and future, connecting them to social and technological change. Social change, such as shifts in the agency of learners, poses new challenges to design. The review illustrates trends in and connections between design, technology and education with key examples of learning materials for secondary education.

Professor Hugh Lauder, Professor Phillip Brown, Dr Ceri Brown, The consequences of global expansion for knowledge, creativity and communication

This review examines the fundamental trends concerning changes to the division of labour within the global economy and its consequences for education with particular reference to knowledge and creativity. It examines the fundamental drivers of the rapidly changing global division of labour. It argues that while the twentieth century brought what can be described as *mechanical Taylorism* characterized by the Fordist production line, the twenty-first century is the age of *digital Taylorism*. It shows how this involves translating *knowledge work* into *working knowledge* through the extraction,

codification and digitalization of knowledge that can be transmitted and manipulated by others regardless of location.

Professor Victoria Carrington, Professor Jackie Marsh, Forms of literacy

This review outlines ways in which literacy is changing and reviews the implications for educational institutions in the future. A number of key themes are addressed in this review, including multimodal representational forms and configurations, new forms of literacy and knowledge production, new purposes for literacy and reconfigurations of resources in sites of learning. The review identifies key trends and emerging patterns of the current research base and indicates how these trends and patterns might develop and identify how educational institutions need to respond to them if they are to meet the needs of learners in the decades ahead.

Dr Sara Price, Dr George Roussos, Taciana Pontual Falcão and Dr Jennifer Sheridan, Embodiment/the body, knowledge, creativity and communication

This review begins by outlining the current theoretical underpinning of embodied cognition and embodied interaction and the implications for knowledge, creativity and communication in education. It presents an overview of state of the art technologies, including key development trends, and their relationship with interaction and use; followed by a review of interaction and learning based research around these technologies. It outlines the implications of embodiment in today's climate of technology and society, its role in thinking about learning – both theoretically and practically, and explores the potential impact of current trends and developments on shaping the way we think about and operationalise the development of, knowledge, creativity and communication.

Professor Roger Säljö, Dr Oskar Lindwall, and Dr Asa Mäkitalo Technology, representation and knowing

This review addresses features of the discourse on the knowledge society and how it seems to lead us into characterizing the value of schooling primarily in its instrumental functions in relation to short-term economic goals. It goes on to discuss the manner in which technology has become a central part of many young people's lives outside school – and what this development might imply in terms of the necessity of schools to adapt to the lives of students rather than the other way around.

Professor Keith Sawyer, The future of learning in the age of innovation

The innovation age requires people who maximize their creative potential, people who not only master existing skills and knowledge, but who are capable of creating new skills and knowledge. To maximize innovation and knowledge generation, many societal factors must be in alignment—political, legal, cultural, economic. This report focuses on the critical role to be played by schools. This report summarizes research on creativity, collaboration, and learning, and provides advice about how to design learning environments that result in creative learning. The report identifies a range of challenges, and six future scenarios, for teaching and learning in the age of innovation.

Dr Michael Schillmeier, Risk as Mediation: Societal Change, Self-Endangerment and Self-Education

This review paper picks up the rhetoric of risk as an adequate discourse to reflect upon current modern societal change, self-endangerment and self-education. It offers an

understanding of risk as a complex process of mediation of endangered futures that can be seen as central for rethinking (self-)educational efforts in world risk society.

Julian Sefton-Green, Location, Location, Location: Rethinking Space and Place as sites and contexts for Learning

This review considers the role of context and site in common understandings of learning in general and describes models of learning that exist as complement, supplement or remediation with 'standard' versions of schooling especially those invoked by the idea of informal learning. It then looks at the 'geo-social' relationships of learners, homes, communities, non-formal learning spaces, regions, schools, nations and the globalised economy trying to tease out what may or may not change in future scenarios to offer different kinds of learning processes, experiences and activities in all of these domains.

Dr Sylvia Wolf and Professor Robin Alexander, Pedagogy: Argumentation and dialogic teaching

This review explores how a climate of compliance and accountability in education is currently undergoing challenge at different levels in the system and by internal and external forces centred around evidence from studies of classroom talk that indicate a strong link between dialogic forms of communication and advances in knowledge and depth of understanding, for students and teachers. The review explores implications of these shifts for the re-conceptualisation of knowledge and changing roles and relationships between teachers and learners. The review concludes by considering the challenges and risks involved in such enterprises for practitioners and teacher educators.

Professor Michael Young, Professor Johann Muller, Thinking about the future: Lessons from the sociology of knowledge

This review draws on social realist approaches in the sociology of knowledge and in light of them constructs three scenarios for the future of education in the next decades. The focus is on the relationship between school and everyday or common sense knowledge. The different possibilities for how the school/nonschool knowledge boundaries might be approached are expressed in three scenarios - 'boundaries as given', 'a boundary-less world' and the idea of 'boundary maintenance as a condition for boundary crossing'. The educational implications of each are explored.

Challenge 4: The future of work and implications for education

Professor Robert Wilson, Warwick Institute for Employment Research

Section 1: Introduction

1.1 Background: Aims and key research questions

This report considers how the nature of work and employment is likely to change over the next few decades, in the context of developments in technology and other key drivers of change. It summarises the main trends in employment patterns and other aspects of work. The aim is to establish a long-term vision of the context for education in the second quarter of the 21st century. Some tentative conclusions about the possible implications for education are then developed.

1.2 Structure of this report

The structure of the remainder of this report (which constitutes the "Synoptic Report" for the *Working & Employment Challenge* area) comprises two main parts.

Section 2: Evidence and Insights
This section summarises the evidence gathered during the review process and the related events and insights in the *Working and Employment Challenge* area that was relevant to the BCH programme. In particular, it highlights:

- The existing observable social and technological practices in the challenge area which can reasonably confidently be expected to continue to 2025;
- The factors, for example events or changes in social values, which might play a significant role in shaping future developments in the challenge area;
- The key uncertainties in the challenge area that may lead to radically divergent future developments, and what might act as the lever for such divergence.

Section 3: Implications for Education
This section moves on to consider the potential future challenges or opportunities that these trends and factors might present for education. It also considers what evidence there is for policy actions to be taken. This includes what existing educational practices or evidence might provide insights into potential responses to these challenges or opportunities and why.

Section 2: Key issues and trends: A summary of the evidence and insights generated in the *Working and Employment Challenge*

2.1 Work and Employment at the start of the new millennium

Paid work in the formal economy is the major activity occupying most people's waking hours. It is also the prime source of income, as well as representing one of the main ways that most people identify who they are. Rates of participation in the formal economy (the proportion that are economically active) are currently around 85% for males and 75% for females of working age (16-60/65). A significant proportion of the remaining time is taken up by work in the informal economy (housework, caring for family members, care of the home, etc). The "grey economy" also accounts for a significant amount of activity for some people. This includes activities ranging from conventional work (often outside the auspices of the tax authorities) to criminal activities.

Since the 19th century people have got used to the idea of fixed places of work, leading to a clear distinction between formal work and informal work. This has often had a strong sexist dimension. For many years the male was seen as the breadwinner, while

the female role focused more on the home. Two world wars and various other factors have changed both attitudes and behaviour, so that there is now a somewhat more even distribution between the sexes. Women now account for almost half of total employment, although many of the jobs they do are part-time and there remain strong patterns of occupational and sectoral segregation.

Technological change (for example, advances in equipment to aid domestic work) has facilitated new ways of organising the allocation of time to different activities including work and leisure/play. The demographic mix within the formal labour market has shifted dramatically in favour of women's involvement. Many social norms have changed as a consequence. Expectations of the importance of work and how it fits into people's lives have also changed.

More recently, information and communications technology (ICT) has had significant impacts on the possibilities for locating work (both locally and globally). ICT allows people to work in very different ways ("distributed work") but there are often significant human and other barriers and constraints preventing some people from taking full advantage of the opportunities this opens up. Sen (1999) has developed what he terms a capabilities approach to highlight these problems. "Capabilities" as defined by Sen cover a much broader range of issues than the personal capabilities of the individuals concerned as usually described. It also includes various external factors that limit what is possible for those individuals in the circumstances in which they find themselves.

These developments have significant implications for employers, employees and education and training providers. The way that work is structured and organised requires careful consideration, if the opportunities opened up are to be fully exploited to everyone's best advantage. These issues are discussed in more detail in the reviews by Round (2008) and Atwell and Costa (2008).

2.2 Key Drivers of Change

There is a general consensus that there are three main drivers of change in the labour market and the world of work. These are technological change, globalisation and demographics, (see, for example, Karoly and Panis (2004), Wilson *et al.* (2007), BCH (2007) and Gambin and Wilson (2008)). The first two drivers in particular are strongly linked, indeed in some respects globalisation can be seen as simply the way individuals, organisations and countries have responded to technological change, depending on the economic constraints they face, and their social and political values.

The key drivers of change as far as employment and work in both the formal (market) and informal economies are concerned, are therefore technological change and demography. Together with political, regulatory, legal infrastructure and social values, plus behaviour, these determine patterns and levels of employment, and the significance of work in the formal economy.

However, as the papers by Cliff *et al.* (2008), Baldry (2008), Bosworth (2008), Wilson and Gambin (2009) and Harper (2008) make clear, neither technological change nor demography are strictly speaking exogenous. Everything depends upon everything else. But for many purposes it makes sense to regard these as external factors impinging on work, employment and education, rather than being shaped by them.

2.2.1 Technological Change

Recent technological change has been dominated by the impact of information and communications technologies (ICT), although other technologies may be becoming of equal or greater import over the next 20-30 years (see Cliff *et al.* (2008) and Dixon (2008)). ICT has been the key technological development over the past 30 years and

looks set to dominate events over the next 30 years, albeit sometimes in combination with other technologies such as biotechnology or nanotechnology. ICT has resulted in huge changes in both processes and increasingly also in products and services. These are dramatically changing the worlds of work, employment and education.

Dixon's paper reviews some of the key trends and possible future developments, including drawing out some implications for learning and education. Recent and near future developments in ICT include real time speech recognition and translation, artificial intelligence and robotics. These developments enable ICT to take over many aspects of work including automation of many functions in service as well as manufacturing operations. Shorter more customised production runs are also facilitated. This has resulted in an explosion of new products and services, as well as new ways of producing them. ICT requirements from employers are often far from clear; they are very heterogeneous. But ICT skills will remain a key area for focus in education for the foreseeable future.

As noted above, mobile technology enables an increasing amount of work to be done at any time and place (a key aspect of so called "distributed work"). The development of improved communications, as well as transport and logistic services, has revolutionised the relationship between customer and supplier. In many markets key tasks and operations can now be subcontracted to the other side of the world. This brings with it problems in managing distributed work and flexible working patterns, (both locally and globally), which requires new forms of education and training for both managers and employees in general.

ICT has resulted in dramatic changes in both products and services and ways of doing things. This has had significant impact on employment patterns and levels in different locations as individuals, organisations and countries have adjusted and responded to the threats and opportunities that this has offered up. One important consequence is a requirement for a core of very highly qualified experts who understand the technology in depth, plus a more general cadre of high skilled workers to operate it. However, as noted below, not all jobs will be high level ones related to the information/knowledge economy.

Technological change[1] is having a dramatic impact on the structure of employment as well as many other aspects of the way work is conducted. ICT in particular has revolutionised the way business is done, created new markets and offered the possibilities for people to exert much more control over their working lives. It seems certain the pace of change will continue if not accelerate. However, it is important to recognise that just because something is technically possible does not mean that it will inevitably happen. As Baldry (2008) emphasises, outcomes are shaped by social and economic considerations and constraints. Simple extrapolations based on technological determinism, and based on the false idea of a fixed "lump of work", have resulted in many previous projections of the impact of technology on employment looking very silly, (for an explanation of the "lump of work fallacy" see Box 1). In the 1970s for example the doomsters predicted the collapse of employment and the paperless office would be the prime outcomes of the coming ICT revolution (see, for example, Jenkins and Sherman (1979)). Both were far wide of the mark. This does not mean to say that developments over the next decade or two will not have profound implications for employment and the world of work, but it does illustrate the dangers of simple extrapolation, taking no account of social and economic behaviour and the power of markets to adjust to new circumstances.

[1] Especially ICT but also biotechnology and the extensive use of nano-technologies.

Much of the debate on the impact of technological change and globalisation in recent years has focused on its biased nature which has tended to favour skilled labour (so called skill biased technological change (SBTC)). Generally, technological innovations in production methods result in improved productivity. In the short-run, holding all else equal (e.g. output levels), rising productivity implies falling demand for labour. But with biased technical change the demand for some types of labour may increase.
More generally, economic theory suggests that, in the long term, productivity (output per person hour worked) is primarily determined by technological change, where this is generally defined to include efficiency gains due to re-organisation of working methods and working conditions.[2] In many models this is treated as exogenous (falling like manna from heaven). In so called endogenous growth models (see Bosworth (2008)) it is linked to investment in human and physical capital. At the macro-level, therefore, there is no long-run trade-off between employment and labour productivity growth.
In the long run, if labour markets are functioning efficiently, changes in employment can be expected to reflect changes in the overall size and composition of the labour force, and, in turn, broader demographic changes. The final outcome will also be influenced by the various factors that affect the functioning of the labour market, (such as labour market (and other) policies, and labour market (and other) institutions).

Box 1: The Lump of Work Fallacy

The lump of work (or labour or jobs) fallacy has been called one of the "best known fallacies in economics." It is widely cited in disparagement of policies that suggest reducing the standard hours of work can be used to boost employment (see discussion in Walker (2007)). It has also been used to argue that automation must mean job losses. According to Krugman (2003) it is the idea that there is only a fixed amount of work to be done in the world, so any increase in the amount each worker can produce reduces the number of available jobs. He quotes the example: of dire warnings in the 1950s that automation would lead to mass unemployment. This same mistake lay behind hopelessly pessimistic predictions of the impact of ICT on employment in the late 1970s. As the name suggests it is an idea that economists generally view with contempt.

While it is undoubtedly the case that technology has the capacity to make some jobs redundant or obsolete, it is not inevitable that employment as a whole is reduced. This assumes that there is some fixed amount of work to be done that automation can take over. In principle, there is no limit to the number of useful things for people to do, whatever their skills. Whether these can in practice generate viable incomes for those undertaking the work depends upon the market.

The initial predictions undertaken in the 1970s about the possible impact of the ICT revolution were for mass unemployment in the 1980s, (e.g. Jenkins and Sherman, 1979). This turned out to be misguided. More considered analysis, which recognised the importance of market adjustments, came to much less pessimistic conclusions, although recognising the negative aspects for those directly affected (Whitley and Wilson,1987).

It is clear that dramatic further technological changes are in prospect (Cliff *et al,* 2008). But just because something is technically possible does not mean it will inevitably take place. Impact depends on take up and implementation, which is moderated by economic forces costs and benefits) and other factors (such as changing social values), and shaped

[2] See for example, neo-classical growth such as those outlined in Barro and Sala-i-Martin (1995), where the accumulation of human and physical capital is subject to diminishing returns (Barro, R.J. and X. Sala-i-Martin (1995), *Economic Growth*, McGraw-Hill, Inc., New York).

by existing values and infrastructures. As noted above, initial estimates of impact of ICT on work and employment in the late 1970s were way off beam. This reflected the "Lump of work fallacy" (see Box 1 for further general discussion).

In thinking about possible futures it is important to avoid technological determinism (Baldry, 2008). There are plenty of useful things to be done, including care of people and care of the environment. The question is how to ensure that such jobs are created, and offer a living wage.

2.2.2 The growing importance of virtual worlds and virtual markets

Castronova (2006), Heeks (2008) and others have highlighted the potential of virtual worlds and the internet for generating value in the real world.

There are many positive aspects of such virtual worlds:

- There are many opportunities for translation to real world; sale of virtual world information/assets for real world dollars, so called "gold-farming";
- Virtual worlds can be used as training environments and vehicles, building up practical experience in low cost and unique ways;
- There are benefits for team work and communication;
- Development of new ways of being (having fun and being happy).

At present these remain relatively minor in terms of income and employment in a UK context. While the "games" industry is worth many billions of US dollars, the scale of gold farming and related activities is much less significant (although quite important for some developing countries, including China (Heeks, 2008)).

More human centric work can be better fitted into new styles of working based on on-line communities (Zhao *et al* (2007). On line communities can be an important source of work:

- Open source software (OSS);
- Scientific communities facilitated by cyber infrastructure (CI);
- eBay type operations and markets (eBay traders together form one of the largest "sectors" of employment in the USA);
- Creating products and obtaining benefits by working collaboratively in cyberspace.

Most of these activities represent more competitive (individualised/atomised) markets, rather than monopolistic markets dominated by the "firm" or large corporation. This opens up the possibility of individuals generating their own employment opportunities rather than relying on the State or major corporations to provide them with jobs and employment. This might involve operating in the informal as much as the formal economy. These possibilities are taken up in Section 2.7 below.

Of course there are also negative aspects of such technologies. These include:

- Exploitation of people over the net;
- Malign intent, (malware, viruses, botnets, etc);
- Big brother (both by the State and large corporations);
- Pornography and related activities;
- Criminal activity, identity theft, etc.

Some of these also have a positive economic face. For example, virus protection and other security software is quite big business. The market capitalisation of Symantec and

McAfee combined amounts to some $16-17bn, so there is big money in protection and prevention. Estimates of the negative economic impact (e.g. clean-up costs) of malware are c.$0.5bn for the bigger and more pernicious outbreaks. So there are real economic costs and opportunities in these areas.

The development of "expert systems" has led some to suggest that many professional jobs will disappear. While IT systems can be designed to substitute for humans, there are still real limits to how successful this is, as anyone caught up in automated telephone answering systems can testify. Similarly access to the internet for "expert" information is no substitute for an in-depth education and years of professional experience. Contrary to the views of an immigration official that "skill shortages of Indian chefs was not a problem since anyone can read a recipe",[3] execution of many complex professional, technical and craft jobs requires real knowledge and understanding that cannot be obtained by simply tapping in to "Google" or checking out Wikipedia.

2.2.3 Globalisation

Although Globalisation can in many respects be seen as an outcome of technological change moderated by economic and other factors, it is worth considering it as a separate driver for some purposes. A key issue is the way in which the technological changes outlined above have resulted in the economic playing field upon which the UK competes with the rest of the world, including developing countries, being flattened. As Friedman (2007) argues in his popular book "The World Is Flat", this is having dramatic implications for the world of work across the globe. Reduced transport and communication costs open up the possibility of outsourcing to take advantage of significantly lower costs for labour and other factors of production. Improvements in global communications are affecting the distribution of work geographically across labour markets on a global scale. There is now much less certainty about where work will be done in the future and by whom. Increasingly there is a single global market for everything, including people. Capital, people and jobs are increasingly mobile and less constrained by national boundaries.

Some commentators such as Brown *et al.* (2008) argue that this undermines the comfortable view held by some that the UK and other developed economies can retain and indeed expand on the numbers of high level jobs associated with the so called knowledge economy. They paint a much more pessimistic view about the impact of globalisation on the UK and, in particular, stress the low likelihood of the UK being able to reach the promised land of the knowledge economy for all but a few of its workforce.

2.2.4 Demographics

Demographics is the other main driver of change affecting the labour market and economy. Harper (2008) sets out the key trends. Perhaps the most significant change in terms of work and employment is the gradual increase in the average age of the population. Casey (2008) examines the changing trajectory of working lives resulting from this, focusing on what will be the impact of an ageing workforce and longer working lives. His review explores the significant implications this will have for the world of work, employment and education.

It is clear from the reviews by both Harper (2008) and Casey (2008) that the UK, along with many other developed economies, faces a three-fold challenge:

- an ageing population and workforce as the 'baby boom' generation approaches retirement;
- increased life expectancy; and
- a falling birth rate.

[3] Article by Ronald Yeats, Sunday Express, 13/01/08, p55.

In combination these open up a gap in the dependency ratio between the economically active and the retired population. The projected change in dependency ratios raises major concerns about the sustainability of the pensions system, and rising costs of health care, especially for the elderly. This is likely to result in the need for later retirement and life long learning.

Casey (2008) highlights a number of tensions. In some respects the long-term trend has been for working lives to contract, with later labour market entry associated with longer time spent in formal education and earlier retirement. However recent concerns about pension provisions have been exacerbated by the financial meltdown associated with the "credit-crunch", and the talk now is about extending working lives to enable people to build up pension rights. Of course, as economic circumstances pick up, previous trends towards early retirement may resume.

Increases in the average length of lives are also leading to more people considering working longer to fill their lives with something meaningful as well as topping up incomes and pensions.

Often this involves the need to change jobs (as noted above) the idea of a single job for life has become less and less realistic as an ambition for the vast majority of the workforce. Increasingly it is only the public sector that offers such possibilities.

For those in employment approaching their 60s, the idea of hanging on to their current jobs, thinking "this will see me out", is often no longer an option. There is an increasing need to think about retraining and re-skilling to maintain employment status.

Even for those that have retired there is often a reassessment and subsequent search for post retirement work and related activities (possibly in the formal economy but equally in the informal economy, such as voluntary work).

Subject to what might happen via migration, the average age of the workforce is due to rise significantly. Employers will have to adjust to an ageing work force and then learn to live with that older workforce.

Life long learning will also need to focus increasingly on an ageing population and one with different needs.

At the opposite end of the age spectrum, many younger people are happy to operate as portfolio workers, flitting in and out of engagement with the formal economy as it suits them. But as they mature and acquire responsibilities they may need to find and secure a "proper job", with more security and stability. This may become increasingly difficult in the immediate future as the impact of the recession bites, and previous modes of working become less easy to replicate.

Recent events in financial markets have exacerbated pressures on most pension schemes (both private and public). Many people will have a long and relatively comfortable retirement, but many others may face poverty, loneliness and a growing need for care. This will put pressure on the State and the extended family, forcing many to stay in jobs longer to improve their pensions and to pay for care for both themselves and their parents. However, as argued by Giullari and Lewis (2005), the "commodification" of care does not necessarily meet the emotional needs of the cared for nor the carer.

In addition there are a number of demographic issues relating to migration. Political changes (especially enlargement of the EU), as well as other factors, have made

movement across national boundaries much easier. This has resulted in big increases in cross border flows of people. Although they are not so significant in numerical terms as the implications arising from the other demographic factors outlined above. The UK government has argued that such flows have helped to meet labour shortages, and inward migrants often contribute a dynamic boost to their new countries. However, the much greater flows of inward migration that the UK has experienced in recent years also pose many problems for the labour market, for education and for policy makers in general.

All these demographic developments pose particular problems for employers. They will need to change their recruitment and retention policies to attract and retain the staff they will need. This may reinforce trends towards more flexible working practices, including less abrupt retirement transitions, and require targeting of groups such as older workers. Another important aspect which can be included under this heading relates to the increasing role of women in the formal economy.

Work, employment and education are shaped by many institutional and political factors which have a demographic dimension. There are two specific policy changes that are important in thinking about future developments. These reflect decisions already made; first, to (effectively) raise the minimum school leaving age to 18; and second to raise the official retirement age of women to match that for men. These will be matters of historical fact in the future scenarios to be considered as part of the BCH programme, although as noted elsewhere they may bring with them many problems of adjustment in the short-term.

Another aspect of demography to bear in mind is the difference in birth rates between different groups in the population. Dex (2008) notes that the proportion of children from disadvantaged backgrounds coming through schools is likely to be increasing, since the poor are having more children and the rich are having fewer. For similar reasons the proportion of children from teenage pregnancies may also be expected to increase unless recent trends are halted or reversed. This will all have implications for educational priorities.

2.3 Changing patterns of work and underlying trends in sectors and occupations

The sectoral and occupational structure of employment has changed slowly but steadily over the past century and more. Two centuries ago the economy in the UK (and in Europe more generally) was predominantly agricultural. The industrial revolution resulted in the dramatic advance of manufacturing and industry as a key source of employment. Despite this, just 50 years ago, soon after the establishment of the European Community, much of Europe was still pre-industrial, and heavily dependent on agriculture. This is changing very rapidly and only a few members of the expanded EU now have significant proportions of their workforces employed in agriculture. In the UK it now accounts for less than 2% of all jobs.

Trends towards the so called "knowledge" and service economies have gathered pace over the last 10 years (see the analysis by the Work Foundation (2006), based on Eurostat estimates). The so called information revolution has resulted in the transformation of employment patterns, with much greater emphasis on service based employment, focused on knowledge and information acquisition, processing exploitation and dissemination. This includes a very diverse mix of jobs, ranging from high level professional and managerial occupations to those working in call centres and doing routine clerical support jobs. According to the Work Foundation, amongst the EU15, employment in knowledge based sectors rose by almost a quarter over that 50 year period compared with an average increase of just 6% for the economy as a whole. In the

UK the overall share of knowledge based employment had risen to around 50%, one of the highest amongst the EU15. These trends are confirmed by more recent analyses, such as in official publications like *Employment in Europe 2008*, and in more academic studies such as Wilson *et al,* (2008).

Gambin and Wilson (2008) provide a general review of both conventional and non-conventional views of the prospects for work and employment, including research on possible future trends. The conventional approach, based on examination of well established trends and patterns of behaviour, emphasises continuity and the need for education to prepare people for a world in which skills at all levels will be needed to succeed in the labour market. Less conventional approaches highlight the possibilities for both utopian and dystopian visions, which could have rather different implications for education.

Pink (2005) argues that a third revolution is now imminent. The first (industrial) revolution swapped fields for factories, while the second (information) revolution replaced brawn with brains. Pink suggests that the third revolution will involve a shift from "left" to "right-brain" economic production. The "left brain" is mainly associated with logical thinking. This is an area that computers are well suited to deal with. Developments in ICT such as speech recognition, GPS systems, the internet, etc, are making it possible to accumulate, analyse and apply information automatically, so that systems can replace people in many areas of service work, as well as in manufacturing. Systems can be designed to deal with routine enquiries, make bookings, and providing standardised professional advice. Expert systems are also becoming increasingly feasible, with the very best knowledge and practical experience about how to do most things available on-line. In contrast, "right brain" activity is associated with more creative thinking that cannot be so easily replicated by computers.

Gambin and Wilson focus primarily on paid employment in the formal market economy. Dex (2008) considers the future of both paid and unpaid work. Her paper covers some common ground with that of Round (2008) but focusing more specifically on the place of work within the family. They both consider some of the key trends in paid work, home-working and unpaid work They outline some of the links between these trends and social benefits, as well as general attitudes to work. Dex (2008) also highlights the loss of deference in society and the implications of this for schools, as well as a number of more general educational implications.

The trends in informal work are not clear cut. On the one hand the importance of the formal economy is in many ways growing, with women in particular taking an increasingly important role in the formal economy, with rising labour market participation rates amongst those of prime age (25-55). The employment rates for both males and females have also risen steadily in recent years encouraged by the State on the grounds that this is the best way to ensure social inclusion. On the other hand informal activity remains very significant for most people, and in many respects technological change is helping to encourage such activity, while some changes in social values (rejection of materialism, concerns about the environment, etc) are encouraging people to reject market/capitalist solutions).

Gambin and Wilson's review focuses on key trends at both a UK and pan-European level. They draw upon the recently published *Working Futures* results for the UK, as well as Cedofop projections which present an initial attempt to examine Europe's labour market as a whole.[4] Although both sets of projections were carried out before the current financial crisis broke, the emphasis is on longer term trends to 2020. They suggest that

[4] See Wilson *et al* (2009), Cedefop (2007a, b and c) and Wilson *et al.* (2007) for details.

although the growth of the so called "knowledge economy" will continue, it is the services sector more generally that will provide the main source of new jobs, both nationally and across Europe as a whole.

Gambin and Wilson's (2008) review sets out in some detail the various drivers of change. It is argued that the changes in employment patterns expected largely reflect a continuation of previous long-term trends, driven by technological change and demography, moderated by economic factors. In combination these have resulted in shifts in patterns of consumer demand as incomes have risen.

As in the UK, the analysis confirms that Europe as a whole has been experiencing a sustained shift in employment away from the primary sector (especially agriculture) and traditional manufacturing industries towards services and the knowledge-intensive economy. This general trend is predicted to continue, albeit with some exceptions as a few Eastern and southern European countries benefit from inward investment in some manufacturing (as a result of their lower labour costs).

Despite these changes, employment in many new EU Member States still relies to a great extent on agriculture and manufacturing, but this is changing rapidly. By 2020, the primary sector (agriculture and mining) is anticipated to decline from almost 8% of total employment in 1996 to less than 4% in 2020. Manufacturing employment also is projected to fall from 20% to below 15% over the same period. By that time ¾ all of jobs in the EU will be in services.

The Cedofop projections suggest that over 20 million additional jobs might be created between 2006 and 2020 in the EU-25+ (EU-25 plus Norway and Switzerland). This projection was undertaken before the scale of the impact of the recent financial crisis associated with the "credit crunch", and its effects on the stock market and the real economy became clear. The main driver of the long term increase in employment is demographic change and the expected growth of the population and labour force. These are unlikely to be radically affected by short-term events. Assuming that an economic collapse of the scale last witnessed in the 1920s can be avoided, such longer term trends are likely to be reasserted.

The Cedofop projections suggest that the construction sector will only show modest[5] growth with fewer than half a million new jobs being created between 2006 and 2020. Distribution, transport, hotels and catering together are projected to see employment grow by more than 4.5 million over the same period, while non-marketed services (which includes education and health) are expected to increase by slightly more (4.9 million). Business and miscellaneous services are projected to see the brightest prospects, with more than 14 million additional jobs being created between 2006 and 2020. Although the employment prospects for areas such as banking and insurance are likely to have been dented by recent events, the potential for growth in jobs in areas such as other business services and childcare and social care (which form part of miscellaneous services) will remain strong.

Underlying these trends is an assumption of continued innovation, technological and organisational change, and development of the so called "knowledge economy". UK and other European governments have argued that future employment prospects and economic performance will depend upon continued investment in human capital to maintain competitive advantage compared with the rapidly developing countries of the Far East and elsewhere. There is increasing recognition of the importance of R&D and innovation in maintaining economic growth and competitive performance. While this is

[5] Skill is typically measured by occupation or qualification.

mainly tied up with education at the highest levels, there are implications for education more generally, in particular, the role of those qualified in science, technology, engineering and mathematics (STEM) subjects. While these are not the only kinds of skills required, a sound foundation of science and technology is regarded by many as fundamental to continued economic success. These issues are discussed in more detail in Section 2.9 below.

The projected sectoral changes set out in the Cedofop work suggest that there will be significant implications for the occupational (and other) skills needed in the future. Skills can be defined and measured in various ways (for detailed discussion see Wilson *et al.* (2007) or Leitch (2006)). The most common definitions and measures used relate skills to either the occupation that people have,[6] or to the qualifications they hold.[7] Changes in sectoral structure have a direct impact on the pattern of demand for occupations and qualifications. They are also linked to other aspects of skills (variously referred to as key, core or generic skills, such as literacy, communication skills, etc).[8] These changes are being reinforced by changes in the patterns of employment (skills demands) **within** sectors. Technological changes are a key driver here, affecting the pattern of demand for skills, these are being reinforced by changes in how work is organised and how jobs are performed within sectors.

A key trend identified is the shift towards demand for highly skilled workers. In general there is a rising demand for higher level occupations, typically requiring higher level qualifications (i.e. at degree level) and various types of generic skills.

The review by Green (2008) focuses upon the changing demands for generic skills. Drawing upon results from detailed surveys of employers, both in the UK and in many other countries, he suggests that generic skills, such as communication skills, problem solving skills, team working and ICT skills, are increasingly valued in modern economies and labour markets. Systematic studies of trends in the UK reveal a number of significant trends in the demand for a range of such skills. This has clear implications for education if the UK is to equip young people with the types of skills they will need to succeed in the labour market of the mid-21st Century.

Almost 40% of those employed in Europe are now in higher-level jobs such as management, professional work, or technical jobs, that typically require a university degree as an entry requirement, and this share is expected to rise further. This reflects the continued growth of the so called knowledge economy.

However, at the same time, there is a clear trend towards a growing number of lower level service jobs in hotels and catering, distribution and other areas. Increases in employment are therefore also projected for many jobs requiring no or lower levels of skills such as elementary occupations. Although there will be fewer jobs for some groups such as agricultural workers and clerks, the continued growth of the service sector will result in many less skilled job openings in areas such as hotels and restaurants.

The changing patterns of employment by sector and occupation are therefore projected to lead to a job polarisation (i.e. job growth at both higher and lower-levels of the occupational spectrum, with the demand for many jobs in the medium-level occupational

[6] The UK's Standard Occupational Classification (SOC) distinguishes a hierarchy of occupational titles and categories, dependent in art on the skill levels required to undertake them.
[7] Formal qualifications are of course only a partial measure of the skills people have acquired , many of which are not formally accredited and are acquired and developed after the process of initial education. Nevertheless formal qualifications have the huge advantage of ease of measurement.
[8] There have been numerous attempts to define and measure these other aspects of skill, some of which are as much personal characteristics as competences that can be taught and acquired. In the UK the work of Francis Green and colleagues has been seminal (see Green (2008) for an overview).

layer becoming thinner). Technological change (especially ICT) and related organisational changes have increased the productivity of many medium skilled workers, with machines often doing routine and predictable work (both manual and non-manual) that was previously done by such workers. New technologies are less successful in substituting for labour skills where the work involves some element of discretion and response to human interventions, even in work typically done by low skilled workers. There are many tasks that, despite major technological developments in ICT, cannot be undertaken by machines or computers. Consequently the demand for low skilled workers is likely to remain for some time to come.

However the picture is quite complex and other research such as the forthcoming "Jobs Project" report by the European Foundation for Living and Working Conditions suggests that while polarisation has occurred, it is not a uniform phenomenon across all countries in Europe. The polarisation of employment opportunities has a gender bias and significant implications for equality and social inclusion (see Wilson *et al.* (2008) and Wilson (2007) for more extensive discussion).

However, some authors such as Brown *et al*. (2008) fear that the changing features of modern capitalism described under the heading of globalisation above mean that future patterns may be less benign, with businesses and capital being much less tied to particular locations and less prepared to accept long term responsibilities to their workforces in a new "flat world". This could result in a much less rapid increase of demand for graduates than Leitch and others suggest.

The Leitch Review set up by Gordon Brown considered the UK's optimal skill needs in some detail looking forward to 2020 and beyond (Leitch 2006 and 2006). Leitch along with other independent reviews (e.g. Wilson *et al.* (2007) has confirmed that the UK still has a serious problem with basic skills (especially literacy and numeracy). A significant proportion of the workforce still has no formal qualifications. Many lack the basic skills of literacy needed to function properly in a modern economy. Most commentators suggest that the need for skills at all levels is likely to rise over the next 20 years. The analysis suggests increasing needs for both for higher level skill (with increasing job opportunities for high level occupations (needing degrees, etc) as well as for some lower level occupations (needing basic skills). The need for basic literacy and numeracy skills is also projected to rise (both in terms of the numbers and proportions of jobs where such skills will be regarded as essential as well as in terms of the breadth of such basic skills with literacy in particular being expanded to cover other dimensions than simply oral and written communication using conventional media (see discussion in Jewitt's *Challenge* 3 paper).

2.4 Location of Work and Learning

One of the major impacts of ICT has been its potential for changing the location of work. For many years pundits have predicted the end of conventional work patterns, emphasising the scope for remote working and telecommuting. In fact change has in many respects been less dramatic and rapid than they have suggested. Felstead (2008) provides a more considered assessment of the changes that have taken place in recent years and the prospects for the future.

Take-up has been much slower than many predicted, due to resistance from both employers and employees for a variety of reasons (including the need for social contact and fears of loss of control). The majority of today's workers still work in offices every day, despite the fact that ICT allows many of them to work anywhere. Felstead argues that the potential for further increases in teleworking, homeworking, etc, is significant. Reinforced by pressures to operate in a greener fashion, such changes could accelerate in the next few decades, with significant implications for education and learning. Most

existing offices are designed to minimize operating costs and preserve hierarchy and status, rather than inspire creativity and fuel collaboration among workers. The level of job satisfaction for most workers in this situation appears to be in decline. There are therefore good reasons to consider alternative approaches. Despite this, Felstead considers that the most likely path will be for much slower change than the advocates of such flexibility predict.

Atwell and Costa (2008) focus more specifically on the potential for integrating personal learning and working environments. Their review covers drivers of the development of present learning and working environments and probable, possible and preferable futures in this area. It considers whether the idea of the "industrial" model of schooling may be becoming dysfunctional, and suggests that long established trends towards the separation of learning and working environments may be reversed. This could have very significant implications for education.

Other more general aspects of the location of work across geographical areas are considered in Green (2008a). Her review focuses on various aspects of location and place. It highlights the way in which location can influence economic prosperity and labour market outcomes, in both positive and negative ways. It also considers how education can help to engender positive virtuous circles, as opposed to negative and vicious ones. There are also important tie-ins here with some aspects of the "green agenda", including links between the economy, technology and the environment.

In the US and UK there has been a great deal of emphasis recently on creating "Green jobs". As EMSI (2008) demonstrate "Green jobs" are NOT occupationally specific. They are more related to sectors, especially on the outcome of particular activities aimed at driving households or other organisations to act in a more environmentally stable ways (e.g. reducing energy use or pollution, or improving the environment in measurable ways). These might include various types of construction activity including refurbishment to achieve green objectives; investment in new transport systems, energy production transmission and use, waste management, scientific activities connected with these issues, etc.

Identifying sectors and public and private funding aimed at achieving these ends can help to identify changing skill needs associated with it. In a few cases these may be unique to green type activities (e.g. environmental specialists) but more generally will cover the full spectrum of occupations.

2.5 The meaning of work

Work has many different meanings. There is no single generally agreed definition, either in general parlance or amongst different academic disciplines. A number of the Review Papers commissioned for the *Working and Employment Challenge* touch on these issues.

Overell (2008) argues that this is a complex matter. For many people work is a key element in defining who they are. His paper focuses on the meaning of work, and identity, covering the quest for meaningfulness and purpose. It includes a discussion of topics such as "craftsmanship", "professionalism" and the nature of occupational identity. The search for meaning is generally regarded as a positive thing. However, Sennet (1976 and 2008), amongst others, has argued that this is not always the case. The search for meaning can be counterproductive and the cause of unhappiness (see detailed discussion in Overall (2008)). There is also evidence that for some people work is becoming less meaningful and, if some more pessimistic expectations are borne out, this could become more not less common. Brown *et al*. (2008) argue that the future vision of a knowledge based economy, with meaningful and well paid work for all, may be a mirage. For many people such high expectations will be dashed.

The issue of identity is taken up in slightly different context by Bimrose (2008). She argues that the role of careers information, advice and guidance (IAG) is becoming an increasingly important element in helping people to understand themselves and their place in the world. In an increasingly complex economy and labour market, providing well informed information, advice and guidance in a holistic manner is a key element in ensuring a match between what individuals choose to study and the kinds of skills and qualifications that they will need as they leave formal education and enter the world of work and employment. This review emphasises that career guidance is very much at the centre of societal change and can be seen as an attempt to help all individuals attain their potential (not just those at the upper end of the spectrum). This can also help in promoting broader societal aims, including enhanced economic performance. She emphasises that current practice in the area of much careers guidance lacks cohesions and needs radical reform.

Other review papers conducted for the *Working and Employment Challenge* also touch on these matters. Hogarth and Bosworth (2008), as well as Powdthavee (2008), both begin their approach to the issue from a traditional economic perspective. Work (primarily employment in the formal economy) is seen as the main means of obtaining an income for most people, a necessary "evil" to ensure bread on the table, clothing on backs and a roof overhead.

Powdthavee's (2008) main focus is on the drivers of "happiness". In traditional economics approaches, work is regarded as something to be avoided (or something to pay others to do), as opposed to leisure or play, which along with income is regarded as contributing positively to "utility". Powdthavee suggests that recent research suggests that "happiness" is only loosely related to income. If anything it is relative income that is important, but it is clear there are many other factors that influence happiness or Subjective Well-being. (Subjective Well-being, as measured by asking respondents direct questions about their lives). Such results suggest that there may be a need for people to be better educated about what makes for happiness and well being. This line is reinforced in the latest report from the Children's Society (2009).

Subjective Well-being is crucially dependent on employment/unemployment. The strongest results suggest that Subjective Well-being is negatively affected by unemployment (separate/independent of any impact on income). The stigma attached to unemployment is still very strong for most people. The implication is that it is much better to keep people in jobs than give them unemployment benefit.

However, there is some evidence that this may not be the case for a growing minority. The evidence reported by Dex (2008), suggest that the impact may be modified (reduced) if many people in the same area/community are also unemployed. There is also some evidence that some young people have different attitudes from previous generations motivated by a strong work ethic.

The evidence presented by Powdthavee (2008) also suggests that Subjective Well-being may also be negatively affected by long hours of work (raising work-life balance issues), but the links are complex and the direction of cause and effect uncertain.

He also explores the link between Subjective Well-being and education. Again the results are somewhat mixed. Generally, it appears that education may exert a positive effect but it can also lead to unsatisfied expectations. The link between Subjective Well-being and leisure choices is also covered. This includes time spent watching TV, time off work in the formal market economy, voluntary activities, etc). Much of the evidence is mixed, with unclear directions of cause and effect.

Powdthavee (2008) suggests that more emphasis should be placed on understanding what determines happiness in general education, in particular, getting people to understand that higher income is not necessarily the route to happiness. There are however, dangers of a moral hazard and of producing a self-fulfilling prophesy here, with a strong risk of undermining incentives and motivation.

Round's (2008) review highlights the possible value associated with voluntary work (related to both the care of the environment as well as other people), and suggests some possible links here to green, sustainability and related issues. But the reliance of the market economy on incentive systems, based on rates of pay and images of the "good life" followed by celebrities, suggest that developing alternative life styles and mechanisms for distributing incomes and work may not be so easy. Thus although there may be some tendencies towards less conventional values and attitudes towards work in the formal economy the latter is likely to remain at the centre of most people's lives I the UK for the foreseeable future.

The management of the workforce also raises a number of tensions relating to issues of control, autonomy and discretion. As noted by Green (2008), there are indications that much work is becoming more closely controlled and that individual workers have less discretion and autonomy over their work. This is closely linked to measures of worker satisfaction and individual happiness.

2.6 Why work is important

The discussion in a number of the reviews (especially Overall (2008), Powdthavee (2008) and Dex (2008)) highlight that the positive aspects of work (income, self esteem) are a key element in well being. While well being is usually not very precisely defined it is generally agreed that it encompasses more than material living standards. Powdthavee's (2008) review confirms that, while there is no simple answer to what determines well being and happiness, having meaningful work certainly helps, while being unemployed has very negative effects.

The possible future balance between paid and unpaid work is one of the many topics taken up by Dex (2008) who, along with Felstead (2008) and Atwell and Costa (2008), consider likely trends in the location of work (home-working, telecommuting, etc) as well as the location of learning activities). They suggest that while some tendencies towards increased home-working, involvement in unpaid work will continue the role of paid work (in the formal market economy) will remain central for most people. Dex's (2008) review focuses particularly on the place of work within the family. It outlines the links between these trends and social benefits, as well as general attitudes for work. For a minority living off state benefits will remain significant, and general attitudes and motivation to work will be difficult to turn around. Some of these and other more general trends in paid employment are also picked up in the review by Gambin and Wilson (2008). These are discussed in more detail below.

The reviews by both Overell (2008) and Powdthavee (2008) suggest that productive work is one of the keys to well being. Traditional economic approaches emphasise that work (especially in the formal economy) provides income as well as socio-economic status. A job is one of the main means of ensuring social inclusion (see Wilson *et al.* (2007) for a more detailed discussion of the role of skills in raising individual incomes as well as the probability of finding and retaining employment).

As noted in Wilson (2008) life satisfaction is not the same thing as happiness, but evidence presented in the *Atlas of European Values* suggests that Europeans generally are quite happy compared with the rest of the world. Having a formal job makes a crucial difference to life satisfaction. Survey evidence reported by Liddle and Lerais

(2007) suggests that most people appear to be satisfied with the jobs they have. Even when they are short of money, 84% of Europeans declare themselves very satisfied or fairly satisfied with their working conditions. Conversely concerns about unemployment are confirmed as a crucially important negative influence. Having people in paid work is also of crucial importance for the State (as well as individual citizens) because it increases national output and tax revenues.

As trends towards a knowledge economy gather pace, with increasing proportions of the workforce employed in higher level occupations, many jobs could (should?) become more satisfying and less routine.[9] Such jobs, employing better educated workers, are generally more vocationally orientated, as well as offering higher incomes, which (all else equal) should increase job satisfaction. However the trends set out in Section 2.3 suggest that not all jobs will fall into this category. Over the period to 2020 and beyond, there will also be growth in the number of less intrinsically interesting jobs. Not all jobs can be made fulfilling and rewarding. Many will remain relatively undemanding, routine and repetitive, but not subject to substitution by machines.

2.7 Boundaries of work

Overell's (2008) overview considers various other issues related to the meaning of work, including semantic and philosophical debates, as well as social scientific perspectives. His review poses the general rhetorical question of whether people "work to live" or " live to work", as well as raising more general issues about the meaning of work and links to happiness and fulfilment. The distinction between work and leisure is in some situations much less clear cut. What some would regard as leisure or even play, others do for a living. Sports-people, artists, entertainers and others earn a living doing what many would regard as play.

But this blurring of boundaries is not solely restricted to professional and related groups. Many other people see their work as a vocation that defines their lives. This covers wide parts of the occupational spectrum, including many professional and associate professional jobs (e.g. doctors, nurses, teachers, lawyers and scientists). Many of these types of jobs have seen substantial job growth in recent years as highlighted below. Pride in work is not restricted to such areas. For many craft workers there is a natural tendency to take pride in the application of hard earned skills and natural talent. Such aspects can be seen in many other jobs, although perhaps with less emphasis compared with the aspects of drudgery and mindless repetition that characterise many routine and elementary occupations.

If someone is in the right job for them from this perspective, work can cease to be regarded as something to be avoided and becomes play or at least an activity from which positive utility can be obtained. When an activity becomes something that has to be done (often, but not necessarily, associated with externally imposed deadlines and targets and loss of autonomy) there is a danger that it becomes a chore. The classic economic distinction between work and leisure then comes back into play. This can apply as much to the professional footballer and musician as to those in more conventional jobs. Self motivation and discretion, rather than external control and target setting, are probably the crucial distinction.[10] Even without external constraints and demands people can stress themselves by self imposed targets that are not easily achievable. Success at the highest levels in such activities requires considerable effort, perseverance and dedication, all of which are normally regarded as attributes of work rather than play.

[9] Although note the caveats on this matter set out in Brown *et al.* (2008), who argue that the idea that the UK can become a predominately knowledge based economy is wishful thinking by politicians rather than a likely future outcome. Moreover, even those knowledge jobs that are created may offer much less scope for discretion (and hence job satisfaction and fulfilment) than their incumbents might hope.

[10] Francis Green (2008) also discusses some aspects of this in his review.

This evidence suggests that work and employment are closely tied up with identity and personal perceptions and esteem. Round's (2008) review emphasises that while work in the formal (paid for market economy) may play a crucial role here, work in the informal economy may be for some people just as important.

Round (2008) focuses upon the boundaries between informal and formal work. The former includes a range of activities from housework, care of family members and DIY through to the so called "black economy" (more frequently now referred to as the "grey economy"), and criminal activity. Round (2008) challenges the "commodification" thesis that argues that market based work in the formal economy is driving out informal activity. He highlights that even in developed countries informal work remains a key part of most people's lives. His analysis draws on a range of research, documenting such activity, and highlights some of the possible implications for education and learning. These include the need to explicitly recognise the importance of such activity and especially the difficulties that those working informally can face in accessing education in a life-long learning context.

It is clear from the broad range of research evidence reviewed that the boundaries between work, play and leisure, and between formal paid work and informal work, have shifted significantly over the past half century. This is as a consequence of technological developments, as well as changing social values and economic circumstances. Further substantial change can be expected over the next 50 years.

It is also clear that both individuals and society more generally often have ambivalent attitudes to work and employment. On the one hand, as in the more traditional economics approach, work is seen as something to be avoided and minimised. On the other hand, taking a broader sociological and psychological perspective, work is often regarded as a key element in how individuals are perceived, both by themselves and others, and crucial to feelings of self-worth and personal esteem.

The reviews referred to here, as well as other evidence covered below, suggest that paid work in the formal economy is likely to remain the normal means of generating income for the vast majority of households. However, it is also clear that most people also engage in various forms of informal and domestic work. In some cases this veers into the grey economy (tax avoidance) and, at its most extreme, criminal activity. On a more positive note, voluntary work is also an important part of many people's lives.

Technological developments, especially those associated with ICT, seem likely to open up many new opportunities for informal activities often linked to virtual worlds rather than conventional realities.

2.8 Work-Life Balance

There has been a long running debate on "Work-Life Balance" which is dealt with in Hogarth and Bosworth's (2008) review. This begins with a discussion about the traditional economic analysis of the choice between work and leisure. It highlights the long term negative trends in the number of hours worked in the formal economy in a typical week, as well as more general patterns of work over the life cycle (increasing length of holiday entitlements and (until recently at least lower) the falling age of retirement). It also touches briefly on other aspects of working patterns such as some increasing trends to use of unsocial hours/shift-working. They emphasise general trends towards greater flexibility in working patterns (both from an employer and employee perspective). They consider how these choices have been shaped by technology, as well as economic and other considerations. The latter will include the effect of changing attitudes and values, as well as regulatory interventions by the State.

There are many other concerns about undesirable trends in Work-Life Balance. As noted by Hogarth and Bosworth (2008), there is evidence of increasing stress resulting from work intensity, despite long-term trend reductions in average annual hours worked in most countries, and improvements in accident rates, etc. Many workers report that work has become more stressful and that their working hours are incompatible with family and social life. This seems likely to be exacerbated over the next few years, as the structural economic changes highlighted in Sections 2.3 are raising the demand for skills and forcing ever more rapid changes in work organisation, content and pace.

A related factor is job insecurity, with (as noted by Dex (2008) and others) general trends towards increases in various forms of less secure employment (such as self-employment, part-time employment and short term contracts), many of which seem likely to continue to 2020 and beyond. For many, the idea of a single job for life has disappeared. There will be the need to re-educate and re-train to refresh and update skills and knowledge required to take part in the formal economy, as well as some aspects of the informal economy (see Round (2008) for more details on the latter).

Despite negative trends overall in the length of the official working week, there is still a strong culture in many organisations in the UK of long hours worked in the formal workplace (although perhaps not as extreme as in the USA). A study by the Families and Work Institute, (2005) in the US showed that one in three American workers feel overworked, with half claiming to be "overwhelmed". Such behaviour is seen to be an indication of dedication. Attitudes in the rest of Europe seem to place a less positive view on such behaviour. Such practices can be argued to place too much emphasis on labour input as opposed to output, ignoring negative impacts on productivity. Attitudes on the continent appear to place less emphasis on "presenteeism" (being seen to be in the office or work environment for long hours).

For some time there has been public policy concern at a European level about extended hours and over-work. The Working Time Regulations are a clear indicator of this. Overwork is argued to be a prime cause of both physical and mental illness. The pace and intensity of work is increasing in the modern workplace. Britain still has much longer working hours than many of its European neighbours. While pressure from the State (especially at European level) seems likely to continue to reduce weekly hours, economic considerations are likely to work in the opposite direction.

The simple division between work and life assumed in much of the discussion of a work-life "balance" is of course debatable. For many people life and work overlap and interact. Drawing a clear cut boundary between the two is not straightforward. As noted in the previous section many people gain meaning to their lives through their work (whether paid or not). However, this does not mean that there are no conflicting tensions between demands from the workplace and the home, either for the individual or the household.

Attitudes to work are also changing. While many may still define themselves by their work, others increasingly define themselves in other ways (for example by the hobbies or other activities they devote themselves to). Work for an increasing number of (especially) younger people is just a means to an end. A recent survey for Business Week in the USA is indicative. The results suggest that whereas for the older generation (55+) 28% *live to work*, for those aged 25-34 this falls to 16%. The vast majority of the younger generation *work to live* and they do not appear to regard the vocational aspect of working as so important as older generations did.

2.9 Education and work

There are many links between work, employment and education. Much of the recent socio-economic discourse on this topic has emphasised the role of education (and

training) in preparing people for work and providing them with the skills, knowledge and attitudes they need to succeed in the workplace (see Green (2008) and Bimrose (2008)). Education has always been seen as having a crucial role as preparation for work. This has various aspects, including social conditioning and instilling of attitudes, as well as imparting knowledge and work related technical skills.

There is a large body of evidence suggesting that education makes a huge difference to individual employment prospects (see the various *Skills in England* assessments conducted annually since 2002 which provide a comprehensive review of the research evidence (e.g. Wilson *et al.*, 2007)). Better educated and qualified individuals are much more likely to find and retain jobs. They also tend to end up in better paid jobs. Individuals investing in the acquisition of qualifications tend to have higher incomes and increased productivity.

As noted in Wilson (2008), previous generations of schools in Europe and the US can also be seen as aimed at producing workers suitable for the factories, offices and other workplaces (instilling discipline, attitudes and basic skills). Educational systems in the second half of the 20th century were designed to deal with the relatively standardised requirements, a homogeneous population and the relatively well established social order of the post-war industrial society. These circumstances are however changing, which has some significant implications for education.

Of course, education has many other roles in addition to preparing individuals for work:

- Understanding of the world and society;
- The ability to take part in civil society (citizenship, social capital);
- Broader cultural and social aspects;
- A consumption activity (learning for its own sake);
- Contribution to the "knowledge, innovation, research & development (R&D) triangle".

The latter is especially significant for long term economic development. The links between education and work and employment are not just a one way process, with work and employment implying a demand for certain types of education. Education, through its role in the "knowledge, innovation, R&D triangle" plays a crucial role in determining the path that scientific technological, economic and social developments take. Competitive pressures from globalisation are placing an increasing emphasis on these links. Ensuring the right skills are in place to be able to innovate and compete at the leading edge of scientific, technological and economic developments has become a top priority for governments across the world.

Education can therefore be seen as a key driver of change rather than simply a passive response to the needs of the labour market and the economy. Education's role in innovation and technological change is reviewed in Bosworth (2008). He argues that, despite the assumptions adopted in some economic models, technology does not simply fall like manna from heaven. It is dependent on investment in human capital in the form of R&D and knowledge. The R&D, knowledge, innovation triangle is a key element in the drive for improvements in productivity and economic competitiveness. Education, especially at the highest level, plays a key role in this process, with universities being key players in much research, development and innovation. Bosworth's review focuses on the nature of the relationships involved, and on the implications for work, employment and education.

Bosworth (2008) emphasises that this implies a demand for:

- Those qualified in STEM subjects (possibly quite small in number but playing a crucial role);
- Management and leadership;
- Entrepreneurship.

A particular concern highlighted in a number of official reports in both the UK and other countries relates to the crucial role of those qualified in science, technology, engineering and mathematics (STEM) subjects. This is emphasised in a growing body of research evidence reviewed in Wilson and Gambin (2008). This emphasises the fact that much investment in new technology is dependent on a solid base of science, technology, engineering and mathematics personnel. Although not all technological developments rely on such skills, they do lie at the core of most technologies. A firm foundation in such disciplines is probably a key element to achieving prosperity. The implication for education of encouraging the study of such subjects in school through to university is therefore an important issue that needs to be addressed. Bosworth (2008) also emphasises that it may be important for the general population to have a sound grounding in such disciplines, if they are to be able to critically appraise scientific issues and to make informed judgements about products and services based on such knowledge.

Innovation therefore needs people with management, leadership and entrepreneurial skills plus STEM and related skills (Wilson and Gambin, (2008)). But it is not just about a core elite. For markets to grow, a well informed population is needed to act as customers for the new products and services produced.

Many of the reports reviewed in Wilson and Gambin (2008) suggest that there is evidence that not enough young people in the UK are choosing to undertake science and engineering studies. This may be a problem across Europe more generally (see Wilson, 2007). Many young people shy away from difficult technical subjects such as mathematics, physics and engineering. There are also concerns about vicious circles arising from a lack of good teachers in these areas, further discouraging young people to take up such choices. Careers guidance and advice also has an important role to play here.

The “knowledge triangle” requires a sound science, technology and engineering foundation if the UK (and the EU more generally) are to compete successfully in the global economy. This requires high level skills in this area. Countries such as China are currently investing much more heavily in these areas.

Of course it is not just about science and technology, other aspects such as innovation and design in the more creative and cultural industries and services will also be very important. The UK has many people working very successfully in these areas. There will also be a large range of jobs in the future associated with the care of the environment and care of people. But much of this is underpinned by a sound understanding of science, technology (especially ICT) and engineering.

Other Challenges within the BCH programme are also covering the issue of general "creativity", but it is also important to retain a more technical or economic definition of "creativity". The common conception of "The Creative Industries" seems to be about making films or music, creating art, fashion and design. The work of people like James Dyson, Alec Issigonis, Frank Whittle and Barnes Wallis. The significance of innovation in engineering, technology and science can be crucial and world changing. See for example Christiansen’s (2008) work the Innovator's Dilemma/Solution, etc. Such innovation and

creativity in industry more generally has an economic impact that dwarfs impact of fashion-design and the "creative" media. But combining science and art disciplines is not easy. All too often school timetables work against this, with physics and other pure sciences set against the arts and humanities.

The role of education in encouraging entrepreneurship and improving management and leadership is also a key feature of much recent research, (see Tamkin, 2008). Having the right resources and skills is of little value if they are not managed appropriately. Tamkin's review emphasises the importance of leadership and good management, as well as entrepreneurship (see also Wilson and Gambin, 2008). These factors become increasingly important for economies to compete successfully in global markets. This applies both at national and local levels, and in public and private sectors.

Based on this general body of evidence, governments from around the world have tended to place increasing emphasis on the importance of the economic benefits of education (based on the idea of investment in human capital). This has often been linked to ideas about the knowledge economy and it has been suggested that the UK needs to invest more heavily in skills to take advantage of these trends.

Some have questioned whether or not the evidence represents cause and effect. Ideas such as credentialism, and the so called screening hypothesis, suggest that education does not actually increase productivity, as implied by the human capital model, but simply helps to identify more able individuals. Others (Brown *et al.* 2008) suggest that future employment growth in the "knowledge economy" may be a mirage, and that the demand for the highly qualified could fall off, as competition from abroad undermines the advantageous position that older graduates have held, and as huge increases in the supply of well qualified people across the world swamp the market.

The idea that initial education can be provided at the start of people's lives that will serve them until they retire has become increasingly outmoded. Unwin (2008), focuses on the ongoing need for learning in the workplace, especially the more vocational aspects. She emphasises not just the general need for life long learning but focuses on what workplace learning might look like; what kinds of leaning practices will be important; who will pay; who is responsible; and delivery mechanisms.

Brown (2008) takes this a step further, focusing on the idea of developing expertise and moving beyond a focus on workplace competence, assessment and qualifications. His paper focuses on trends in the specifications of "expertise" in different jobs and what people in them are expected to do. It highlights problems with a competence based approach, especially one focused around sectors, emphasising the complex nature of many jobs, which cut across discipline and sectoral boundaries. He also highlights the importance of collaborative working and supporting of others in the learning process, rather than an emphasis on individual achievement and acquisition of qualifications.

The workplace is also an important site for learning. Education does not just take place in classrooms and at the beginning of people's lives. Unwin (2008b) considers these issues in some detail. The quality of much learning in the workplace is very variable and existing practice may ingrain inequality. When done well, it can lead to self-development, and the formal education sector may have some real lessons to learn. In many cases, however, employers often resort to external means to obtain skills rather than trying to grow them in-house. Recent upward trends in use of migrant workers in many sectors is a clear example of this (see MAC 2008) for more detailed discussion.

Some individuals see real relevance to learning at work and a chance to shine at work. But the trends are mixed; there are falling numbers doing apprenticeships of the

traditional kind and concerns about the quality of many new modern apprenticeships. Problems in finding places for apprentices are only likely to be exacerbated by the current recession, as employers cut back on both employment and training.

It is also worth recalling that educational establishments are also themselves workplaces, but that there is often failure to follow best practice in approaches to learning and related matters (see the discussion in Unwin (2008b) for various examples).

Keep (2008) provides a broader overview of the links between the labour market, skills and education. This focuses upon a number of key trajectories (both historical and over the future) in the labour market generally, including: occupations, work organisation and management. As well as changing employment patterns it also considers pay, earnings and incentives, highlighting a growing polarisation between and within occupations. Keep argues that this has significant implications for the incentives for investment in education. His paper considers the different types of incentives to learn and invest in education, both financial and non financial. He suggests that for many people there is a lack of incentives for learning which needs to be addressed urgently. He concludes by drawing out the implications for economic and distributional outcomes, including who benefits and why, and how education might influence this. The paper highlights some of the problems of barriers to access such as class, (path dependence, implications for identities) and financial resources.

Of course, in principle, education can help to challenge and reduce such barriers. The present liberal, free market orthodoxy relies on market forces to determine rates of pay (although the UK does have minimum wage) imposed by regulation. In some other countries, (e.g. Scandinavia) social values impose a much narrower distribution of incomes and rewards, with a broader way of valuing the work people do than the size of the pay packet. This raises the question of whether further government intervention is necessary in the UK to change market signals (e.g. raising the minimum wage or trying to change social attitudes towards inequality, as in the Scandinavian model). It also raises the question of whether or not the educational system can help to reinforce or replace weak market signals.

The UKCES is currently undertaking an in-depth review of investment in training and education by both individuals and employers, looking at the barriers and rewards to such investment. This is still to report but may throw some further light on some of these issues.

2.10 Other aspects of work that are also changing

Other sociological factors, governance, culture and environment are also key drivers of the changing face of work and employment. Associated with the broad changes in employment structures described above are many other social and related changes. Liddle and Lerais (2007) set out some of the underlying currents accompanying these structural changes. These include increased emphasis on individualisation, household restructuring (including increasing divorce rates and more people living on their own), and the changing role of women in the formal economy. Other aspects include some indications of movement away from consumerism and increased concerns to meet the new challenges related to the environment. As both Liddle and Lerais (2007) and Dex (2008) note, there are many complex links with the Welfare System and concerns of how to deal with problems of inequality and social exclusion.

The paid work ethic lies at the core of the present Government's social and economic policies. Policies such as *Welfare to Work* and the *New Deal*, emphasising the importance of employment opportunities for all, have been central to its strategy to assist a whole

range of disadvantaged groups, including the long-term jobless, lone mothers and the disabled. All these groups have been encouraged to join the formal economy and take up paid work. Active participation in paid work is presented as a crucial test of social citizenship. A small minority of the population have resisted or avoided such engagement. This raises concerns about how to achieve a set of shared values as well as ensuring general consent to established rules and laws. A significant number of people are dependent on benefits, and given the current state of the economy this is likely to become of increasing significance in the short-term at least. This is also linked to issues of child poverty.

A number of the Review Papers suggest a significant increase in various forms of flexible working, (e.g. Dex, 2008). The term flexible working has been widely used and encompasses a vast range of different practices (for an extensive review see Bosworth and Wilson (2007)). This includes various aspects of time and location, patterns of working, as well as contractual status. A key issue is whether flexibility refers to the interests of the worker or the employer. Flexibility for one may mean uncertainty and precariousness for the other. Traditional discussions of flexible working cover aspects such as part-time working, self employment and sub-contracting all of which have shown some tendency to rise in recent years (see Gambin and Wilson (2008) or Bosworth and Wilson (2007) for more detailed discussion). More recently new technologies have facilitated the development of remote forms of working (including home working, although the latter has a much longer history, quite separate from the effects of ICT).

Many commentators and some researchers have emphasised that "jobs for life" are no longer the norm. But there is still a remarkable stability in most working lives in the UK according to more considered research. Taylor's (2004a) review of the ESRC programme of research in this area confirms that these patterns are changing but only very gradually. Undoubtedly many things are changing and 50 years from now things will look as different as today's labour market does from that of 1959, which was dominated by industrial forms of working (focused on primary industries and manufacturing rather than services). But many features will remain unchanged.

Section 3: Implications for the *Beyond Current Horizons* programme

3.1 The Children's Plan

The DCSF launched the Children's Plan in 2007 (DCSF, 2007). In considering which of the trends and issues identified in Section 2 are most likely to impact on education and related matters it is helpful to highlight some of the key points set out in the Plan. Its key aims and objectives are based around:

- Supporting parents and families in bringing up children;
- Enabling children to fulfil their potential and develop as far as their talents can take them;
- Enabling children and young people to enjoy their childhood as well as to grow up prepared for adult life.
- Ensuring children's services are designed around the needs of children, young people and families rather than around professional boundaries;
- Prevention of failure and identification of potential problems in advance.

The *Working and Employment Challenge* is especially critical for the second of these, focusing on what employment and work in adult life might actually mean in 2025 and beyond. It also has a critical role to play in the last issue, helping to identify what might be the big employment risks in future, and highlighting how education (and training) can help to avoid failure and disappointed expectations, including avoidance/prevention of

children ending up as "not in education, employment or training" (NEETs), and prevention of disengagement and exclusion from society as adults.

3.2 Stylised facts: Key Trends and Issues

3.2.1 Work

Much of people's daily lives is taken up by work, be it paid or unpaid or in the formal, informal or grey economy. Work is crucial to the economy and society as a whole. Directly or indirectly it meets both basic needs for food, clothing and shelter, as well as luxury goods. Directly it generates the goods and services produced, or enables them to be purchased. Indirectly it satisfies many non-materialistic needs, some of which are often achieved as much by the act of undertaking it.

Many people attach value to work for reasons other than its immediate economic benefits, including the fact that it helps to establish identity and provides a sense of purpose, self worth and self esteem, as well as offering opportunities for social interaction and personal relationships.

Despite the traditional economic view of work as a "bad thing" (something to be avoided or minimised because it takes up time that could otherwise be spent in more enjoyable (leisurely) pursuits), many people (possible the vast majority) enjoy work, particularly its social side. For some people, work provides them with an important social network and may provide a main avenue through which they meet friends and potential partners. This idea of work as a social venue/hub is likely to continue to be important.

Many people also view work as having intrinsic values, helping to define who they are. Most people appear to be satisfied with their work. Productive work is considered one of the keys to well being. For people who are intrinsically satisfied and fulfilled by the work they do, there may be a blurring of the line between work and play/leisure.

Some people take up work that defines them – such as religious figures, teachers, and health/medical professionals. Some people take up work in activities that are generally viewed as leisure activities – such as professional athletes, people working in creative sectors (musicians, painters, actors, etc).

Others may also find internal fulfilment in having a job that creates a finished product of which they are proud (e.g. craftsmen, artists, etc.). For people who are driven by intrinsic motivation, and for whom fulfilment is considered a priority, work that is satisfying is as important for their well-being as well as its economic productivity.

On the negative side, work may be an activity in which some people participate only to meet the general societal expectation that they should work. Such people may resent the fact that they have to do menial jobs to secure a relatively poor income. Others may resent the fact that they lose part of their incomes in the form of taxation to support others who are able to work but do not do so. There are complex relationships between work, income and status that have bearing on such attitudes.

3.2.2 Key drivers of change and implications for employment patterns

The two key drivers affecting work and employment will be technology and demographics, but these will be shaped by political, social and economic factors. Globalisation, it has been argued, is best regarded as an outcome of these inter-related factors.

Changing patterns of international trade will undoubtedly have a significant impact on the fortunes of many sectors and significant implications for the jobs and incomes of

many people. This is not a zero-sum game however. Success for other countries does not necessarily imply negative consequences for UK employment. However, the UK like other developed economies will need to constantly strive to keep pace with developments in other countries (let alone move ahead in the game).

Technological developments mean that many products and services can be produced at ever decreasing cost by ever fewer people. This raises important issues about control of such technologies and how incomes and rewards are distributed.

There are many dramatic technological developments on the horizon which will have significant implications for employment and work, including how it is done and where it is undertaken. Those linked to ICT are likely to be especially significant. Although in some respects ICT may be reaching its natural limits, and is regarded by some to be "played out" in strictly technical/scientific terms, its implications for employment and work are far from finished. The potential for further dramatic changes in productivity are likely to be significant for the foreseeable future.

But the take up of these developments is not inevitable. Just because something is technically feasible does not mean it will happen. What does happen will depend on both the benefits and costs. These may be both economic and social, and include various constraints and obstacles to be overcome. It is important to avoid adopting a technological determinist view. What will happen will be tempered by social and economic factors and behaviours.

There is often an important element of path dependence when technologies are taken up, decisions and actions made early on may predispose economies and societies to particular paths.

It is also important to recognise the "lump of work fallacy". There is not a fixed amount of "work" to be done that technology can take over, inevitably leaving people previously employed in doing such work "unemployed". Society can reorganise itself to create new jobs that are valued and desirable. Markets are powerful mechanisms that can help to ensure societies and economies can adjust to the shocks caused by technology and other factors. Previous mechanistic extrapolations of the impact of ICT have failed to recognise these factors, and as a result grossly overestimated the negative impact on employment, etc. In principle, there is no limit to the "work" that can be done in caring for each other, and caring for the environment. The problem is in designing institutions and systems that can provide the incentives and mechanisms to ensure that such work is valued.

3.2.3 Conventional trends and vie*ws*

Formal paid work in the market economy is likely to remain crucial to the well being (income and employment) of the great majority of families and households in the UK for the foreseeable future. Formal work will continue to be both the key source of income and status, as well as a key element in identifying how people see themselves.

Informal work will however also remain important, and this can have rather different requirements for education and learning than those from formal work.

Patterns of work in the formal economy will continue to change, with many trends obvious.

- Specialisation, use of capital, implementation of new technologies, etc, will result in continuing structural changes by sector (growing importance of services and "weightless" activities associated with the knowledge economy.

- Demand for skills will continue to rise in many areas, but there may be some polarisation.
- There will be increases in demand for many higher skilled occupations and for formal qualifications, especially at higher levels. But not all jobs will require a PhD; polarisation means rising demand also for occupations such as sales, personal service occupations and unskilled low skilled work.
- There are also strong trends in patterns of employment status (towards increased part-time working, self employment, temporary work, etc).

But many trends will probably be less extreme than some commentators and the media expect, for example in areas such as homeworking and teleworking, etc, which have grown much less rapidly than predicted and which will probably continue to change only slowly. There is likely to be a growing need for generic skills, such as:

- literacy;
- numeracy;
- communication;
- team working;
- problem solving;
- IT skills;
- management and leadership.

Falling hours worked per lifetime (part of the fruits of technological change) will continue to be taken in the form of greater leisure (less time spent doing work in the formal economy). Key trends in this area include:

- a long term trend of falling average hours per week working in the formal economy;
- falling days per week (longer weekends);
- falling weeks per year (longer annual holidays);
- falling years per lifetime (earlier retirement).

Although there are some opposing trends, such as presenteeism (and the long hours culture), as well as staying on at work until a later stage in the life cycle because of extended lifetimes and concerns about pensions.

While projections are always hedged with caveats the most likely outcome over the medium to long term seems to be that globalisation will continue the patterns summarised in 2.7 (and described in much greater detail in Wilson *et al*. (2008 and 2009).

Subject to avoiding a major slump, the most likely developments in employment patterns present a reasonably optimistic picture for the UK.

- Technological change will result in structural changes by sector, and changing demands for occupations and different types of skills:
- These structural changes, will involve job losses as well as new jobs;
- There will be rising demands for many skills (as measured by occupations; qualifications (especially at higher levels); and key/core/generic skills of various kinds);
- But there is also likely to be polarisation, with growth in numbers of general and more mundane service jobs, as well as jobs for those working in the knowledge economy.

Technological change will also open up new opportunities for employment (as well as learning) in:

- Activities related to the environment and climate change;
- Virtual worlds.

Ways of distributing income will continue to evolve (including the use of both market and non market mechanisms).

The boundaries between work, (formal and informal), rest, recuperation, leisure, play, are probably becoming more blurred.

There is increasing recognition of the importance of R&D and innovation in maintaining economic growth and competitive performance. While this is mainly tied up with education at the highest levels, there are implications for education more generally. In particular, the role of those qualified in science, technology, engineering and mathematics (STEM) subjects in the R&D, innovation, knowledge triangle is regarded by many as key. This has particular implications for education at school level, where there are serious concerns that the UK may be falling behind its main competitors. Of course science and technology are not the only disciplines that are important for innovation and economic success.

3.2.4. A critique of some less conventional perspectives

While there is general agreement on the main drivers of change, there is much less of a consensus about the direction and scale of changes that may take place and how this may affect the worlds of work and employment. There are of course many possibilities. These include much more pessimistic scenarios associated with global economic meltdown or other catastrophes (some of which are highlighted in BCH (2007)).

The greatest pessimists see a spectre of mass unemployment, growing insecurity and widening social divisions. On the other hand, there are some who point to much more optimistic possibilities, with technology and changing attitudes having the potential for liberating many employees from dreary, dull, repetitive and degrading work.

Such alternative visions are rarely based on any systematic theory and usually lack any kind of historical perspective or sound empirical foundation. Undoubtedly very significant changes are possible which could have profound implications for many individuals and groups in society. But final outcomes will be moderated by inertia and stickiness in many institutions and behaviours. The final outcomes will almost certainly be less dramatic than either of these two more extreme views suggested here.

The most pessimistic pundits paint a vey gloomy picture, involving a complete breakdown of market based systems, breakdown of basic institutions, loss of trust/faith, anarchy, much greater central control, and dictatorship. Such apocalyptic visions of mass unemployment worldwide, while not completely beyond the realms of possibility are not very likely (although perhaps a little more so in the light of recent events in financial and related markets than would have been thought the case by most people a few months ago).

The populist argument is that capitalism has failed. Undoubtedly capitalism is at bay, and there have been immediate pressures for greater government intervention and regulation. However, as noted below, for all its flaws, the market based economy remains the only serious game in town, with the capability of allocating resources and distributing incomes on a world wide scale.

Some have seen the recent events in financial and other markets as heralding the end of capitalism, but to paraphrase Mark Twain, reports of its death seem somewhat premature! The problem is in finding robust and generally accepted mechanisms for linking paid work to incomes. Although capitalism and free markets are currently getting a bad press, they probably remain the best (most efficient) way yet invented for allocating resources amongst competing needs. For it to work effectively, capitalism, and indeed any alternative voluntarist system, requires a set of legislative and socio-economic structures that the vast majority of the population are prepared to sign up to. The alternative, state control and intervention, has severe limitations and *in extremis* can lead to very undesirable political as well as economic outcomes (as illustrated by the performance of Stalinist states).

It is clear that the present economic situation remains very uncertain and many economists think that the recession will be much deeper and longer lasting than most governments would hope. The possibility of a long lasting slump cannot be ruled out. This would have significant implications for the labour market, the economy and public finances.

As Round (2008) notes, some have argued that there is a growing resistance to "commodification" of everything and ask if there is an alternative to the conventional market based system. They argue that governments and communities, by de-coupling production and consumption from the commodified realm, could in principle open up alternative development paths, with possibly significant implications for education. Round (2008) argues that work in the informal economy is of great (possible increasing) importance for many people. For those that earn their main income in the formal economy, informal work can nevertheless be very significant, while for others the informal can be their only way of obtaining income and status. Work in the informal economy can take many forms, including increasingly opportunities opened up by ICT.

One example of this is the suggestion by thinkers such as Castronova (2005) that it is possible to develop such systems in "virtual worlds" rather than what most people regard as the "real world". The use of virtual worlds for such purposes is only just being explored but there are already indications that there are significant possibilities for achieving real world outcomes (as measured in real dollars) from activities carried out in virtual worlds. While there are significant examples of such activity in some parts of the world,[11] these remain very tiny compared with activities in the real economy and are likely to remain so for immediate future, although they do appear to offer considerable potential for some work and employment, especially in areas such as training and education in situations and circumstances that are difficult or expensive to replicate in the real world.

Another potentially important area of divergence from conventional economic trends and trajectories relates to the Green agenda. Growing awareness and acceptance of the role of mankind in climate change is causing many to question key assumptions underlying the capitalist model (consumerism, materialism) and advocating significant changes in values attitudes and behaviours. If these continue to gain ground this could have implications for both the economy and labour market, as well as education.

The more pessimistic views about employment are centred on three main concerns:

- Technological change will displace jobs;
- Global trade will undermine UK businesses;
- The patterns of jobs created will not match the skills available.

[11] So called "gold farming", which involves playing or taking part in computer games on behalf of others to gain some economic reward in the "real" world.

The first concern has been around since the Luddites. While it is undoubtedly the case that technology displaces some jobs, there is no inevitability that employment as a whole is reduced. Such a notion is based on the "lump of work" fallacy. There is not just a fixed lump of work to be done that automation can take over. In the long run, free markets will adjust to find useful things for people to do, whatever their skills. The initial predictions undertaken in the 1970s about the possible impact of the ICT revolution were for mass unemployment in the 1980s, (e.g. Jenkins and Sherman, 1979). This turned out to be misguided. More considered analysis, which recognised the importance of market adjustments, came to much less pessimistic conclusions, although recognising the negative aspects for those directly affected (Whitley and Wilson,1987).

Similar remarks apply to the issue of where economic activities are undertaken. There is not a fixed amount of output that is to be divided up between countries. World trade is not a zero-sum game. Improvements in standards of living for the Chinese do not necessarily imply a reduction for those in other countries. Not all jobs can be outsourced to India or China (or done by a machine). Many services which involve personal contact fall into this category. Healthcare and teaching/ mentoring involve a high level of emotional intelligence. Other jobs involve the application of creativity and imagination. While such jobs are not exclusive to the developed world there are factors which favour their location in particular places. As Florida (2005) emphasises, these preferred locations score highly on the three Ts; Technology, Talent, and Tolerance. Education has an important role to pay in developing such characteristics.

Some pessimists have also argued that those lacking the capabilities to acquire the skills needed in the knowledge economy will struggle to find employment because of the falling number of unskilled jobs in the UK. This ignores the fact that current evidence suggests the number of low skilled jobs is actually rising in some areas.

Others have argued strongly that the "knowledge economy" is a mirage in terms of generating many new jobs in the UK. Brown *et al.* (2008) suggest that, as a result, there could be a significant excess supply of UK graduates. They suggest that the knowledge economy (with the vast majority of jobs falling into this category) is a mirage, and that therefore graduate targets set by the government are misguided. The rest of the world is catching up fast and also wants the high-end jobs. In this type of scenario, they argue that the UK economy would struggle to achieve full employment and maintain sufficient levels of high quality jobs. To some extent this view contains some elements of the notion of a fixed lump of work, and assumes little scope for market adjustment. However, it does suggest that the optimistic picture set out in the Leitch targets and the Lisbon Agenda may be much harder to achieve than many politicians would like to suggest. Recent events in the world economy are likely to exacerbate these difficulties.

3.3 Key dimensions of uncertainty

Technology: The uncertainties here are not so much about technology itself, but more about its possible impact on the labour market and economy, as well as education. Many technological trends are not particularly uncertain, but their impact on the economy, labour market and education may be.

The possible impacts are likely to be moderated by economic and social factors. The role and significance of virtual worlds may be one particular area of uncertainty.

The Economy: Many trends are quite robust and almost inevitable, but there are significant uncertainties about the overall success of the UK economy in the face of increasing globalisation and the current recession.

Possible key dimensions and uncertainties here relate to:

- how quickly the world and UK economies recover from the current economic crisis (is this a temporary blip, similar to previous recessions, or a more fundamental shift that results in a much longer term depression in economic and labour market prospects, more like the 1930s that the 1980s?);
- how successfully the UK economy will compete with other countries the global economy (in particular, whether or not the aim of securing employment in high level jobs linked to the government's vision of the knowledge economy is realistic).

Market versus Regulation: Linked to uncertainties about the economy are political uncertainties about the way society is managed and controlled. Some have suggested that the recent financial crisis and subsequent impact in the real economy signals the demise of the free market economy. Others argue that markets remain essential to bothefficiency and economic prosperity (as well as political freedom).

The key dimension here is:

- the operation of free markets; versus
- a command economy (centrally administered by the nation state or possibly major multinational corporations).

Social/political values: The market versus regulation dimension also has a parallel with other more general socio-political values. These include:

- Individualism versus collectivism;
- Materialism versus humanism;
- Work to live versus live to work;

3.4 Potential implications for education

3.4.1. The Meaning of Work

Liddle and Lerais (2007) note that, "there is an issue of 'respect' in our societies for those in poor quality jobs". Given that education is increasingly regarded as the main route into a decent job, this message can come across as very threatening to those groups in society who have traditionally failed in the education system.

It has been argued that we need to find ways in society of valuing ordinary jobs more. Some countries (e.g. Nordic countries) have managed to achieve this.

At present, as Brown (2008) argues, there is an unhelpful hierarchy of formal qualifications, with many people being excluded and unvalued.

This is also linked also to pay, and concerns about equality and social exclusion, but it is not obvious what alternative there is to the market mechanism. The Nordic countries offer some hope in this direction but they have also had severe problems in recent years, so there are no easy solutions.

Overell (2008) raises the question of how to encourage people to do things well and to take pride in their work at all levels. Licences to practice may be part of a solution. Better job design to try to instil meaning (at societal, state and organisational levels), is also important. This requires a greater awareness of the significant trends that technological change and globalisation are imposing on the labour market. It also involves the need to equip management (including policy makers at a macro level) with the knowledge and information they need to help structure society and design jobs for all people emerging from the educational system. Moves beyond the traditional idea of

the educational system passively producing people with skills suitable for use in the economy and society. It will also involve preparing all individuals to make the most of the opportunities they face and talents they possess.
Most people agree that there is a need for more and better (more fulfilling) jobs. The EU *New skills for New jobs* articulates such a vision, but it is not clear that it is attainable (at least in its more naïve version, with Europeans cornering the market in high level, knowledge economy jobs). The polarisation of jobs in terms of skill requirements seems a more likely outcome.

This raises the question of what can be done to equip people best for this brave new world. To some degree societies can also make choices about the mix of jobs available by setting and raising standards. Some countries such as Finland (for example) have been able to raise the proportion of higher quality jobs and raise basic standards of literacy throughout their population.

It is clear that not all jobs will be knowledge based. Polarisation implies a need for many lower skilled workers as well as highly skilled and qualified "knowledge" workers. Education needs to prepare people for this reality, as well as developing high level STEM graduates. But focusing on the elite and the rest, risks real problems of division, exclusion and alienation. There could also be major problems of mismatch and disappointed expectations.

Education terminating at 16, 18 or even 21 is unlikely to equip people for what they will need in the whole of their lives in the 2nd quarter of the 21st century (if it ever did). There will be need for frequent updates and new learning. Education needs to equip individuals in such a way that they are empowered to deal with whatever they may face. It is important to recognise the need to avoid the idea that it is possible to plan in precise detail. But this does not negate the need for detailed projections of what the world might look like. On the contrary these are an essential component of the labour market information needed to guide and inform individuals so that they can make informed choices and decisions. But the priority is for distributed decision making not mechanistic central plans. Having said that, society, the State and employers do have some scope to structure jobs in general terms to meet the expectations of learning empowered citizens, as indicated by the experience of the Nordic States. There are broad social and political choices to be made, as well as organisational and individual ones.

3.4.2 Work and Happiness

One way to happiness is to do more fulfilling things at work. Cognitive action also keeps people more active generally, which has other benefits.

There is a need to make the population more generally aware of these findings, and to educate children and others better about what determines well being. This includes factors such as:

- Emotional intelligence;
- Networks and family;
- Health;
- Moderation of expectations and aspirations regarding income, etc. (or at least more realistic and reliable information on the possibilities facing most people).

The aim should be to enable young people in particular to make well informed decisions.

We also need better thought out policies on adult education, reflecting the changing nature of work and employment (recognising the increasing rarity of "a job for life") as

well as the demographic and other trends that are increasing the need for a life-long learning perspective.

3.4.3.Work and Values

The balance between freedom (unfettered markets) and regulation (command economies/central control) may be changing as a consequence of recent events linked to the "credit crunch". However, recognition of the importance of market mechanism means that we are unlikely to see a reversal of the general trends towards decentralised decision making. Technological developments generally also point in the same direction, with knowledge and information being more widely distributed. However, there are some countervailing tendencies, with concerns that some multi-national corporations (and maybe some Nation States) will maintain an undesirable level of central control.

Recent trends have resulted in a much greater focus on individualism, self and materialism/consumerism (Thatcherism). There has been an apparently inexorable move away from collectivist/social values. But this may contain within it the seeds of its own destruction. Unrealistic aspirations and expectations, generated by the media and others, may lead to a backlash.

There are some signs that these trends may be reversible. Growing concerns about the environment and world poverty are one indicator. The political dimension may also be showing signs of a demand for a change in values, with the election of Obama in the recent US presidential election.

There is a case for education to play a key role in this process, by helping to inform citizens about these issues, so they can make well informed judgements.

One aspect of the increasing focus on the individual and self that is particularly pertinent relates to possible tensions between women's rights and priorities (including the right to follow a career in the formal economy) and children's needs for parental care (Children's Society (2009)).

Another aspect relates to citizenship, and ties in to more general social values; valuing what all others do (ensuring greater mutual respect). Much more could be done to change perceptions of the value of different types of work (especially in certain vocational areas and low level skills).

General social values are not fixed. As exemplified by Scandinavian countries, they can be changed in a direction that promotes greater equality in terms of both pay and status, emphasising the need to provide a living wage for important but low skill/low status jobs. There are often cultural aspects to this (e.g. the value in France, placed on high quality food, which has implications for status of occupations such as waiters and chefs). It is conceivable that the recent financial meltdown could help towards a reassessment of fundamental values.

3.4.4.Work-life balance

Education also has a role to play in the area of Work-life balance. Traditional individual work/leisure choices (where work is assumed to be bad, something to be avoided) are morphing into more general family choices and lifetime decisions.

Various trends are significant here. Reduced average weekly hours worked, parental rights, carers rights, etc, are all becoming increasingly regarded as important and appropriate.

There are a number of specific educational implications:

- The first relates to education as a sector of employment (in principle, work-life balance issues should be both recognised, and policies put in place to ensure a reasonable balance – in practice, these seem to be more common in the breach than the observance in the educational sector!);
- Education might be expected to help individuals to understand and achieve a good work-life balance, including facilitating occupational and social mobility;
- Lastly, a good work-life balance opens up the possibilities for additional demands on the educational system, as individuals take up possibilities for undertaking additional education, either as an investment or a consumption activity.

3.4.5.The demand for skills and formal qualifications

The general consensus is that there will be a growing need for more highly educated people to meet the needs of the knowledge economy. But, Brown *et al.* (2008) warn that it is unlikely that this will be the case for all jobs and suggest that there is also likely to be significant growth in jobs that require no or low formal qualifications. There is a real danger that the targets set by politicians for those acquiring higher level qualifications will lead to excess supply and dashed expectations. China, India, etc are catching up at top end of the job spectrum, and are also looking to expand high level, knowledge intensive employment, competing directly with the UK for such work.

However, there is no limit to human ingenuity and the possibilities for developing new products and services that require such inputs. There is no fixed lump of such work to be done. Nevertheless there is a need to reconsider the proposed expansion of graduate qualifications when the economy may not keep pace with the need for such qualifications, with the risks of discontent this will create in the workforce, as well as potential moves further away from gender equality. Brown *et al*. (2008) argue that there has been a failure of policy makers (both in the UK and in Europe more generally) to recognise reality. Aspirations to become a high value added, purely knowledge based economy may be unrealistic and unachievable.

It is also important not to see education as having a purely passive and reactive role. While much of the discussion is about people getting the right skills for jobs that are likely to emerge, there will also be opportunities for people to develop their own jobs their own work. Encouraging people to take a more proactive role, and encouraging entrepreneurialism can help to fill any gaps that might emerge in terms of job opportunities generated by the existing population of employers. In many respects the climate for people wanting to start businesses is likely to be made easier by technological developments.

All of these possibilities could have very important implications for the curriculum. At present State schools run a common curriculum up to 14, yet the scenario sketched out by Brown *et al*. (2008) and others suggests very different demands for skills (with polarisation, across both occupations and geographical space).

Keep (2008) also stresses the importance of incentives. A polarised earnings distribution makes for weak incentives for participation in education for all but a lucky few. This poses some significant challenges for educational policy. Simple changes to the curriculum are unlikely to resolve this. Major changes in priority may be needed which recognise the need to cope with very heterogeneous demands for skills. These may well be strongly polarised, with very different impacts at upper and lower ends of the educational spectrum.

On the one hand, there will be increasing demands for highly creative, technically skilled, knowledge workers. On the other hand, there will also be many jobs requiring limited skills and low expectations and ambitions. For many individuals who are less successful than average in terms of educational achievement, these are the only jobs they may be able to find. The old 11+, which marked 80% of the population as failures at aged 11, has now been replaced by a more general divisions at 14+ and 16+ between those able to go on to become graduates, and the rest. And even for many of those that do achieve graduate status, the kinds of job opportunities on offer may fail to match their high expectations.

In this case supporting such people to develop own businesses (and therefore their own jobs may become of increasing importance. This would place increased significance on measures to support and encourage entrepreneurial activity both within education and more generally. The experience of previous recessions suggests that many graduates unable to find jobs in traditional areas of graduate employment take on new identities and develop new niches (Purcell *et al*. (2005).

3.4.6. Demands for Specific skills

The trends broadly summarised in Section 3.4.5 are identified in much greater detail elsewhere in this document and in the large body of research aimed at anticipating changing skill demands. While there are some concerns about the quality of such information (as a result of inadequate investment in pertinent data and methods (both at a UK and a broader European level)), a number of key trends have been identified. The Leitch (2005 and 2006) reports identify gaps in skill requirements for 2020 and beyond:

- at the level of basic skills (including literacy and numeracy);
- for intermediate skills (including the lack of a sound vocational base); and
- at higher level relating to management and leadership.

Basic skills

At the level of basic skills, too many young people are still not acquiring the most basic skills, including literacy and numeracy. Many fail to acquire the fundamental skills at primary school, and are turned off and disengaged almost from the start. This requires intervention at primary level to break the vicious circles of disadvantage and deprivation that underlie these patterns. In many respects this is no different from what is already happening with Sure Start/Early Years qualifications/Numeracy & Literacy strategies. What is distinctive about the projections is that these needs are likely to intensify, both in terms of the numbers and proportions of jobs that will require at least these minimum requirements, as well as the scope of those basic skills (which are likely to include a broader definition of literacy than simple oral a written communication skills).

Intermediate skills (especially vocational skills)

Not for the first time in reviews about the UK's skill needs, Leitch has identified a gap at intermediate level in the skills profile of the UK. Intermediate skills refer here to a broad group of skills below graduate level but about basic levels, especially various vocationally orientated skills (both technical knowledge and practical experience). Tomlinson (2004) highlighted the need for greater emphasis on vocational courses at this level, arguing for parity of esteem with more academic courses. The Government's response was to introduce a range of initiatives, including *Train to Gain*, *Modern Apprenticeships* and the new *Diplomas*. However, as noted in the following sub-section, for a variety of reasons, these initiatives seem unlikely to provide the long-term solution.

Management and leadership

Management and leadership are crucial to economic performance. Many UK managers remain poorly qualified. Although it is not clear that formal qualifications such as MBAs,

etc, necessarily improve matters, it is clear that the economy will demand more of this particular cadre of workers in the future. There is a need to encourage more talented people into management and leadership courses. The importance of using methods of education that emphasise teamwork is also stressed. There is also a need to explore failure and the lessons to be learned from it, as well as successes. However, there are also some key questions to be addressed about whether or not effective leadership can be taught.

STEM qualifications
There are some particular concerns about adequate supplies of STEM graduates. This involves getting policy in schools as well as higher education right. It is as much about getting the right quality of students undertaking such courses as simply boosting or maintaining numbers. There is a need to prevent young people closing out the options of undertaking STEM subjects too early. There are also concerns about perception of what work in these areas might look like. The definition of the term engineer in many young people's minds is often muddled and few have clear picture of what work of a professional scientist or engineer is like. There is a need for better informed and impartial careers guidance.

Other issues relating to the demand for skills
Green (2008) also highlights the need for greater emphasis on communication skills (including interaction with others) as well as formal qualifications. This suggests the need to incorporate learning on emotional literacy, interpersonal skills, and negotiating skills into learning curricula, especially at further and higher education levels. IT skills are also likely to remain in high demand, so the educational system will need to continue to supply learning on IT skills and internet use.

The Leitch reports emphasised the need to focus on the demand for skills. This begs the question of demand from whom? The term is often ill-defined and can be used to refer to the demand for places on courses of education and training by individuals as well as the demand for skills by employers to undertake their day to day operations. The UKCES (as reported in HCIUSSC (2009)) has emphasised that it is the needs of employers that is the key issue (rather than demand from individuals, which is in many respects more of an indicator of the eventual supply of skills (as they acquire qualifications and accreditation)). But others have questioned whether employers always know what they need. Hogarth *et al.* (2009) suggest that some employers may fail to recognise that they need to upgrade the skills of their workforce in order to meet competitive challenges. The quality of jobs and learning is often not given a high profile by many (unqualified) managers, who like people to be in the same mould as themselves.

There are number of other key issues that could also be raised here. Not just about whether employers know what they want, but also the question of who should be responsible for delivery of sector specific skills. However, this goes beyond the remit of this particular paper. For further discussion see the ingoing review by UKCES (2009). Finally, there are also some significant issues related to the demand for skills linked to the Educational workforce, including concerns about recruitment and retention of requisite numbers, and quality of teachers and lecturers at all levels of the system. In some cases there are problems of vicious circles (for example, poor or inadequate teaching in science and technology or maths) discouraging students from taking up these subjects, leading to shortages of well qualified people in these disciplines and difficulties for the public sector to recruit and retain high quality staff in these areas.

3.4.7.A misplaced focus on formal (academic) qualifications?

The debate at both national and European levels about changing skill needs over the next few decades tends to focus upon formal qualifications, especially in a UK context on

academic qualifications. This is understandable as these are relatively easy to measure and monitor. But these raise some important questions about whether this is the correct focus. Not all education and training is formal. Much learning takes place informally and has significant value. This raises questions about whether or not the focus on academic qualifications is desirable and whether a more diverse set of skills/competencies should be encouraged? It also leads to questions about whether less traditional teaching and learning approaches, less focused upon the acquisition formal credentials might promote greater engagement amongst some individuals who find traditional, formal education and schooling more difficult.

Until relatively recently, early school leavers could find employment, even if they had few or no formal qualifications. It is clear that those who leave early without good qualifications are increasingly finding themselves marginalised. These problems are more serious for boys as they are more likely to leave school early and without formal qualifications. Although the current generation of school leavers is much better qualified than its predecessors, a significant proportion have still not reached upper secondary (NQF level 3) standard.

Current plans will effectively lead to the raising of school leaving age to 18 in the UK. This is likely to lead to growing problems of dealing with those less academically inclined children who are already disengaged. There is an urgent need to re-engage those for whom a traditional academic approach has little relevance. Traditional class-room based instruction simply does not work for many such children.

In the UK there has also been a general move away from emphasis on vocational education and training (exemplified by the government's rejection of many of the recommendations of the Tomlinson (2004) report). The new diplomas currently being introduced still place a huge emphasis on theoretical rather than practical work, despite claims to the contrary. There is still a real problem in getting most employers to engage with this agenda, and finding work placements remains a key stumbling block. There are also still real issues of lack of parity of esteem for the vocational route. For many it is still perceived as a two tier system, with FE still being widely regarded as inferior to schools (sending the wrong messages about the value of vocational courses compared to more academic ones, see (Coffield, 2002).

There is a need for much greater employer engagement. In many cases employers are being discouraged from getting involved by increasing levels of red-tape and demands for certification. Many skilled people are not allowed to train or pass on their experience and knowledge because they do not have the formal qualifications/credentials demanded in the FE sector. There are also difficult questions about how to provide practical work experience and knowledge for young people. More and better incentives are needed to encourage employers to release people. Current ways of connecting education and work are often not working well.[12]

There is an increasing awareness of special needs of many youngsters (with growing numbers with dyslexia, ADHD, speech and language problems). Such children need special support. Many will never achieve NQF level 3. Increasing mental health issues amongst the young also have significant implications for happiness, stress and eventually for burdens on the NHS.

Brown (2008) questions whether initiatives such as the Lisbon Agenda, and the current government's emphasis on achieving a 50% HE participation rate, are moving things in the right direction. He concludes that a radical rethink is needed and that schools and

[12] There are some echoes here with problems of ensuring that there are sufficient teachers of good quality to nurture an adequate supply of high quality STEM graduates.

other providers of education should seriously consider whether the focus on acquiring formal qualifications is misplaced. He suggests that more emphasis needs to be placed on progression measured in other ways, and on encouraging collaborative working and support for the learning of others, which some might view as "cheating" and working "off task". Of course this type of initiative raises problems about how to measure success (and failure), and in particular the difficulties of avoiding the free ride problem in measuring contributions to team work. Brown suggests that social expectations around what constitutes success and what constitutes a contribution to an activity are likely to change, facilitated by a range of technologies that can support new forms of assessment and data capture. This will change the context in which educators are operating.

Too much focus on formal qualifications for all can increase perceptions of lack of self worth for those that are non-academic. If they have not achieved a C+ in GCSE in English and maths at 16, they are branded as failures, leaving them wondering what is the point of education? There is a case to be made that school leaving should not be so tightly linked to age, nor to the achievement of particular types of qualification.

Employers also need to be encouraged to look at young people "in the round", not just at their formal qualifications. Partnership with employers is needed, but many are not interested in opening up their workplaces for work experience, apprenticeships and work-place based learning generally (sometimes for good reasons, health and safety, economic factors, etc).

There will be a continuing need for innovation in the classroom and in educational establishments. The priority is to find ways of making education relevant to young people and the changing face of work and society. See, for example, the innovative practices of the Walker College (2008) and other schools such as Barrs Hill in Coventry.[13] Universities have long recognised the value of learning by teaching. Young academics learn and consolidate their knowledge by taking classes. Older staff find that teaching helps them to extend and develop their research. But this is much less practised in other parts of the educational systems, yet it can work equally effectively at all levels. In Barrs Hill school in Coventry, for example schemes such as "language ambassadors" take the opportunities presented by a multicultural school population to allow children to take pride in their culture and language by teaching younger children in nearby primary schools about these things. This promotes self esteem and self confidence, as well as multicultural understanding and valuing others. Encouraging such youngsters to take GSCEs in Persian or Hindi also helps to encourage recognition of the value of such knowledge and skills, yet such schemes and practices remain exceptional rather than the rule.

Other examples of innovative practice include Motorvate which is aimed at those of a non-academic bent. It involves teaching young people about road safety, how cars work and are maintained, as well as giving them an opportunity to learn to drive. It is aimed at reducing accidents and joy-riding amongst young males, helping them to learn about the law, Highway Code and the impact of car crime. Such schemes can help to encourage pride in work, as well supporting the learning of others.

Assessment in the workplace is generally less focused on formal qualifications. Workplace based assessment reconnects teaching, learning and assessment. It helps to focus on Life-long Learning and active knowledge transformation for a practical purpose. The work of Brown (2008) and others suggest that the current focus on formal qualifications and credentials is misplaced and seriously question whether low level

[13] Barrs Hill is an example of a Full Service, Extended School, which aim to provide a more holistic approach to educating. Other agencies based in such schools can help with early interventions (linked to childcare, and working with parents). This was intended to become mainstream policy but seems to have been sidetracked.

qualifications (especially post 16) add any real value for those that acquire them. Brown (2008) argues that the focus in the Lisbon agenda, etc; on moving people upwards through well defined skill levels (defined by formal qualifications attained) is misguided. Progression in the labour market should be the main policy goal, but this is less easily measured and achieved by policy focused on the control manipulation of the supply side (numbers on courses and numbers acquiring formal qualifications).

Qualifications are frequently seen as an end, whereas they are often more of a means to an end. They provide an indicator of moves towards a more knowledge based society and knowledgeable population. Because they are relatively easily measured and monitored they tend to be the main focus of attention rather than what happens to the individuals in the process of acquiring them such as changes in individual competencies. There is a need to reconsider what 11 or 16 years of initial formal education is for, and to draw out the implications. For example, this might involve placing more emphasis on:

- Supporting the learning of others (collaborative working less focus on personal achievement);
- More open ended solutions, rather than following a strict and narrow curriculum;
- A curriculum more focused on work skills;

There is often an implicit assumption that if we get education for young people right then all will be well. But a sole focus on initial education is inappropriate. As emphasised by many authors, learning does not stop at 16 or even 21, and people need to be equipped to continue life time learning.

There are some important technological aspects to this. Knowledge and information are in many respects becoming more widely distributed, although there are also some countervailing pressures, with some aspects of this being concentrated in just a few organisations. The more general trend of increasing distribution of knowledge is making it much easier for individuals to tap in to what they need, as and when they need it (just in time). This has significant implications for learning and knowledge acquisition.

Some people question whether the industrial (factory) model of schooling is becoming dysfunctional and out of date. There are some indications that personal learning and working environments may be converging. This may affect the traditional dichotomy between academic (brain) and vocational (manual) work and learning.

Learning is increasingly becoming integrated within the workplace. Learning does not suddenly stop after 11, or 16 years of initial education. But the implications of this for formal education could go in various directions, depending on how policy and schools, etc, react and adjust to these possibilities. For example, State schools may adjust to the new environment by proactively embracing new technologies and taking on new roles, or they could find themselves becomingly increasingly replaced by learning opportunities offered in the workplace, or privatised educational establishments, including virtual organisations.

3.4.8 Life-long Learning

Workplace learning, Vocational Education and Training (VET) and Life-long Learning are likely to become more closely connected. VET is especially crucial for the middle group of jobs and people left out by the polarisation of skill structures identified in Section 2. Vocational education and training should not be seen as remedial.

The trends identified in Section 2, including the continuing rapid change in the structure of employment and jobs and the ever escalating and changing skills required in most jobs, means that there will be a general need to prepare the workforce for jobs that

require continual learning, and to prepare the appropriate training courses to meet these learning needs.

There are other related educational implications:

- The need to recognise the greater number of significant work-life transitions that most people will have to make;
- The need for up-skilling throughout lifetime;
- The need to focus on individual skill sets rather than occupational skill sets;
- The importance of mastery of a knowledge base;
- The importance of working in teams;
- The importance of supporting the learning of others;
- The need to allow for transfer between contexts;
- The potential for exploitation of virtual world, technologies, etc.

3.4.9 Location of work and learning

Work is increasingly being detached from fixed and traditional locations, but the process is slow and the pace has frequently been exaggerated. Collective office space is becoming increasingly commonplace (hot-desking, etc). Home working may be expected to grow, but probably only modestly (see Felstead (2008)). Maybe around 20% of workers by 2025 will be working from home or hot-desking.

But this kind of working requires particular skills and discipline. There may be some significant educational and learning implications, in particular helping young people and adults to learn to cope and prosper in such a world.

Working at or from home relies heavily on time management skills, but also on being able to draw boundaries between work and non-work time to have work-life balance. People who need to do this kind of work may need to be psychologically profiled and trained to check they can cope with the isolation and boundary issues and recognise emerging health problems. This includes educating people to occupy space rather than possess it.

It is also worth emphasising that learning occurs as a result of participation: "bumping" into people results in informal learning opportunities. Working at home can lead to isolation and problems associated with this, although hot-desking can sometimes lead to more such interactions than is the case for those working full time in isolated offices.

3.4.10 The importance of place

Place is an important dimension in the links between work, employment and education. Education can play a key role in helping to break local vicious circles of deprivation and disengagement. Obviously this is not the sole or necessarily even the key factor. Infrastructure, including transport, plays a key role (Green (2008a).

For many multi-national companies the centre of gravity is moving away from the UK to elsewhere. Such companies, especially if they are foreign-owned may recognise no strong links to local economies and populations. Their commitment to the UK may be modest, although foreign ownership can have some benefits such companies often having greater emphasis on High Performance Work Practices (HPWPs), etc. Educational providers can play a more active role in local economic development. Examples of US and Australian experience suggest that this can be an important part of strategies to set up and nurture local skills as set out in Section 2 (see also Eberts, (2008), EMSI, (2006), and Green (2008a)).

Many citizens and employers do demonstrate a strong loyalty to "place" and take civic responsibility very seriously. Such attachment to place can have strong influences on

local economic development issues, and needs to be tapped. There are lessons to be learned from other countries about the ways in which educational establishments such as FE colleges can better serve their local areas by getting actively involved in economic development issues, rather than seeing themselves as simple passive suppliers of education and training. In the East Coast of the US, for example, colleges are actively involved in trying to ensue that conditions are right for inward investment into their localities by providing the right kinds of education and training both for initial labour market entrants and for older people. This includes those that may have been displaced from employment as some jobs are made redundant by technological change or other aspects of globalisation (EMSI (2008)).

Ethnicity and diversity brings new challenges at a local level (with links to past patterns of inward immigration. Concentration of ethnic groups in particular localities is increasing, with Leicester soon to be the UK's first major city with the white indigenous population forming a minority. There are a growing number of businesses run by members of the ethnic minorities, but this does always not guarantee a rosy picture for employment conditions for ethnic minority groups. Such employers are not always paternalistic (e.g. the recent Primark example of clothing suppliers exploiting their workforces).

Eberts (2008) argues that place specific policies are needed, focused on the demand for skills by employers (e.g. encouragement of HPWPs, Richard Florida type amenities; regional partnerships; and involvement of local FE colleges in economic development). He highlights a number of key features:

- Business as the main customer should be the main focus of this aspect of education;
- Outcomes and objectives should be agreed, quantified and tracked (SMART);
- Local organisations (including educational institutions) need to become more entrepreneurial, problem solvers, and stakeholders;
- The need for good labour market information, including projections to allow markets to adjust, as individuals make more informed decisions in a rapidly changing global economy (but note that this is **not** about trying to mechanistically and centrally plan to match skills supplies to developing needs).

Eberts (2008) also advocates education and training for disadvantaged groups to assist social inclusion and enhance social mobility. Particular initiatives may be needed in local labour markets with high unemployment among ethnic minorities and other disadvantaged groups. There may be particular need for effective training in manual skills, vocational training and courses starting and managing one's own business (which includes coping with uncertainty and managing fluctuating income) for those displaced by the technological and other changes. It may also be necessary to give greater consideration to the welfare system's response to handling uncertain income flows.

3.4.11 Educational Demands from the Informal Economy

For the great majority, involvement in the informal economy is in many ways growing in significance, although the formal economy is still the main source of income and self esteem for most households. In the short term, economic circumstances (the recession) may force more people down the informal route (including the grey economy (and *in extremis*, criminal activity)). Informal work could be a more preferable alternative for many than employment in the formal economy in low skill, low wage jobs. This involvement can be based around community/networking/caring for others, as well as for the environment. This includes various types of voluntary work. ICT also offers some new possibilities, including the exploitation of virtual worlds, although as noted in Wilson

and Gambin (2008) the use of ICT also brings with it some risks of negative consequences.

All this needs changes in public policy (e.g. attitudes towards and support for entrepreneurship and innovation at a micro-level, as opposed to that carried out by large corporations), and the need to operate a more socially orientated economic/humanist model.

It is a moot point to what extent entrepreneurship can be taught. However there is certainly a role for education in explaining to young people the importance of entrepreneurial activity in generating new goods and services and jobs. According to the review carried out by Wilson and Gambin (2008), there is evidence that the UK has a generally good record in providing a good environment for "doing business", and for generally encouraging entrepreneurial activity. One key area of concern is that there appears to be a considerable fear of failure. This may be another area where education can help, by emphasising that risk of failure is an inevitable consequence of such activity, and encouraging a realistic appreciation of the potentially great rewards as well as risks of such activity. There is considerable evidence that people can learn from failure and education can be refocused to encourage this.

Other implications for education include:

- Making young people more aware of possibilities of the informal economy;
- Encouraging awareness within schools of young people currently engaged in caring for other family members (which affects their own education);
- Rethinking how the educational system might make contact with such carers to ensure their educational needs are met (ICT might help);
- Ensuring life-long learning, provision and access to those involved in the informal economy as well as for those in the formal economy;
- Identifying those in ethnic minority communities, working in family businesses and other disengaged from the formal economy who are missing out; again ICT may offer new and better ways of doing this.

There are also possible implications linked to trends in unpaid (e.g. voluntary) work. These include:

- Educating the younger generation about the costs of care for older adults, what care is, and how society should solve this growing problem of care in an ageing society;
- Educating for more equal gender balance in the amounts of informal care hours for older adults provided by households;
- Formal flexible working arrangements for employees to cope with care needs of older adults;
- Greater attention to child care provision to make sure quality grows and becomes more uniform and accessible in all areas, through systems of quality control, or licensing or inspections;
- Attention to the uniformity across local areas in quality and quantity of after-school and holiday care for school aged children;
- Training up a care workforce for older adults, which might be heavily dominated by immigrant labour, for quality care provision.

There are also implications for those living off benefits (which is likely to become of increasing significance in the short-term at least). Educational policy needs to be aimed at breaking the cycle of disadvantage that is often at the root of this. Family breakdown is of course an issue across all socio-economic groups, but as Dex (2008) notes, it is

especially severe in terms of its impact on children for those at the bottom of the income distribution. Dex (2008) suggests a number of specific policy implications:

- Parenting classes could be important in tackling low achievement and the effects of disadvantage (possibly involving the development of "all age" schools, thereby fostering a culture of Life-long Learning).
- Parenting classes could be made mandatory for prospective parents when pregnant, as part of the antenatal 'clinic'.
- Early intervention into the cycle of disadvantage at pre-school ages 3-4 is likely to remain a top priority, and it may be necessary to spend more on this if the percentage of such children from disadvantaged families goes up as seems likely.
- The majority of children coming into compulsory school (5+) in future are likely to have had some childcare, but only a minority will have had full-time care. This may require remedial action.
- Given evidence that suggests that children are disadvantaged by marital breakdown and lack of male role models, high divorce rates and high lone parent rates will lead to many children suffering emotional problems during school life, which will require remedial action.

3.4.12 Values, attitudes and motivation

A number of the reviews have highlighted changing social and economic values and how this relates to both work and employment and education.

The loss of deference in society generally is also reflected in schools. Such trends seem likely to continue. This has implications for how schools are organised, how they are run, as well as the aims and manner of conducting school inspections. There may be some lessons here from industry, where evidence from the workplace suggests that participatory models produce better results.

Other aspects include:

- Education to tackle bullying cultures;
- Balancing control and autonomy in the classroom to help better equip children for the world of work;
- Educating for identifying and handling stress;
- Recognising that the premium on learning and self direction will be high in the workplace;
- Education to promote personal development and Life-long Learning.

As noted in the recent report by the Children's Society (2009), young people in particular are now bombarded continuously by the media to take part in consumerism, driven by fashion and other factors. It is argued there, and by others (e.g. Bauman, 2008), that there has been a steady shift towards self-interest and individualism, and away from altruism and societal values. Such discussions highlight the dichotomies between:

- Individualism versus collectivism;
- Materialism versus humanism;
- Those who work to live versus those who live to work.

The market economy and liberal values have come in for considerable criticism recently, especially following the excesses associated with the credit crunch. The problem is finding some other generally acceptable mechanism, other than free market forces, to allocate and distribute incomes and jobs. Consumerism is what keeps the economic world going round, and keeps most people in the UK employed.

3.4.13 Careers guidance and advice

The dramatic structural changes taking place in the economy and the labour market will have significant implications for the types of jobs that will be available in the next 10-20 years, as set out above. This will result in the need for much better labour market information to inform citizens about these possibilities. This is recognised in the *New Skills for New Jobs Initiative* that has recently been launched by the CEC (2008).

Education at the beginning of the 21st century now faces the challenge of much more demanding requirements from employers; heterogeneous populations (with ethnic and language diversities and very high expectations); and a much less well established social order. All this has to be dealt with in the face of rapid technological, demographic and economic change (including in the short-term the imminent prospect of what could still turn out to be a major recession). The demands of the new knowledge economy, in the context of what Friedman (2007) describes as a "flatter world", open to much sharper and immediate competition from many directions, may require a very different set of attributes in the second quarter of the 21st century.

To keep pace with these developments, there will be a need for greater emphasis on retraining and lifelong-learning to keep workers up to date (given the pace of change). Technology mediated learning may help to achieve this, both in public and private sectors.

The need for effective and impartial careers information and guidance is also growing, and this is likely to become even more important. But existing practices are too often constrained by outdated and outmoded systems and approaches.

Careers guidance needs to be more focused on empowering individual choices, based on robust and unbiased information about the realities of prospects in the labour market. The incentives built into the system at present may not be working as intended. Too many children are being given advice to stay on at school to follow academic course of study for which they are unsuited. The incentives are often wrong, focused on putting "bums on seats" not on the child's best interest.

Finally, increasingly there is a need for a Life-long Learning perspective. People will need more assistance at later stages in their lives, not just during initial education.

Section 4: Concluding Remarks

The role of education in the world of work and employment
The overall aims of education are to impart knowledge and understanding. A key rationale for this is to help people to participate in the economy and society, and to make the most of the opportunities they face, maximising their potential.

Key trends in the world of work and employment
Much change is in prospect in the world of work, employment and education. But equally there is often enormous inertia to be overcome. The world will look very different beyond 2025, but many elements will be familiar and similar to today. Continuity is just as important as change, although it is the latter that tends to be the prime focus of attention in the media and popular accounts.

Many of the more extreme changes in ways of working and employment patterns that have been identified in Section 2 may well take place, but they will remain of relatively minor significance in quantitative terms. For example, the significance of teleworking and use of virtual reality, will probably remain modest compared with the more conventional "9-5" workplace environment. This is likely to remain the norm for many. The media

tends to home in on the more dramatic and extreme possibilities rather than a more sober and measured assessment of what may actually happen and its real impact. Previous extrapolations based on technological determinism have often been way off the mark. Projections made in the late 1970s on the expected impact of ICT were for the paperless office and mass unemployment, neither of which has come to pass. Many of the more extreme technological extrapolations currently being mooted will undoubtedly suffer the same fate.

There will also be a considerable diversity of experience, and many differences between individuals and across employment types. Social exclusion and concerns about limited social mobility remain areas of key concern. As William Gibson has famously put it: "The future is already here, it's just unevenly distributed". One of the key roles of education is to help address these concerns.

Technological change is also resulting in the potential for dramatic changes in the possible locations – for both work and learning.

The influence of the media and communications will increase, (focusing on star/celebrity effects, etc), causing problems in managing expectations for many young people, whose personal experiences are unlikely to match the aspirations encouraged by such role models. Trends towards emphasis on self and individualism are likely to continue.

Implications for education
Education will have a key role to play in placing more emphasis on helping people to understand society and the economy (and their role in it). This may include placing greater emphasis on social values, and helping people to gain a broader understanding of what makes for happiness.

The importance of reliable and robust labour market information and intelligence, and sound and impartial careers guidance and advice is likely to rise.

Many of the employment trends outlined in Section 2 have strong implications for education, for education providers and for educational policy makers.

The changing patterns of jobs will require different types of skills and knowledge;

- a need for general management and other professional skills;
- there will be a requirement for some very high level technical skills, notably in STEM subjects;
- vocational education for more young people at entry level.

But there will also be a continued need for many lower skilled jobs. Education will be needed to help individuals understand their position in the world of work. This is in part about recognising the importance of lower skilled jobs, as wells as high skilled ones. It is also about empowering individuals, helping them to learn to take advantage of opportunities and assist social mobility.

The general demand for formal qualifications will continue to rise, driven by both supply and demand side pressures. The importance of STEM subjects will also increase, although the cadre of people needed who are qualified at the highest level will probably remain small. However these will need to be of the highest quality to compete internationally. The importance of a range of generic skills, including communications, team-working, leadership, management, business, entrepreneurial skills, is also likely to grow.

However, for many individuals the benefits of formal qualifications will be questionable, and the value of a conventional academically focused curriculum dubious.
Education will be needed not just for work, but for life:

- this includes work in the informal economy;
- it will need to be available at all ages: Life-long Learning;
- it will need to be flexible (to help ensure work-life balance).

A case can be made that education is currently too "front loaded", with too much emphasis being placed on initial education (age 5-21). There is a need to develop new mechanisms for spreading the emphasis more evenly over a life time, with rights to sabbaticals, etc, as people have longer and less predictable working lives. This raises important questions about how the present institutional framework and systems could best adapt. There are, of course, often significant problems in designing new systems, especially incentives (which often have unintended consequences). There are also many important considerations from the point of view of the individual, if a life time of learning is to be achieved, not least the question of finance.

There are a number of crucial switch and transitions points in individual's lives (from school to work, from one job to another, job and employment shifts linked to family formation, and the move from work to retirement, etc. These are often traumatic. More thought needs to be given by policy makers to what the State can do to ease these transitions; (including financial oiling of wheels, and financial entitlements to allow investment by the individual at later points in the life-cycle (but noting the previous problems with voucher type schemes).

All this raises doubts about whether the current "factory based" models (schools/colleges), providing education and training to large numbers at the same time, are the right ones.

It also raises practical questions about what the State can do to help individuals "follow their dream". The business advisors model is not very practical; but NIACE have suggested the need for a regular "learning" heath check. There is some evidence that, when done well, personal advisors can help (as in Connexions).

New technology will also have significant implications for the educational process and delivery (ways of learning; plagiarism (a growing problem for assessment), where learning takes place, etc). There will be a continuing need for innovation and to find ways of making education relevant to young people and the changing face of work and society.

Needs of the economy
This will have various aspects, including a distinction between the needs of those parts of the economy most linked to the global economy and those more focused on meeting the needs of more domestic and local customers.

The evidence assembled in Section 2 emphasises (*inter alia*) the importance of:

- the basics (literacy and numeracy), which are the keys to learning to learn;
- skills in the use of the internet and ICT are also key elements;
- lifetime learning, which will be a key feature, although much of this may be informal or conducted in the workplace rather than in formal educational establishments;
- "DIY" or self-directed learning will increase in importance and in principle has enormous potential (but it also has limits);

- "just in time learning" (e.g. searching for information and knowledge on the internet as and when required), which be increasingly be the norm;
- managerial, leadership and entrepreneurial skills;
- the need also for managers to have soft-skills including recognition of the value of their work-force.
- diversity (including the effects of changing demographics, which will have some significant implications, with particular groups (older people, ethnic minorities) imposing special demands on the system);
- the need for an understanding of other cultures and knowledge of languages in the context of the global economy (recognising that just as there are many students (and migrant workers) coming to the UK, there is an equal potential for more few UK students and temporary migrants going to other countries).
- some analysis emphasises the likely increased demand for high level skills and formal qualifications, but others question whether this increase in the quality of work, will benefit more than a few;
- if these more pessimistic scenarios prevail, then for many work may mean less autonomy, less time to think, inequity, stress and related mental health issues;
- there are also issues about vulnerability, with those least able to adapt being most at risk.

This will all raise many questions for those involved in providing and delivering education and training:

- how best to ensure educational opportunity for everyone throughout their lives;
- how to help those who fail to benefit from the present system (especially the socially disadvantaged);
- how to ensure that everyone has the skills they need to find and retain a decent job;
- how to identify and remove any other barriers to success for disadvantaged groups;
- how to identify the skills people will need;
- how should people be advised and guided to make the right choices?;
- how can education be used to empower individuals?;
- what needs to be done to ensure that education and related activities will help to shape the future in a way that benefits society as a whole?

There are also a number of educational workforce issues. These include:

- the stresses and burdens placed on teachers and lecturers by administrative overload, and emphasis on measurement and monitoring;
- status and pay.

Overcoming inertia:
There are many sources of inertia in the current systems and procedures for delivering education and training. This reflects vested interests, and other factors leading to resistance to change. These affect:

- Government (including DCSF/DIUS), which some see as part of the problem as well as the solution);
- Employers; and
- Individuals.

At the institutional level, it is imperative that there is a broader recognition of the role of education as preparation for work for all those in the population, not just the top of the academic ability range.

For employers, a clearer view is needed of what the role of work should be in a life-time of learning and how this is likely to change. They also need to articulate more clearly how their demands for skills are likely to change.

Finally for individuals, more help needs to be given to children (in particular) so that more of them have a better understanding of the role that education plays in their future life paths, and especially their prospects of securing and maintaining gainful employment. Too many still do not see the relevance and meaning of education, and there are some parts of the country where whole localities effectively "drop out" and disengage, leading to vicious circles of deprivation.

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Challenge 5: State/Market/Third sector

Richard Sandford - Futurelab

Introduction

This report considers the relationships between the state, the private sector and the third sector in the provision of education. It looks at the some of the factors that influence these elements and the relationships between them – in particular, digital technologies – and explores some of the ways changes in these factors might influence the way education delivery is structured over the coming decades to 2025 and beyond. In doing so, it draws largely on a set of reviews written for the Beyond Current Horizons programme, expert interviews and discussions from a workshop event. A summary of these reviews and activities can be found in Appendix 3.

The primary questions within this report centre on the actors whose actions constitute the educational landscape: who determines educational content, who is managing educational institutions, who is providing educational experiences, who is developing educational resources, what the funding mechanisms are that pay for this, and who is responsible for ensuring access to education. These address educational provision in its broadest sense, touching on independent, supplementary and alternative education, work-based learning, and paying particular attention to emerging forms of educational provision that have been enabled through new forms of technology.

It was noted by a number of review authors and interviewees that the lack of data that would support a comprehensive investigation into the relationships between state and non-state actors in the education arena was surprising, given the centrality of these questions to debates on education and its future direction. In part, this appeared to be due to the commercially sensitive nature of data on factors within the education market (though it should be noted that interviewees working for educational suppliers were extremely generous in sharing the information available to them). This sensitivity is recognised here in leaving interviewees' views and comments unattributed. To some degree, however, this absence appears to reflect a genuine lack of investigation, rather than a lack of transparency. There are a number of possible factors that might contribute to this state of affairs. Within some research communities there are dominant narratives of state responsibility and corporate activity that are easily left untroubled. There are other actors within the public sector who may not feel that it is in their remit or their interest to trouble these narratives, or to reveal complex relationships within the market that may be misunderstood as a result. Information that would be necessary for a full understanding of the area may be held within organisations and sectors which lack a tradition of engagement with academic research or cultures of openness. Any thorough academic investigation would require a genuinely interdisciplinary effort, as relevant topics are addressed by a range of disciplines that may not have a history of collaboration. These factors are presented speculatively and are of course not exhaustive.

This report offers:

- An overview of the contemporary educational landscape in England, examining responsibility for access, curriculum authorship, production of educational materials, management of educational institutions, assessment and funding.
- An exploration of those features of the landscape considered likely to persist over the relevant timescale.
- An outline of some emerging trends within the provision of education whose direction of travel seems relatively clear.

- A set of related uncertainties, examining the different ways in which these emerging trends might plausibly develop.
- A short selection of implications arising from the trends and uncertainties discussed in this report, and some possible actions that might be considered as responses to the challenges they offer.

Some of the emerging trends identified here arose from discussions during the workshop event and have been drawn from a summary report written by Helen Beetham, to whom thanks and acknowledgement are due.

The various trends and uncertainties described here should be understood as factors that the work of the review authors suggests are worth continuing to pay attention to over the coming decades, rather than a comprehensive or exhaustive account of all factors that act within education or that will shape its future. As with any attempt to discuss future events and developments that have yet to occur, these trends and uncertainties are not certain to play out in the directions suggested here, nor is it impossible that other developments not addressed within this report will play a greater role in the future of education than currently seems likely. There are no predictions here, only likelihoods or possibilities.

It is worth briefly marking a couple of points regarding language. First, the distinction between learning and education, where learning can be considered a personal process of change and development, and education can be seen as an intentional social project executed with specific goals. As a social project, the practices of education are subject to the forces that shape all of society and will change as they change; learning processes, in contrast, change over a much longer timescale. While these two terms are often used interchangeably today, when considering the longer term future it is more likely that we will see changes in the ways we educate rather than in the ways we learn.

Second, throughout this discussion the terms "delivery" and "provision" are employed: these are terms used to describe the institutional organisation of education rather than to imply a particular method of education. In other words, it is not suggested that it is possible to 'deliver learning', nor that learners are best thought of solely as "end users" of what is delivered.

Section 1: The contemporary landscape of relationships between state, private and third sector provision in education

The purpose of this section is to offer a broad outline of the contemporary education landscape, and to begin to chart some of the interactions between the state, private and third sector organisations that take place within it. It is clear from the work of the review authors that the divisions between the state and other actors are far from distinct. The notion of an education system wholly defined and provided by the state alone, or of privately-funded schooling that exists entirely independently, are each belied by the complex interchanges that constitute the operation of the various education markets as currently seen. The material produced through the reviews and interviews that addresses these interactions is examined below, under the following areas: responsibility for access, curriculum authorship, production of educational materials, and management of educational institutions, assessment and funding.

Responsibility for ensuring access to basic educational needs
There are strong cultural and legal frameworks that define schooling, including the individual child's entitlement to schooling, and the responsibility of the state to provide it. These frameworks are now firmly embedded in European law and international charters. One's identity as a subject of the state is recognised as being established in

part through schooling, and the frameworks that support this are likely to remain in place. From a policy perspective, an important context for examining the current landscape is the 2006 Education and Inspections Act[1]. There are a few key features of the Act that are worth highlighting: the emphasis on "empowering" schools by "devolving as much decision-making to them as possible"[2], the conception of Local Authorities (LAs) as 'commissioners' rather than 'providers' of education services with a duty to promote "choice and diversity", and the efforts to make "links with external partners" available to all schools, all support the notion that responsibility for the delivery and constitution of education is not located within the duties of the national government but is being moved towards schools. Acknowledging, or encouraging, the contribution of external partners is something that creates room within policy for the various interactions between schools and other groups described below. Responsibility is still acknowledged, however: the state still has a role in ensuring "fair access" and moderating covert selection processes. It is the practical considerations of providing education that have moved, rather than the duty to ensure access to education: the state acts as regulator and mediator of education provision, ensuring basic motivations for a national education settlement are met, but aims to do this through working with other agencies, whether for-profit (or other) groups from the private sector or third sector organisations (faith, social and parent groups). In particular, the state has an obligation to employers to ensure that they are able to contribute towards the provision of "skills" amongst the workforce: the Leitch review also gives the government an opportunity to cast those within education as "customers" [3], a relationship between learner and provider that draws on the language of the private sector.

Within the reviews and discussions that took place, some basic principles underpinning the provision of education were identified. Most fundamentally, contributors identified a moral right of an individual to education, and a moral obligation on the part of the state to provide access to education. In addition to this moral contract between citizen and state, there are societal needs served by a national educational settlement: the need for individuals to form an identity as a citizen of the state and the need for the development and establishing of social values and norms. These processes require some form of recognition, in the form of certification and accreditation of individuals who have participated in a process of education, and providing this recognition is another social role fulfilled by education.

There are other groups with an interest in and responsibility for ensuring access to education. Families have a number of well-recognised responsibilities towards children's learning. Most straightforwardly, they are expected to support their child's learning in school through provision of a home environment in which homework can be undertaken, and through a wider respect and enthusiasm for learning: the desire to see their children launched on successful life paths is translated into a responsibility to invest in their learning 'privately' within the family, as well as publicly through school. Many feel the need to do more to provide access to an education they feel is best, whether by relocating to an area with well-regarded schools, or by funding their children's education directly themselves, and this reflects a more general cultural expectation that families actively support and promote learning for their members. Traditionally this support has been assumed to be for children's learning, though increasingly families will need to support learning of all their members.

[1] http://www.opsi.gov.uk/Acts/acts2006/ukpga_20060040_en_5#pt3-pb3-l1g39

[2] http://www.dcsf.gov.uk/educationandinspectionsact/docs/Guide%20to%20the%20Education%20and%20Inspections%20Act.pdf

[3] http://www.dius.gov.uk/publications/worldclassskills.pdf

Employers, too, are recognised as having a stake in the provision of education, though it is debateable how much of a responsibility they have to provide educational opportunities directly themselves. As a group their interests are explicitly acknowledged by the government through definitions of education that focus on the eventual ability of learners to contribute to the economic wellbeing of society, and through the provision of vocational education that is responsive to employers' stated needs. Employers have had a large degree of influence on vocational qualifications, though increasingly the need for training that meets wider social needs rather than solely the needs of employers is recognised by policymakers. This is part of a more general tension between identifying and investing in long-term skills (often transferable and more in employees' interests), and meeting immediate short-term skills gaps (often specifically related to a particular role). Encouraging companies to invest directly in training staff appropriately, either in–house or through external suppliers, is one approach, though this would make it no easier for those not in employment to gain skills, and it may be difficult to find appropriate training in some regions.

Contributors felt that there is, perhaps more strongly in the UK than in other European countries, a strong discourse of individual responsibility for taking up learning opportunities, what might be thought of 'capitalising oneself' with knowledge and capabilities. Schools are becoming sites for the inculcation of personal responsibility as a more general social value, encompassing health and well being, citizenship and political participation in addition to more traditional, subject learning. Some contributors felt that the increasing diversity of supply models across the sectors was likely to strengthen the argument for individual responsibility and self-management. This individual responsibility is most noticeable within the context of membership of the workforce and the concomitant necessity for people to ensure they possess the necessary skills for such membership, but is also resonant with arguments that make a social case for learning and personal development. Many learning activities that seek to further this take place outside formal educational settings, and are often described as constituting "informal" learning by researchers and commentators, though they may still be structured and require a degree of commitment from the learner. These learning experiences are likely to interact in some way with the state, private or third sectors when they occur, perhaps through the simple exchange of capital in exchange for tuition, through the use of a facility funded by one of these sectors, or to expedite the learner's entry into a more formal learning environment.

Determining the curriculum

Private or independent schools are not obliged to follow the National Curriculum, though the majority work towards recognised national qualifications and so there is a degree of overlap. Little of the material gathered through the reviews and interviews addresses the independent sector specifically, and insofar as these schools are independent their examination might be thought less relevant to describing the relationships between state, private and public sectors.

State-funded schools in England follow the National Curriculum, designed and set by the state through the Qualifications and Curriculum Agency, and assessed through a series of national tests until the age of 16, when learners can sit national examinations. This curriculum is developed in partnership with other government agencies and external groups representing adult learners, vocational training, employers' needs and other stakeholder priorities. It represents government aspirations for learners and their contribution to society, reflecting wider policy directions, such as a commitment to remaining competitive within the "knowledge economy" or the inculcation of a sense of citizenship, as well as aiming to establish essential skills such as literacy and numeracy. Over the twenty years of its existence the National Curriculum has responded to social changes and attempted to meet new needs, as instanced by the introduction of

functional mathematics, the recent focus on scientific literacy and the establishment of technological subjects such as Information and Communications Technology (ICT).

Companies with an interest in the education sector, such as publishers and technology providers, can influence the development of the curriculum in a number of ways. Most directly, there are close links between individuals from education technology companies and policy-makers (for example, through the Intellect group[4]) which allow these representatives of the private sector to offer their perspectives on policy direction, and government to share current thinking. More broadly, the private sector as a whole shapes understandings of the economic context in which education is operating, works to reinforce the notion that the education sector is in the service of the country's economic wellbeing and often seeks to influence perceptions of appropriate future strategic directions for learning and education through publishing white papers, sponsorship of events and initiatives and funding independent research into learning and technology[5].

A particularly visible site of interaction between the public, private and third sectors is the academies programme, originally a programme in which publicly-funded schools received sponsorship from private firms or individuals. Intended to raise standards in inner-city areas, the involvement of the sponsor was explicitly intended to enable them to embed their values (assumed to be focussed on success and aspiration) within the ethos of the school, and the injection of private capital was originally intended to offset the "deprivation"[6] of the inner-city locations in which they were based. Private sector sponsorship has declined since the introduction of the programme, however, and the emphasis is now on attracting sponsorship from universities and the third sector, whose specialist knowledge it is thought will support the development of an academy's own specialism: the minimum £2million contribution has been waived, and the emphasis is now on sponsors contributing educational expertise and demonstrating a commitment to social mobility[7], as demonstrated by the engagement of the RSA[8] and the charity ARK[9] with the academies programme. A number of new academies are not the 'failing' inner-city schools that were the original target, but are formerly independent schools seeking greater financial stability. Regardless of the nature of sponsors, they are accorded a part in the development of the curriculum each academy follows, provided core elements of the National Curriculum remain.

A small number of early sponsors of academies attracted controversy for their supposed embrace of contested subjects such as 'intelligent design', prompting public concern that there were possible tensions with accepted science curricula and mainstream thought. Some academies are explicitly schools with a religious character, or 'faith schools': around a third of state-maintained schools have a religious character, and this naturally informs the curriculum they present to their learners.

Private sector organisations directly providing education that focuses on their particular field or practice are in a position to centre curricula on their specific needs, tying learning much more closely to employment within a particular area than under more general learning activities. This might provide learners with an advantage insofar as they can be confident they are learning skills and dispositions that are appropriate for their employer, or eventual employer, but may limit the range of employers for whom they might work if what they learn is tied too closely to a particular company's practices.

[4] http://www.intellectuk.org/
[5] Futurelab has received funding from Microsoft's Partners in Learning scheme to support its Enquiring Minds research programme
[6] http://www.standards.dfes.gov.uk/academies/what_are_academies/?version=1
[7] "Academies, Trusts and Higher Education: Prospectus": DFES 2007 (http://www.standards.dfes.gov.uk/academies/pdf/AcademiesTrustProspectus.pdf?version=1)
[8] http://www.thersa.org/projects/education-legacy/rsa-academy---tipton
[9] http://www.arkonline.org/

For companies engaging with education in this way, the issue of intellectual property becomes important, as engaging learners with their particular domain and practice might necessarily expose their IP to a greater extent than they would prefer: these firms need to balance the benefit of increasing the pool of employees or potential employees with appropriate skills with the difficulty of protecting their IP. More broadly, education can be seen as a site for the generation of new IP. The materials supporting teaching and learning produced by educational publishers constitute an important source of IP from a business perspective. Longer-term, many universities have defined sites of innovation within their organisations specifically for the generation of intellectual property (for example, Cambridge Enterprise and Imperial Innovations). However, while the materials used to support teaching a particular curriculum might be protected intellectual property, no mention of protecting curricula themselves was made within the research underlying this report.

Producing educational materials

The focus here is on educational materials that rely on or are disseminated through digital technologies, as this was emphasised in the reviews and interviews, but it ought to be noted that educational publishers themselves observe no distinction between "old media" publishers and "new media" publishers, with most offering both paper and digital versions of textbooks and support materials, as well as software. Within the reviews and interviews, no mention was made of toys, physical models or demonstration devices, technical equipment such as environmental sensors, or tangible or haptic technologies, for example: this reflects perhaps a current general conception of technological educational materials that revolves primarily around networked computers and the software that runs on them, though a number of the interviewees represent companies that sell products from several of these categories.

There is a general agreement within policy and industry that educational provision operates within a market, with a choice of providers and competition between suppliers. While in many respects this is a more accurate conception than imagining educational provision to flow from the state, it was noted by some contributors that it might not be recognised as a true market by publishers and technology providers working in sectors outside education. Government policy (for example, efforts to increase the number of computers in schools, or to integrate different data-management systems across institutions) and the injection of capital from a central source (through, for example, the e-learning credits scheme) have a distorting effect on the marketplace, determining needs and objectives, and although the government does not act as a central purchaser it exercises what Sefton-Green describes as monopsony power, shaping the focus and direction of suppliers. Some interviewees suggested that the education sector in the UK has also been used historically to stimulate the growth of technology-related skills across a wider national arena, driving domestic and corporate uptake of computers and related technologies. However, it was also noted that the private sector must necessarily be involved in the provision of technology as there is little government scope for becoming a manufacturer or software developer.

The purpose of the technology which is sold to schools is often to support administrative and management processes (pupil tracking, payroll administration, asset management and so on), rather than directly supporting learning. Rhetoric around the capacity of technology to support learning often emphasises the ways in which it supports individual development and offers the possibility of 'personalised' learning: however, information technologies are powerful tools of standardisation and massification, offering a great degree of bureaucratic control. This second, less visible use of information technology accounts for a greater proportion of schools' software spending than software explicitly focussed on supporting learning (roughly around 13–15% of total technology spend

within the schools' market, as opposed to around 5–7% for learning software: the remainder is largely spent on hardware).

These figures are vague and uncertain, reflecting the difficulty of examining this market and the hidden nature of some associated costs. For example, in some schools technicians are employed in-house (and so feature as staff), while in others technicians are external and their cost is part of services provided by an external supplier. For universities, the cost of contributing to an open source project might be greatly reduced if students carry out the work as part of their course than if a member of staff does the same work. These blurred lines illustrate the muddy nature of the interactions between technology and education, and suggest that viewing "technology" as a separate domain is not always practical.

There are a number of different kinds of private-sector suppliers of educational technologies operating in England at the current time. There are large consumer electronics and software development companies for whom education is a small part of their business (for example, Apple, Oracle or Microsoft) and for whom the motivation for engaging in the education market was reckoned by contributors to be less profit than an opportunity to raise brand awareness, increase the familiarity of future consumers with their products and philosophies and to address issues of corporate social responsibility. As an adjunct to this group, there are some companies who, while not directly concerned with educational provision or technology, may shape its delivery and influence expectations of learners and parents through efforts intended to fulfil corporate social responsibility objectives (for example, Tesco's Computers for Schools programme, or Morrison's Let's Grow scheme). Farook notes that there is often considerable resistance to these programmes if they are perceived as inappropriate. Where the benefit to both school and firm is clear and equal (for example, in the provision of access to branded sports equipment by students) this resistance may be lessened, and it seems clear that this relationship between state and private sector will continue to be developed. More subtly, these efforts can shape wider societal expectations around (for example) access to technology for learners.

There are a small number of large companies whose focus is on the education market, most visibly the international educational publisher Pearson and the UK-based hardware supplier RM. These two organisations have diversified their activities within England in recent years, with RM moving into the supply of software and a greater range of peripherals, and Pearson acquiring one of the national examination boards, Edexcel. In general, educational publishers appear to be moving away from the simple provision of hardware and software into supporting assessment and long-term service provision (particularly with respect to the Building Schools for the Future programme). It was suggested that over the coming years fewer large companies will be operating across a range of what were previously discrete markets, and a range of smaller companies will establish themselves by identifying and actively targeting particular niche areas (the publisher Rising High was cited as a strong example of this approach). For commercial companies, there is greater interest in maintaining their close relationships with schools rather than the FE or HE sectors, as the standardised nature of schools and some FE colleges makes it possible to create content that can be used (or delivered) on a national scale, as opposed to universities which have a tradition of creating their own intellectual resources.

There are concerns around the role played by these large firms and their relationships with local authorities and policy makers, with one interviewee describing them as a "cartel". Publishers and developers shape learning through the materials and technologies that are made available to educational institutions, influencing expectations of teaching and procurement staff and necessarily shaping teaching practice,

notwithstanding their claims to be responding to teaching practice. These claims are genuine and supported by the number of employees coming from local authorities or schools with a more nuanced and sympathetic understanding of education practice than a caricature of the aggressive salesman would imply. Still, the relationship between schools and suppliers has a circular nature, with schools to some extent relying on these firms to inform them of their purchasing options and firms relying on schools to communicate their purchasing needs: this is underlined by the claim of one interviewee that there are many fewer people involved in the education technology community outside schools than might be expected, with the same individuals moving between local authorities, government agencies and private companies.

One contributor suggested that schools are comparatively "unsophisticated" consumers of technology, being used to receiving subsidies and having different procurement patterns and expectations to commercial firms. Schools' apparent failure to purchase technology in the same way as a commercial business, apart from reflecting the fact that schools have not traditionally been run along the same corporate lines, may also reflect a pre-existing set of attitudes towards technology that arose from the early days of using technology with computers, when a "hobbyist mentality" was more of a pre-requisite for engagement with technology inside or outside schools and a cottage industry of software developers and distributors arose.

Two kinds of ethos towards technology in schools seem to be illustrated from the interviews and reviews. On the one hand it might be suggested that there is an acceptance of the ready-packaged and quality-assured software and hardware provision from large corporate players such as Pearson and RM, where technology expertise is assumed to be located outside the school and procurement decisions that rely on such expertise are happily passed to representatives or proxies of the market, reflecting the lack of time or enthusiasm within an institution for engaging with such decisions themselves. On the other hand, it could be said that there are still vestiges of a tradition of technological experimentation and development that locates expertise within the school (perhaps within individual teachers), perhaps seeing itself as linked to the university tradition of technological development. Although this second "DIY" tendency is vocal and engaged, and informs much of the aspirational debate amongst researchers and policy-makers, there is doubt over the effectiveness with which teachers are recruited to its standard, and there is little indication within the work examined here that it will become a mainstream attitude within schools.

This hobbyist or DIY attitude might in some ways be seen as part of a wider movement supporting the "open source" creation of computer software. On a practical note, much open source software is significantly cheaper than its commercial equivalents and benefits from the presence of associated user communities. This is mainly relevant to primary and secondary education: HE has a much more familiar relationship with open source software, with HE institutions often acting as centres for the use and production of open source material. The notion of "openness" has been a productive nucleus around which to collect other instances of "open" activity: for some academics, placing limitations of copyright and access on their work slows research and is counter to the spirit of academic endeavour, while for learners there are an increasing number of institutions offering access to content and accreditation, usually using web-based tools[10].

It is not only "open" approaches to learning that make use of digital technologies that enable remote communication. Many companies offer home tuition to school students via webcam sessions with remote tutors (for example, TutorVista and Global Scholar). The

[10] For example, the Open University's OpenLearn project (http://labspace.open.ac.uk/course/view.php?id=4341), itself part of a wider European effort (MORIL), or the MIT Open Courseware initiative.

tutoring model is still based around real-time dialogue but the virtual presence technology allows (typically US) learners to take advantage of lower tutoring costs in other parts of the world (for example, in Singapore). There are also a handful of schools that are encouraging their teachers to develop online tutoring skills and are reaching out to a wider population with paid-for online provision. Online tutoring is therefore an opportunity for schools to participate in the digital education marketplace and to redefine their own communities, as well as a source of supplementary or even competing services.

There are a number of sites not affiliated with formal learning institutions that act as places to access materials explicitly intended to support learning. Some are wholly concerned with learning, whether academic or non-academic (for example, the School of Everything[11], 5min[12] or Instructables[13]), while others, such as YouTube[14], are more agnostic platforms that have become useful for people wanting to share techniques, advice or coaching. Collaborative opportunities online, such as blogs, message-boards, public wikis and so on, have become established as useful locations for the exchange and construction of knowledge with peers.

Managing educational institutions

The most high-profile interaction between the state and the private sector with respect to the management of schools in recent years is the Private Finance Initiative (PFI), in which the construction and management of public institutions is financed and delivered by consortia of private companies, who receive a revenue stream from the state over a fixed period of time. As an investment mechanism it has been widely employed across the public sector, perhaps most visibly for the provision of health services. PFI projects represent the largest investment of private capital in education currently, though as a procurement approach it has been strongly criticised on both economic and ideological grounds. There are practical difficulties associated with the approach: local authorities have not always had the skill to manage a PFI project successfully, and the recent economic climate has made it hard for consortia to raise capital. However, the same economic pressures make it unlikely that new public projects will be able to go ahead without the support of the private sector, and for now the PFI approach is sufficiently embedded within procurement processes for it to continue to be a favoured approach to funding infrastructure projects.

PFI engagement with education projects tends to extend as far as the provision of services related to the facilities constructed under the contract: this may involve funding staff on site, but their role is usually concerned with maintenance and service provision rather than directly with educational activities. Academies, as described above, are another way of involving the private sector in the provision of publicly-funded education, and the sponsors often make a greater contribution to the management of the school itself, appointing representatives to the governing body, recruiting members of the senior management team, contributing to the design of the curriculum, and directing to a large extent the ethos and vision that underpin the schools' activities. The engagement of sponsors of academies with the management of the school is much greater than that of PFI consortia members.

Both PFI schemes and academies are established features of the education landscape in England. Less common is the management of maintained schools by for-profit companies, such as GEMS[15], Edison[16] or Kunskapsskolan[17]. These organisations differ

[11] http://www.schoolofeverything.com/
[12] http://www.5min.com/
[13] http://www.instructables.com/
[14] http://www.youtube.com/
[15] http://www.gemseducation.com/

from traditional independent or private schools in that their revenue is derived through district-wide contracts with state agencies for the management of publicly-funded schools. The three named here represent three different ways of engaging with the provision of public-sector education. In Sweden, Kunskapsskolan manages schools for profit through a government voucher scheme: the company is entering England as a non-profit sponsor of several academy schools. Edison Schools in the US originally managed publicly-funded schools on behalf of district authorities, though poor financial and educational results have led to their specialising in service provision rather than whole-school management[18]. In England, Edison (as Edison Learning) have been contracted to provide school improvement services in Essex and North London, providing teaching staff as well as training and management. GEMS is based in Dubai and manages a string of independent schools globally aimed at the expatriate market, including England, teaching local curricula and the National Curriculum.

These for-profit organisations are qualitatively different providers of private education than traditional 'public schools', with the latter's reliance on social networks to provide legacies and donations in addition to tuition fees received from parents. They are also multinational, reflecting the increasingly global nature of the education market. Many domestic education providers are beginning to expand internationally, using an institution's brand and relationships with locally-based institutions to establish sites of education delivery overseas, either as a profit-making exercise or, more commonly, to support recruitment and intake among domestic institutions. Increasingly HE and FE institutions are competing globally rather than nationally, often against universities with a greater funding base, and awareness of this perhaps encourages a more enterprise-oriented disposition. Currently, international demand is for an 'Anglo-Saxon model', though it should be noted that this does not privilege providers from traditionally Anglo-Saxon backgrounds, and global Englishes are often more relevant to consumers than Standard British English. This tendency to equate an international outlook with economic globalisation is filtering down to school level: the Specialist Schools and Academies Trust runs an International Business Partnership Network[19] encouraging financial partnerships between schools in different countries that are supported by local businesses, while some schools are keen to promote the development of skills supposedly demanded by a technologically-enabled global economy[20].

Independent education provision is under pressure from the redirection of some parents' resources towards supplementary private tuition. The cost of such tuition is decreasing, with low-cost providers often following a model established overseas and offering affordable tuition in supermarkets and shopping malls following the pattern established in Singapore, Hong Kong and the US. Supplementing state education with private tuition is an increasingly legitimate part of mainstream provision, with tutoring for failing pupils offered by the government and Aimhigher funding used by some schools to provide tuition for pupils applying to Oxbridge.

There are a number of other minority approaches to school management. Most visible are state-funded schools run by organisations with a religious character, or faith schools. These are maintained by local authorities, with infrastructure owned and managed by a group – often a charity – with a religious focus, who have representation on the

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[16] http://www.edisonschools.com/ in the US, http://www.edisonlearning.net/ in the UK
[17] http://www.kunskapsskolan.se/foretaget/inenglish.4.1d32e45f86b8ae04c7fff213.html
[18] See for example, http://online.wsj.com/public/article/SB112604287494033169.html, http://www.nytimes.com/2002/07/16/us/complex-calculations-on-academics.html and Saltman , K.(2005), "The Edison Schools: Corporate Schooling and the Assault on Public Education" Routledge (ISBN: 978-0-415-95046-6)
[19] http://www.ssat-inet.net/aboutus/sponsorus/ibpn.aspx
[20] For example, Sir Bernard Lovell School in Bristol: http://www.sirbernardlovell.s-gloucs.sch.uk/v4/internationalism.php

governing body. Staff and admissions may be appointed by the local authority or by the governing body, depending on the school's voluntary controlled or voluntary aided status. Faith schools are valued by some outside the faith community for their supposed emphasis on broad social values and high levels of achievement, though public and political concerns regarding ethnic or secular segregation, religious extremism, social integration and the possible lack of accountability remain, possibly leading to greater scrutiny and regulation in future.

Foundation schools place a similar emphasis on the contribution of the governing body to the management of the school, with the local authority funding the school and the governing body owning the infrastructure and employing staff. Foundation schools may be faith schools, though in practice few are[21]: the primary advantages for schools in having foundation status are greater control over management and admissions policies, and a more equal relationship with local authorities. The structure also allows groups traditionally not involved in the direct provision of formal education to manage a school, and there are examples of parents and community groups taking this opportunity[22], allowing a greater focus on issues of local concern, perhaps responding to a lack of school places, or a desire for stronger ties between home and school.

Foundation schools and academies represent two ways in which the third sector can manage and direct the provision of education. Another approach has been developed by the Young Foundation with the Studio Schools scheme[23], which departs from the usual way in which 14-19 education is structured by conceptualising the institution as a cluster of student-led businesses, employing students, teachers and non-teaching staff with expertise in business: the focus is on developing general skills and dispositions that support entry into the workplace and an entrepreneurial attitude. The scheme has been recognised by the present government as an example of the middle way between full privatisation of education on one hand and centralised state delivery on the other that it believes best promotes the conditions for "innovation"[24].

Education does not necessarily have to happen in a school or formal institution: there has always been a minority of children who are educated outside the formal system, most often at their home. Home schooling presents a direct challenge to the state's ability to deliver its responsibilities and commitments as outlined above, particularly in light of the growing emphasis on schools as part of a system of care for children in England and Wales. This is illustrated by the aims of ongoing Elective Home Education Review chaired by Graham Badman (to be published spring 2009[25]), which is investigating whether councils are able to discharge their duties of care to children outside the school system, whether home schooling can account for the level of education children receive, and to what extent the curricula addressed within home learning environments is aligned with government policy such as Every Child Matters.

While it is difficult to provide an exact figure for the number of children schooled at home (estimates vary from fewer than 10000 to over 50000), there seems to be general agreement that numbers are gradually increasing. One possible factor in this growth is

[21] "Pupil characteristics and class sizes in maintained schools in England, January 2008" DCSF 2008 (http://www.dcsf.gov.uk/rsgateway/DB/SFR/s000786/SFR_09_2008.pdf)
[22] For example, the Bolnore School Group (http://www.bolnoreschoolgroup.org/) and Elmgreen Sceondary School (http://www.elmgreenschool.com/)
[23] http://www.youngfoundation.org/home/themes/studio-schools, http://launchpad.youngfoundation.org/fund/learning-launchpad/events/studio-schools
[24] Speech by Gordon Brown, May 2009 (text at http://www.number10.gov.uk/Page19209)
[25] http://www.govtoday.co.uk/index.php?option=com_content&view=article&id=354:morgan-action-to-ensure-childrens-education-a-welfare&catid=52:sustainable-communities&Itemid=21, http://www.guardian.co.uk/education/2009/jun/05/home-schooling-education-crack-down, http://news.bbc.co.uk/1/hi/education/7838783.stm

widely reckoned to be the increasing availability of learning tools and materials accessible online. Indeed, there are a small number of independent schools existing entirely online, offering timetabled lessons where interaction with teachers and classmates is through messageboard, voice over IP and video-conferencing software. While the mechanism of interaction may be novel, an emphasis on the traditional nature of the underlying pedagogic approach seems to be common to many. Some online schools claim that they are particularly appealing for students whose parents desire a higher degree of control over diet and environment during the day, or who currently have difficulty relating to other students. Online schooling also appeals to some expatriates who presumably feel that their local schooling options are not appropriate: they are also a cheaper option the Within the UK there are three wholly-online schools, with around 200 pupils between them. First College[26] and Briteschool[27] are smaller organisations, while Interhigh[28] is supported by Tutors International[29], a private firm supplying tutors to families around the world. All offer online tuition for GCSE and A-level students, with Briteschool additionally offering primary tuition.

As noted above, much online HE material likely to be administered by the relevant institution (so, far example, MIT's Open Courseware programme is part of the offline institution of MIT rather than being an online university). However, there are a growing number of universities that exist entirely online. The UN's Global Alliance for Information and Communication Technology and Development (GAID[30]) recently announced the formation of an online university, the University of the People[31], offering tuition-free, currently unaccredited courses in business administration and computer science: its focus is on providing access to university-level education in developing countries. Other entirely virtual universities, such as the US Army's "eARMYU" and Jones International University, exist, addressing different sectors. Currently, a more usual approach currently within HE is to offer a blend of online and offline access to learning materials.

Assessment

Three purposes of accreditation were identified by contributors to the research, all social and/or political in origin but acting at different levels of stakeholder interest: legitimation (demonstrating that the national project of schooling young people 'works'); differentiation (organising people into the kind of life paths and educational streams that are felt to be appropriate for them), and providing a personal record of achievement, to support life choices and goals. Arguably, the focus of political debate about education has moved from the second purpose to the first. No mention was made within the research of the role of assessment in the learning process, reflecting the emphasis on external structures of education rather than pedagogy. This resonates well with the findings of the DCSF Expert Group on Assessment who suggest[32] that the government has four purposes in undertaking the assessment of young people: to optimise the effectiveness of pupils' learning and teachers' teaching; to hold individual schools accountable for their performance; to provide parents with information about their child's progress; and to provide reliable information about national standards over time.

National high-stakes examinations are the form of assessment most often discussed in public fora: despite a popular conception that these are devised and administered

[26] http://www.firstcollege.co.uk/
[27] http://www.briteschool.co.uk/
[28] http://www.interhigh.co.uk
[29] http://www.tutors-international.com
[30] http://www.un-gaid.org/
[31] http://www.uopeople.org/
[32] Report of the Expert Group on Assessment, DCSF 2009, ref: DCSF-00532-2009 (http://publications.dcsf.gov.uk//DownloadHandler.aspx?ProductId=DCSF-00532-2009&VariantID=Report+of+the+Expert+Group+on+Assessment+PDF&)

entirely by the state, they are part of what Ofqual describe[33] as "a market for qualifications", provided by "qualification buyers" and "qualification sellers". These examinations – most notably GCSEs and A-levels – are managed and assessed by independent examination boards, primarily AQA, OCR (part of Cambridge Assessment), Edexcel, and the City and Guilds Group. The City and Guilds Group and AQA are independent charities, while Cambridge Assessment is a non-profit. Edexcel, as noted above, is a private company owned by the publishing company Pearson, and has an income significantly in excess of the other major exam boards (over £200m in 2007 compared to AQA's 2007 income of nearly £150m)[34].

There are other qualifications providers not recognised by Ofqual, providing qualifications recognised within particular domains and sector. Accreditation from Ofqual recognises the qualifications offered by a particular awarding body as being within the the National Qualifications Framework, giving them greater national currency and providing a level of quality assurance. The number of recognised qualifications has grown from 2771 in 2001 to 8379 in 2008, a 26% increase, and the number of accredited awarding bodies has grown similarly to 140. The majority of providers and increases exist in the vocational sphere, with some specialist organisations (for example, the Associated Board of the Royal Schools of Music) and others that offer a wide range of qualifications (for example, the City and Guilds Group). Employers recognised as awarding bodies – for example, FlyBe and McDonalds – make up 2% of UK awarding bodies, though this proportion is expected to grow over the coming years as employers recognise the value of their qualifications having wider currency.

E-assessment, or the use of ICT to administer, evaluate and present the results of examinations, is a well-established part of the landscape, though not yet mainstream. There are a wide number of different approaches that fall under the term "e-assessment", and some have met with more success than others. There are a complex set of cultural and logistical issues that vary across educational settings: security, reliability, trust and accuracy are all paramount. Against these constraints, e-assessment has the potential to save costs for institutions and to better support standardisation, making it easier to link assessment to other ICT-supported areas of education such as e-portfolios, detect plagiarism and provide students with timely feedback. While at present e-assessment schemes often require champions and technical intermediaries, a recent JISC report[35] suggest that usability is improving, enabling teachers and non-technical staff to prepare their own assessment procedures.

Automation of existing tasks is perhaps the most readily-observed element of e-assessment, using technology to deliver tests online, and increasingly to mark students' responses: multiple choice or short text answers are more amenable to processing by computer than longer texts, though these are still often sorted using computer software prior to being marked by a human, and text analysis techniques are improving, enabling programmes to offer evaluation on the quality of language and judge the content. This raises the possibility of e-assessment making more of a contribution to formative assessment practices in future, with the field developing from being a set of techniques for easing the administrative burdens of delivering tests to becoming a more central part of the learning process. Educational publishers, notably Pearson, are investing in e-assessment, which may make it possible for such firms to offer linked curriculum, assessment and qualification practices to educational institutions and individual learners. Some contributors noted, however, that developments in e-assessment techniques and

[33] "Annual qualifications market report", Ofqual 2009 (http://www.ofqual.gov.uk/files/09-4141-annual-qualifications-market-report-april-2009.pdf)
[34] Ofqual 2009
[35] "Review of Advanced E-Assessment Techniques", JISC 2009 (http://www.jisc.ac.uk/media/documents/projects/raeatfinalreportpdf.pdf)

the possibility of the easy movement of educational data more generally suggest that a modular approach to assessment is possible, with accreditation being offered as a standalone service, perhaps as a way of validating time spent engaging with course materials available on the MIT OpenCourseWare model.

Funding education

The primary source of funding for education is currently central government. State schools receive funds for running expenses from local authorities , who receive a Dedicated Schools Grant from central government intended to cover each schools' three-year budget and the costs of other educational provision (such as providing for special educational needs). Local authorities also have responsibility for FE, ensuring young people and adults have access to work-based learning through the provision of diplomas and apprenticeships, and for commissioning education providers to offer work-based learning. Higher education is paid for directly from the Higher Education Funding Council of England (HEFCE), a non-departmental public body. The primary source of funding for education in England, then, is the taxpayer.

Within pre-14 education there are few current alternatives to this model. One way of structuring the disbursement of taxpayer –derived funds differently would be through a voucher system, in which vouchers representing the state's investment in learners can be exchanged for educational provision of the learner's or family's choice. There are concerns over the ways in which implementing this approach may affect local inequalities, with different impacts imagined depending on whether private schools as well as publicly-funded schools may be chosen, the degree to which quality of educational provision varies within a region, or whether or not parents are allowed to top-up their voucher allowances from their own funds. In practice, within England pilot voucher schemes have not been as successful as their supporters might have liked[36], and although vouchers are a mechanism that supports parental choice and as such might be expected to remain a feature of educational debate, there are currently no plans to introduce voucher schemes on a national scale for children's education.

The resources represented by vouchers still originate from the taxpayer. At present there appear to be few other sources of revenue for schools or institutions. Parents can fund their children's education directly through private or independent schools, or supplement state provision of education through paying for private tuition as noted above. Farook notes that more than a quarter of children aged between 11 and 18 years old have had private tuition at some point in their lives, and although there is no consensus on the degree to which such tuition impacts academic achievement, and concern that it may increase disparities in educational attainment, private tuition is still a popular choice for many parents, particularly at levels where new examinations have been introduced, such as SATS in key stage 3. Tuition is frequently focussed on passing high-stakes examinations but might also focus on extra-curricular activities regarded as desirable by parents (such as music or sport). In recent years two major developments within the private tuition market have taken place. First, the emergence of low-cost providers has lowered the financial barriers to entry, with many also based outside traditional learning environments and located within shopping malls or supermarkets[37], perhaps giving them access to new markets. Second, families who might have sent their children to an independent school are increasingly choosing to invest in private tuition for their children as a cheaper option, increasing the number of children in state school (and in some areas putting more pressure on limited school places). For some learners, private tuition can be a mark of inadequacy or a source of social embarrassment, and

[36] For example, Wandsworth Council halted their scheme in 1996 (http://www.independent.co.uk/news/councils-pressure-ministers-to-drop-nursery-voucher-scheme-1357165.html)

[37] For example, Explore Learning have a branch in Sainsbury's supermarket in Hampton

Farook suggests that peer-to-peer learning approaches facilitated by ICTs may provide a cheaper and more acceptable alternative to paid tuition.

Following the lead of policy in embracing the language of the private sector, some schools are adopting an entrepreneurial approach to supplementing the funding they receive from central government. Some are able to generate revenue from the use of their facilities, charging for the use of athletic resources for example. In others, pupils contribute to fundraising efforts. At its most direct, this entrepreneurial attitude manifests itself in the opening of for-profit branches of schools overseas, as Harrow and Dulwich College have, and Bristol Academy plans to. Many higher education institutions have taken advantage of their brand to expand overseas in a similar way, though their motivations are often more to do with supporting the domestic institution through encouraging take-up from overseas students than with profit, and it is unclear whether the factors supporting an entrepreneurial attitude within HE, such as an emphasis on innovation for economic benefit, will act in the same way for schools.

HE has explored many ways to supplement central funding. As universities and other HE institutions continue to be pressured by the global market in higher education, in particular from well-funded US institutions, one possibility is for HE institutions to become private institutions, thought this would be controversial and some academic disciplines may suffer if universities are able to offer courses that are in their own interest rather than in the national interest. While a full marketisation of the HE sector is unlikely, the perception that higher education primarily benefits the individual may support the removal of the current cap on tuition fees, and more widely mark a shift in student expectations, seeing themselves more as consumers of a service and demanding appropriate levels of care and provision with a greater emphasis on value for money.

Becoming private institutions themselves may be unlikely. However, universities have had close relationships with external private sector organisations throughout their history: most obviously, through philanthropic donations, funding scholarships and departments. More specific interactions are observed between commercial organisations and research groups working in areas with industrial application, with funds for specific research being made available by private sector groups. In recent years direct partnerships between departments and related organisations have begun to emerge, in which the commercial partners might shape the direction of the department and provide links and opportunities to students within their sector. In general, policy supports the notion of private enterprise taking a larger role in funding and supporting university expansion: it is not yet clear what effect this might have on the focus and nature of research and teaching within HE institutions, nor whether work with no immediate application within an industry will suffer as a result.

Links between industry and education are a more obvious feature of work-based learning initiatives. Local authorities have responsibility for ensuring young people and adults have access to work-based learning, through the provision of diplomas and apprenticeships, and for commissioning education providers to offer work-based learning: work-based learning can refer to learning activities that take place within a work environment, or (when used in a UK policy context) to vocational training for young people. Increasingly, post-Leitch, FE providers are being asked to focus on meeting the perceived skills needs of employers, and this creates a role for employers in shaping and supporting the design of FE courses. Employers frequently fund training for their own workforce themselves, though there is a tension between an organisation's short-term needs and employees' longer-term training and learning needs, as employers often prefer to fund short courses addressing specific, often role-related, skills, while employees require transferable qualifications that may not ultimately benefit their employer.

Section 2: What features of the contemporary landscape will persist?

There are a number of features of the contemporary landscape that we can assume will remain relevant to a discussion of the relationship between private and public spheres as far as it affects education in twenty years' time: these might promote or work against the development of some or all of those features described above.

Taking a broad perspective to begin with, we might say that the following list of factors will continue to operate, providing a context for future education. There are of course still many uncertainties associated with each of these.

- Diversity of provision.
  - There will continue to be a range of approaches towards the delivery and provision of education. In part this will reflect the diversity of requirements on the part of learners through population change and a greater emphasis on lifelong learning. Other factors influencing this diversity of provision include changing attitudes towards workplace and informal learning, the effects of a marketised education sector, and a greater range of possible technological affordances. The customer base for educational products and services is likely to diversify as schooling extends to homes, workplaces, supermarkets and community learning centres.
  - Ofqual expect to see more employers seeking recognition as awarding bodies in order to gain currency for their training beyond the limits of their organisation (Ofqual, 2009)

- The global marketplace will continue to shape higher education provision.
  - This is a consequence of many larger global economic currents: some are described here. Economic growth has created a demand for educational provision perceived as high-quality for cultural and historical reasons (for example, the current demand in China and South-East Asia for accreditation from 'European' or 'Anglo-Saxon' HE institutions), as well as offering HE institutions the opportunity to pursue more commercial relationships that would impact their brand in their home countries. Increased mobility has made it easier for academics and researchers to travel between institutions, while existing relationships with multinational commercial and industrial partners may give institutions access to other organisations and partners in different countries. Many UK universities actively market their courses to students from other countries. Pressure to compete as global research institutions has already driven some UK universities to merge.

- There will continue to be an arm's length relationship between private sector and direct educational provision.
  - While the number of ways in which the state may devolve educational provision to the private sector have grown in recent years, widespread political and cultural commitment to the idea that the state has responsibility for the education of its citizens is likely to ensure that the private sector is not handed direct responsibility for the maintenance of state-owned schools without the state retaining some kind of an intermediary role between third-party providers and learners, or at least retaining an oversight role that addresses accountability.

- State involvement in early years educational provision will remain central to conception of a national educational settlement.
  - Similarly, there is an equally widespread commitment to the notion of a minimum educational entitlement and a common educational experience: the use of schools as a site for socialisation and the inculcation of shared values, together with the economic benefits of allowing parents to work rather than care for children during the day, suggests that the most appropriate age for the provision of a minimal educational entitlement is likely to be during a learner's early years. Some contributors suggested that the specific ages intended for this provision may change, perhaps starting at age 3 and ceasing at 14, or not starting until age 7 and continuing till age 21, depending perhaps on the perception of the role of education or developmental effects of formal schooling.
  - The government will continue to create markets for educational services through its own targeted investment in and regulation of education, but contributors felt that 'the stakes are too high' for this stage to be left entirely to market forces. State involvement in this stage is likely to be seen as providing an initial investment in 'learning to learn' skills that should enable individuals to take responsibility for their learning throughout life.

- The influence of private sector on curriculum and policy will continue.
  - The private sector is likely to continue to influence policy directly and indirectly, through its commercial activities within the education market and through its contributions to wider debates on the appropriate aims and outcomes of education. Market offerings from private-sector learning providers may influence policy indirectly through competition, with the state under pressure to respond to successful private-sector courses by making similar learning programmes available.

- There will continue to be a requirement for lifelong learning.
  - Demographic changes (most visibly an aging society) and changing workplace requirements are likely to maintain the importance of lifelong learning, both as a route to ensuring minimal skill levels and, for some, as a path to further development, whether professional or personal. There is already a trend towards colleges becoming centres of learning for the wider community, collating services that include vocational, work-based, adult and leisure learning, as well as delivery of 14-19 qualifications[38]. However, some contributors felt that the government's vision of lifelong learning remained fragmented, unconvincing and unstructured. Much investment in 'lifelong learning' has in practice been remedial in relation to core provision, rather than an attempt to build or develop new learning.

- Social practices of institutions and learners will continue to shape learning.
  - Several contributors identified the importance of recognising inertia and the durability of established social relationships in discussing educational change. Policy statements, technological opportunities, social changes from outside the sector and market forces will each or together effect change only when they are able to overcome established expectations around educational practice, or when these expectations are no longer part of practitioners' and learners' understandings of education,

More specifically, there are a number of present-day features of the education landscape that authors and interviewees have identified within the Challenge as likely to persist:

[38]For example, Ideastore (http://www.ideastore.co.uk/)

- Assessment will continue to move towards technologically-supported automation.
  - This might be an example of technology being embraced primarily as a labour-saving tool to increase perceived efficiency, rather than being driven by a particular pedagogic commitment to using technology in a certain way (although of course any automation of assessment will carry with it an implicit pedagogy). However, there is currently within the education community an awareness that new technologies allow the possibility of logging data from learners' behaviour that might well support the exploration of different approaches to assessment. The recent high-profile difficulties surrounding national SAT examinations both support and challenge this move towards automation, creating a demand for more reliable and trustworthy assessment while at the same time reducing the appetite for risk-taking.
  - As more of learners' practice takes place with technological devices capable of recording data, more classroom activity will be available for evaluation and technological assessment will be able to play a greater role in formative assessment.

- Peer production and 'web 2.0' approaches to the collaborative generation of formal educational materials and activities will continue to be marginal in the face of institutional and cultural barriers.
  - Despite the enthusiasm for and fascination with recent innovations in web-based communication and data-sharing techniques (often referred to with terms such as 'crowdsourcing' or 'mash-ups'), there is little evidence to date that anybody beyond a small and accomplished minority is able to create materials in this way, or to show how these attitudes towards the creation of educational resources might be embedded meaningfully within existing approaches towards teaching and learning. This is not to deny their potential or the support that can be found within contemporary theories of learning for the exploration and development of such approaches: rather, it is an acknowledgement that the history of digital technology in schools suggests that potential alone, however genuine or widely-acknowledged, is not sufficient to overcome wider cultural barriers to the introduction of new paradigms, and that it has historically taken decades rather than years for new technologies to find a place within education. Not all teachers or learners will want to be producers.
  - Learners may be unlikely to make these sorts of applications directly themselves: however, third-party developers may be able to take advantage of new approaches towards the repurposing and redistribution of data and information. Similarly, HE institutions are likely to continue to use their role as contributors to open-source projects and as sites of technological innovation to take advantage of and develop the affordances of new collaborative technologies.

- Investment in and exploration of location-aware technologies will continue.
  - The inherited discourse of the web as an alternative space (cyberspace) also needed to be set alongside trends in location-aware technologies (GPS, geotagging etc) which support an information-enhanced experience of real-world locations. Soon, all locations will be virtual as well as real, and virtual locations will be increasingly differentiated (including by geographical locale, particularly where governments control what is available on local networks). More mobile devices and better access to networks on the move will continue to enrich locations for learning, including remote communities and field sites. Cyberspace and real space will interpenetrate one another, with the result

that without a conscious effort to disconnect, all learning is likely to take place in this new hybrid space.

- Teaching will continue to be a distinctive professional activity with its own values and skills.
  - However, educational staff will continue to need the support of content creators and service providers. As third-party providers continue to play a role in day-to-day teaching and learning, there will continue to be a demand for technical and product support to assist in the use of tools and content, both in their practical use and more broadly in understanding how new tools might impact well-established approaches to teaching and learning.
  - A wider range of people may undertake teaching and support of learning as part of their professional role, particularly at the post-foundational stages, whether after or as part of an established career in a different sector.

- The nature of knowledge will continue to be contested in the face of debates around authenticity and authority.
  - Although the area of knowledge is more directly addressed by other areas of the BCH programme, there are a number of ways in which developments in digital technology and their associated social practices make this a relevant consideration for this research area. In particular, the need to be confident of the provenance and authority of digitally-gained knowledge will become pressing: not only will people need to be sure of the source and authenticity of information they encounter, but will also need to ensure that they produce information whose authenticity is sufficiently beyond question, in particular when identifying themselves online. Most visibly, there will remain a tension between policy (and associated providers') views of education and emerging student practices and strategies,

- Understandings of information rights and intellectual property will be reconfigured in the light of technologically-informed expectations.
  - It is already the case that there exists a tension between the established legal and orthodox attitudes towards ownership and re-use of information, and those more aligned with the affordances of digital technology. It is also highly likely that retaining these established societal norms will incur an increasingly heavy regulatory cost, making it more probable that they will be restructured in some way. The widespread sharing and redistribution of content – legal, illegal and unlegislated – will remain a feature of this landscape. However, there is high uncertainty over the form they will take: will the current 'wild west' succumb to legal normalisation? Or will a tiered system of information and content evolve as different creators and distributors choose different approaches?

- Tutorship and supplementary learning will become increasingly important elements of the education landscape.
  - The middle classes will continue to use their household resources to secure access to these additional educational opportunities. However, competition between new providers making use of web technologies and novel learning locations is currently lowering the costs of such learning: additionally, independent schools membership is likely to decline at least in the short term as the global economic environment remains depressed, and tuition coupled with state school attendance may be seen to be an adequate alternative to private education for many middle-class parents.

- Marketing through schools by companies not directly related to education (for example, Morrisons' Let's Grow campaign, Tesco's Computers for Schools project) will remain at the current level.
  - While it is true that there is little public appetite for overt branding of any part of the educational experience, there is an appeal for companies in visibly addressing their social responsibilities: this, coupled with the professed desire for stronger links between schools and local communities and a greater acceptance of corporate involvement in the public sphere, will ensure that schemes for the provision of equipment or infrastructure from non-education organisations remain worth individual companies' investment.

- Workplaces will continue to ensure their own training and learning requirements are met, whether by lobbying for the inclusion of certain skills and competencies in curricula, or by providing them directly.
  - Workplaces already form a large marketplace for training and development activities, with individual organisations sometimes able to embrace innovation in ways that traditional learning institutions are not (for example, using videogame technology in simulating not only technical procedures but also interpersonal workplace relationships). This flexibility, coupled with the growing prominence of the private sector in the public sphere and the emphasis on the need for schools and HE institutions to serve the economy, might see techniques and approaches developed in the private sector being more frequently seen in traditional education and lifelong learning.

- Private firms will continue to be used to effect state education provision.
  - While the current economic climate may dampen the recent enthusiasm for the practices of the private sector, the general principle of contracting individual services to third parties is sufficiently established, and the relationships between some private firms and public service agencies sufficiently entangled (as noted by Sefton-Green), that it seems unlikely this will change significantly over the next two decades, even if an adequately practical and compelling case were made (short, perhaps of incontrovertible evidence of widespread and systemic fraud, which at the present moment might provoke state action and a recapturing of the public space: this is unlikely). One practical outcome of this might be that uptake of open source tools in mainstream education meets strong opposition[39].
  - Alternatively, more educational suppliers may move into the provision of qualifications and accreditation, making their content more accessible but charging more for participation in their assessment programmes.
  - Managerial approaches to education are likely to continue to be seen within the culture of educational institutions, further legitimising the engagement of the private sector.

- There will continue to be widespread online provision of learning opportunities.
  - While there are currently many technical and cultural barriers within mainstream schools that prevent full access to web materials, there are a growing number of instances of online provision that support formal and informal learning, originating from both geographically-located and virtual institutions. Experiences of MIT OpenCourseware, VideoJug, Second Life, 5mins and Instructables are evolving the norms and expectations that will be more widely adopted over the coming years.

[39] http://www.itpro.co.uk/603639/becta-open-source-and-education-too-little-too-late

- Public awareness and conceptions of the science of learning will continue to have an impact on views about education.
    - These understandings, whether shared by professional or academic practitioners, will have an effect on what is politically possible in and through education. Reductive accounts of learning in terms of genetic capability or brain chemistry might have more purchase on public consciousness than social and cultural accounts, particularly in light of discussion on cognitive enhancements or genetic technologies. As parents and students invest more directly in education, scientific and pseudo-scientific discourses about learning may be employed more overtly in support of particular private services or public approaches.

Section 3: What changes of direction in state/market/third sector provision of education do we see emerging?

Here we list movements that are sufficiently high-level to be considered as trends in one direction or another. All of these operate under larger changes in the relationship between the public and private sectors: some are specific to education, but many are education-specific instances of wider trends, for example towards greater responsibility for one's own good and wellbeing. And all are written with an understanding that the notion of a simple binary between "public" and "private" is illusory, as illustrated by the recent series of government interventions within the heart of the free market.

- Increasing responsibility for provision of individual education moves from the state towards the individual and their family groups.
    - This could lead to significant levels of exclusion amongst those lacking the capital to ensure appropriate, or any, provision. However, it might also make it possible for some groups to meet the requirements and needs of some learners in a tailored fashion, perhaps through locally-focussed small schools, which might be the product of genuine community effort, or a carefully-branded offering from educational multinationals.
    - This move suggests a recasting of, or at least a greater emphasis on, the relationship between learner and institution as one of customer and provider.

- Increasing emphasis on health, wellbeing, social skills, citizenship and civil participation as things to be fostered within formal education
    - A wider and more speculative movement might be towards the re-imagining of learning as an essential part of general health and wellbeing.

- Increasing direct investment by middle-class families in extranormal provision of education
    - This might also lead to increasing interest in and respect given to 'learning science' discourses centred around psuedo-neurological accounts of learning.

- Increasing diversity of education market
    - Greater choice and competition, or a greater number of groups identifying themselves as possible markets with specific learning requirements, could lead to a plethora of ways of addressing all parts of education, from assessment and accreditation to post-education learning and childcare.
    - Educational publishers that currently receive more benefit from 'off-the-shelf' approaches to education may become more able to provide granularised, modular products that are more easily integrated with custom learning environments.

- New learning practices facilitated by changes in digital technology
  - Necessarily supporting informal learning to begin with as these appear outside a formal learning context (possible uncertainty: gap between innovation inside and outside schools decreases?)
  - In a formal context, developers of education management software are working to make it easier use and gather information on learners to build a more comprehensive picture of their behaviours, preferences, abilities and achievements, with the intention of supporting learning rather than merely facilitating pupil management. Using this data effectively would require new forms of pedagogy, which in addition to having to recognise the ethical and legal issues involved in using data in this way are likely to based on a quantitative, process-driven approach to learning, given the present-day philosophies apparently underpinning work in this area.
  - Another possible direction might be for educational technology suppliers to concentrate on equipping learning institutions to enable learners to use their own personal devices, so focussing on providing robust network access, appropriate data sharing and protection systems, device-agnostic authentication systems and other necessary infrastructure features.

- Disaggregation of education into content, teaching and accreditation in some areas
  - This might happen as a likely consequence of the ready availability of content and open learning materials. In addition to high profile projects in the US[40] several EU universities are now offering their course content for open access, but with potential students applying and paying for accreditation[41]. The funding models are still emergent and the outcomes by no means certain[42]. One envisaged future has poor, low-status universities bowing out of content and curriculum altogether, offering instead a tutoring service to help people gain accreditation (in-house or external), or brokerage of opportunities on an information, advice and guidance model. Franchising by high status universities and colleges might then become the norm, with a corresponding loss of diversity in the HE and FE sectors. This might impact lower down the age range not only because a re-stratification of post-school institutions would create new pressures at the point of transition, but indirectly through the concentration of power in the hands of accrediting bodies across the sectors. As the technologies of content became virtually ubiquitous, technologies for accreditation, certification, management of learning records, and assessment, will become critical to the sector and potentially highly profitable.
  - This separation between content and accreditation may act as a motivator for commercial companies to open access to the materials they currently charge for. For example, Pearson might see more people engaging with learning material for Edexcel qualifications if the costs were reduced, building the market for their qualification, which they could then charge more for.

- Internationalisation of more than higher education
  - If this plays itself out among secondary and primary schools, this would be following a recognised path of innovation within education, particularly with respect to digital technology but also in other domains, whereby practices seen first within HE are found later within secondary and then primary schools. Alternatively, and perhaps reflected more visibly in the present,

[40] For example, MIT (http://ocw.mit.edu) and Stanford, Utah State (http://ocw.usu.edu/)
[41] See for example the Moril project at http://oer.issuelab.org/sd_clicks/download2/towards_european_wide_quality_and_benchmarking_of_open_educational_resources
[42] http://www.downes.ca/cgi-bin/page.cgi?post=33401

further education and lifelong learning opportunities, alongside supplementary tuition online or in drop-in centres, may be offered by multinational organisations.

- Increasing movement of some education institutions to brand themselves on a global scale
  - There is a movement for some schools, largely independent, to open 'branches' abroad: Harrow has schools in China and Thailand, while Dulwich College has schools in China, the income from which is intended to support means-tested pupils attendance at the London school.
  - There are likely to be more UK students studying abroad, and more students from traditional overseas markets studying in locations other than the UK, as China, for example, continues to turn itself into a "host" country offering globally competitive education opportunities.
  - This and the previous trend have implications for curriculum design, in particular the need to be aware of culturally-specific aspects of existing curricula that may not be as appropriate for a more global audience.

- Third sector involvement in providing specialist services to schools rather than managing whole institutions themselves.
  - This would sidestep questions of accountability and mechanisms of redress in the event of service failure. However, there would be equally pressing questions raised about the possible use of third sector organisations as a substitute for government-funded provision.

- Increased diversity of locations associated with learning
  - The association of purpose-built buildings with education may be weakened through the locating of for-profit education services within shopping malls and supermarkets, the use of community facilities by educational institutions (for example through partnerships with leisure centres) and the emphasis on libraries and museums as places affording learners opportunities for active educational engagement rather than being only passive repositories of artefacts.

- Tensions between knowledge cultures, primarily along generational lines
  - New information technologies are likely to reconfigure attitudes towards knowledge use and creation, and those groups that are less familiar with their use may find that existing ideas about ownership, authenticity and identity are challenged by the new practices that emerge alongside these new technologies.

Section 4: Major uncertainties

The trends described above have clear directions of travel, but the ways in which they play out in the world and their implications are uncertain. In this section we briefly outline some of the major areas of uncertainty with respect to the ways in which education might be structured and organised in the coming years.

Despite the impetus towards a marketised school system described above, it is far from certain outcome. There are political obstacles: many in society are unwilling to imagine a fully-marketised school system, and the need to keep the private sector at arm's length noted above is likely to continue to obtain. There are risks that the push towards marketisation originating in discourses of 'choice' and 'personalisation' may tend more towards segregation and division if given full rein. More practically, there are many changes that would be necessary for the school system to be fully-marketised. Some

possible structural changes could include the linking of LA funding to performance, capitation following pupils in addition to funding, the removal of LA control over the funding and organisation of schools, schools given the ability to opt-out of the delivery of a national curriculum and of national staff payment agreements, a robust system for managing school failure, and a national school bus or other transportation system which would enable choice to be meaningful and not constrained geographically as at present.

A related uncertainty is the role played by more affordable private tuition. As noted above, the increase in affordable supplementary provision of education may lead to an increased number of middle-class children in state schools, as their parents conclude that combing state schooling with extra tuition is comparable to a wholly-private education. However, as the affordability of private and supplementary tuition becomes more visible, traditional resistances to private education – a perception that it is too expensive, or only relevant to a higher social elite – may be reduced, encouraging greater uptake. This might be more likely to benefit new entrants into the private sector rather than the traditional 'public schools': additionally, the immediate impacts of the economic depression will tend to work against increased uptake of private education in the short term.

There are a number of areas of uncertainty concerning the sites within education where innovation and innovative practices might emerge. Specifically, the marketisation of content designed to support teaching and learning, the development of open-source software in schools and the role of national public service broadcasting are ones with plausible but contrasting possible alternative paths. All of these have at their centre the effect of communications technology on existing knowledge practices.

Currently, material intended to support teaching and learning, or 'content', is often assumed to be valuable through its designation as 'intellectual property': dissemination relies on its remaining unchanged, and on its being useful to educators. Existing stresses on our notions of IP may lead to an exploration of the value of protecting the design and instruction processes associated with such content, rather than simply the static material. This approach would be counter in spirit to the 'open source' attitudes described above: we have already noted, however, that within mainstream schools there are strong forces countering the widespread adoption of open source software and the notion of freely distributing intellectual property. A recent OECD report[43] warned that commercial interests might start patenting content based on the expertise that has gone into its instructional *design*. This was particularly a concern with respect to educational materials for the US schools market, where content is almost entirely outsourced.

Regarding open source software in education, contributors to the research accepted that operating systems other than those from Microsoft will remain rare in mainstream schools, due in part to teachers' unfamiliarity with the software. However, it is also accepted that many schools (particularly primary schools) contract third-party suppliers to maintain and manage their technology infrastructure. If it became worthwhile for these firms to supply open source software, perhaps thorough a need to price competitively, or demands from schools for more customised software, then provided they also offered adequate support for its use it might not be unrealistic to imagine a wider range of operating systems in use across the sector. For smaller or more marginal schools, perhaps those at a greater remove from the culture of mainstream schooling, open source might be a more appropriate option for financial or perhaps cultural reasons. One major uncertainty that emerged from the interviews carried out was the effect that the entry into the workplace of students familiar with open source projects will have on the software market, given the argument put forward by some contributors

[43] *Innovation in the Knowledge Economy*, 2004: http://www.oecd.org/LongAbstract/0,3425,en_2649_39263294_31658285_1_1_1_1,00.html

that software companies are keen to establish their product as central to students' practice in order to maximise the likelihood of those students preferring it in their professional practice.

Of course, information available online may not be open source. Amongst contributors to the event and interviews there appeared to be an assumption that the availability of online information would change profoundly what would be required of the education system, with a related assumption that the teaching of information would give way to coaching in information skills of various kinds and for various settings. Networked information, along with the associated networks and services, would continue to be free, openly available and highly accessible. The question of who would own the networks and data warehouses, and who by extension would control the information being shared and accessed by users, was not raised. However, Jonathan Zittrain's recent book[44] notes that the Internet is at something of a crossroads, with a proliferation of 'sterile' devices that give basic access without allowing users to share and generate content. In one possible future, then, the Internet becomes a commercial mass medium, with a large majority of passive consumers having their attention sold to advertisers as the price of access – or having to pay more directly. For the Internet to remain a place of creative interchange, a critical mass of users must continue to use computer-like devices to generate and enrich content. How IP is managed on the internet will also of course have a profound impact on the future of online information. It was noted that everything on the web is owned and commercially mediated, and that norms of usage are becoming framed in legal and commercial terms rather than the open, creative terms on which the web originally evolved. Ultimately, authority might be derived from the strength of the brand providing access to information, raising the possibility of organisations whose core business has traditionally not been education providing courses and access on the strength of their existing relationship with consumers.

Public service broadcasters (PSBs) are acknowledged to have responsibilities towards supporting education, broadly defined, and as their role within the national media landscape changes, so too will the ways in which they support education. The ways in which they do this currently, and the ways in which they might do so in future, are complex when examined in detail, but taking a more general view there are two main visible tendencies, each a reflection of the wider discussions about the future roles of PSBs. One is an explicit commitment to formal institutional education, with a focus on providing 'learning content' through profit-making, following a path established by movements such as the BBC Active partnership between Pearson Education and BBC Worldwide[45]. The other follows from a recognition that PSBs are in a unique position to foster innovation and support new ways of engaging with media technology, and that their engagement with education should reflect that, continuing along the direction that elements of Channel 4[46] and the BBC[47] are exploring. It is not currently clear how the two directions would continue to coexist, although it is equally difficult to say that they are necessarily counter to one another.

PSBs are given a national remit, with the historic exception of the BBC World Service, and engagement with overseas territories tends to be through profit-making arms of the organisations. Similarly, HE institutions are increasingly engaging with other territories for reasons of profit, as noted above. There is an uncertainty here around language. Demand for English language education materials is high, and while English is the basis

[44] Zittrain, 2008, "The Future of the Internet and how to stop it", Yale University Press (available at http://futureoftheinternet.org/)
[45] http://www.bbcactive.com/
[46] Channel 4's commissioning strategy for education content can be seen here: http://www.channel4.com/corporate/4producers/commissioning/4learning_2.html
[47] For example, http://backstage.bbc.co.uk/news/archives/2009/01/bettr_and_teach_1.html

for global conversations likely to remain so. However, while the BBC, the British Council and others promote their English language materials through associating them with Standard British English and its perceived authoritative nature as the 'original' or 'most correct' form of English, as global middle classes grow in confidence other Englishes may become more appropriate, reflecting greater national self-confidence.

From the event and the research it is clear that there is uncertainty about who will support innovation in society and the economy? Employers tend to upskill their workforce in areas relevant to their short-term commercial horizons, but society needs the capacity to respond to change on a wider basis and a longer time frame. Traditionally, providing this capacity has been the role of higher education, both through research and development and through the production of higher order skills. If higher education is to be more closely tied to the requirements of graduate employers, and if research is to be further dissociated from teaching (e.g. through a re-stratification of the sector), universities' capacity to support innovation on a longer time-scale may be compromised. On the other hand, widening access to higher education, as required by the Government's current commitments to higher order skills, may mean a larger percentage of the population acquiring such skills.

The question of whether national boundaries will be made irrelevant by networked technology is frequently heard within debates on the relationship between technology and education, and it is certainly true that new global communications infrastructures, combined with corporate branding and positioning, has enabled some education institutions to become less tightly coupled to one particular geographic location. On the other, trends towards a greater emphasis on geolocative and mobile technologies and services within consumer electronics and web use patterns, and towards regional governance and regulation of internet services, might make the notion of 'cyberspace' or 'the virtual' as being places independent of geography outmoded. Networked life may be much more tightly coupled to physical location than previously imagined, with consequences for educational activities that rely on different models of technologically-mediated communication. Indeed, the increasing diversity of provision, and local variety of needs and requirements, could see educational becoming a regional rather than a national project.

It was suggested that a non-technology-based education might become highly desirable, particularly if technology continued to support massification and diversification of teachers' roles. Alternatives such as Steiner schools are already proving attractive to middle class parents, and could present a counter-balance to an increasingly technologised schooling system. Related to this idea was the notion of an unmediated intellect becoming a status symbol in a world where performance enhancement through drugs and digital devices/implants/grafts were to become commonplace, or perhaps instead such a mind would be a sign of deviance. Perhaps the 'conscious effort to disconnect' might become a counter-cultural movement among groups of parents and young people.

There are a number of uncertainties within formal education that are worth noting in the context of future educational organisation and provision, around the notion of specialisation, accreditation and teaching as a profession. Currently, the majority of young learners in formal education are encouraged to specialise, choosing between 'science' and 'arts' subjects at school and then later a more specialised discipline or area in higher or further education, represented as a choice made in support of an eventual professional career. Discourses of personalisation and 'learning styles', as well as pressure on schools to meet attainment targets, may encourage young people to focus on one particular area even earlier than this: alternatively, recognition that longer working lives make it more likely that careers will cover many disciplines and an

emphasis on genuine lifelong learning might together remove the need for young people to specialise in initial education. These alternatives act to shape the future role of accreditation: is it most relevant as a badge indicating that compulsory schooling has been completed, as a means of differentiating between young people, as a mark of competence in a given area, or as something else entirely?

Related to this is the question of when and where specialisation might occur in the education system. Diversification of schooling around different types of provision, seen as a likely possibility by some contributors, might entrench social stratification. Vocational training could migrate further down the age range, with large companies or corporate sectors more actively involved in creation of curricula and sponsoring specialised schools. Universities may forge new relationships with schools that focus on particular domains of expertise, allowing schools to offer specialised courses of education that serve as introductions to degree-level learning and induct students into particular knowledge communities earlier than at present. At an extreme this could be seen as a return to a form of guild system for at least a section of the school population. Alternatively (or, in a highly diverse system, relatedly), different communities could take responsibility for supporting different kinds of learning centre, embracing different educational values, and fulfilling social as well as educational needs.

Accreditation and certification through formal education is likely to play a continuing role in 'organising' young people into different life paths, but it is unclear how far that process will be driven by the diverse capabilities and goals of learners and how far by external pressures, for example to prioritise access to higher levels of learning or meet the needs of employers. If the move towards competence-based accreditation continues, the trend towards individualisation might well be enhanced, as responsibility is placed on the individual to demonstrate a standard or competence, rather than on the provider to 'cover' the relevant knowledge and skills. Different forms of accreditation might be developed to recognise informal know-how and practice-based competences: speculatively these might be technology-supported, e.g. based on video recordings, perhaps with analysis and tagging. This would ensure the further diversification of qualifications and standards of achievement, and might also render much more permeable the boundaries between formal and informal/non-formal learning.

These, and other, possibilities will naturally drive changes in the teaching profession. The trend towards the disaggregation of educational activity into separate domains of 'content', 'delivery', and 'assessment' calls into question the need for a single role of 'teacher', though may open up new opportunities for specialists in these three areas. Increasing financial and commercial pressures may lead to greater variation in contract terms within the profession, with more members of the workforce working as temporary or short-term members of educational organisations. Alternatively, these same pressures may lead institutions to consider the members of their teaching workforce as marketable assets, promoting their expertise and experience as qualities that reflect positively on the institution. Finally, if roles within the teaching workforce are to change significantly, it may be that responsibility for training the workforce may need to reflect this, through 'in-house training', different levels of professional accreditation, greater emphasis on professional development and possible increased engagement with sectors outside education.

One argument that arose from the event was that the trend of 'outsourcing authority and control' to private companies (i.e. transferring public education funds to commercial providers of content and accreditation, rather than paying teachers to provide them in-house) would undermine the profession, and therefore the quality of education. This argument was also expressed in slightly different terms elsewhere in the discussion: the disaggregation of educational provision into content, teaching and accreditation would

undermine the integrity (literally) of the teaching profession. Counter to this came the argument that budgetary devolution to schools opens up a market for 'niche' learning approaches and areas of specialism. Schools could purchase services to fit their own curriculum model on a piecemeal basis (and there would be new opportunities here for commercial providers, such as Montessori learning materials), but the curriculum would be strongly associated with the school and there would be an investment in teachers as the source of ideas and practices relevant to the school's particular mission.

An important intersection of the private sector and education occurs in the context of pharmaceutical interventions: drugs intended to address conditions such as ADHD are manufactured and distributed by private companies, and are a feature of many classrooms. The debates around the place of pharmaceutical interventions within education institutions are complex and ongoing, and likely to inform the response of educators and parents to the likely increased availability of drugs intended to enhance cognition and other pharmaceutical and biological enhancements. If such enhancements became the norm in particular workplaces (for example, within engineering, banking or medicine), and if cognitive processes could genuinely be enhanced without cost to the individual, then come contributors felt that their use in higher education would also become the norm. In schools, a competitive assessment regime would make use of enhancements inevitable, whether or not they were regarded as legitimate. Access to such enhancements would probably come to be regarded in the same way as access to books or a balanced diet – possibly unfair, but not 'cheating', and accessed more easily by well-resourced middle-class families. Alternatives were proposed, however. After a period of differential access, pressure might grow for an equal entitlement as is beginning to happen with networked computers: schools might even be under pressure to provide medication along the lines of school milk. Drugs might be used as a form of social control, with medicated or enhanced classes being better behaved and more amenable to learning messages: low capacity to learn could become a medicalised issue, like ADHD. It was felt by some that, as part of these practices, diagnostic testing would be an area of likely development, given the existing interest in diagnosing children with particular learning needs. Genetic forms of diagnostic test might become more prevalent in education, by transfer from other sectors such as insurance and medicine. Perhaps such an emphasis on the biological would see education considered more properly an aspect of health and wellbeing in the future, with pharmacological and health providers moving into the provision of education as a natural part of their core business.

Section 5: Implications for educational policy makers today

These trends and movements within and between the private, third and state sectors all have implications for education and educational policy to some degree. In some cases, the patterns described are a consequence of policy or otherwise already acknowledged by it (for example, the increasing presence of a market culture within education). In others, education policy has not yet begun to visibly engage with the implications of some of the trends presented here (for example, the tension between encouraging localisation and decentralisation, and treating education as a national project). Here we briefly outline some of the implications for education policy arising from the foregoing overview of the relationships between the state, the private and the third sectors.

There are large areas of uncertainty associated with these interactions. Will education publishers continue their project of vertical integration? Will grass-roots collaborative technologies subvert commercial interests? To what extent will it be acceptable for the state to fund institutions that represent minority values? As the sector diversifies, questions of this nature will multiply. However, keeping track of sites of challenge and innovation will become increasingly problematic without a deliberate effort to remain informed and receptive. Collaborative technologies make it easier to develop new

practices under the radar. New forms of education may emerge in England that developed overseas where their growth may not have been followed. Received ideas about what is and is not 'education' may cause individuals to miss the evolution of new forms of learning practice. In developing the capacity to manage uncertainty, it will be helpful to establish practices that enable the sector to monitor activities centred around learning beyond formal state education, including informal learning practices and learning within the workforce.

Three areas that will be of particular relevance to policymakers arising from the reviews and interviews are the nature of schools, the disaggregation of content and accreditation, and the influence of commercial activity on shaping educational provision.

Much of the foregoing discussion draws attention to the possibility of schools no longer being a core organising structure for education, perhaps as a result of the decentralised nature of new learning networks and practices, or the greater role played by employers and corporate groups in ensuring skills provision. Where they continue to exist as a corporate entity, they may well not be exclusively located within a physical building: school infrastructure may be shared with other local groups or partners, or schools might hire appropriate working space from commercial firms as other corporate groups do. Meanwhile the school would still be able to function effectively and ensure its brand remained robust through partnerships with other institutions or through a strong online provision. This is counter to our current conception of schools as a fundamental element of schooling and an appropriate unit around which to structure state interaction with learners. It may be worth examining the assumption that bricks and mortar schools will continue to be at the heart of education, and exploring alternative mechanisms for distributing state support for learning or effecting national policy interventions.

A second theme throughout the research has been the separation of content from teaching or accreditation. In particular, there is a strong trend towards making educational resources freely available online, whether funded by institutions as in the case of the OpenCourseWare consortium or by individuals as in the case of many contributors to (for example) http://5min.com. There is a wealth of educational content available: however, much of it is not necessarily encountered with a teacher, nor is it necessarily able to lead to a qualification. This raises a number of questions, many of which would fall within policy-makers' sphere of interest. How do learners gain recognition and acknowledgement for their effort in engaging with this content? What is the role of the teacher if they are no longer as able to mediate the content with which learners engage? If there is a rise in paid-for accreditation services, how is accountability ensured and regulation established? These questions will need to have been considered if the effects of this disaggregation are to be managed well.

The third relevant theme arising from the research is effects of horizontal and vertical integration of the education market on the educational landscape. The possibility of a single commercial publisher being in a position to supply a physical learning environment, design the curriculum followed in that environment and award qualifications to learners based on that curriculum is now a reality following Pearson's investments in schools in China and in Edexcel. This vertical integration raises questions again about the role of the private sector in the provision of a public good, and the ways in which a single provider might eventually be in a position, through providing all aspects of an educational experience, to distort the market in their interest, rather than in the interests of learners or wider society. Horizontal integration within the education market raises different but related questions of accountability and transparency, as areas previously assumed to be unrelated become part of a corporate provider's portfolio of interests. The private sector has little motivation for making these connections and

interests transparent: it would benefit the sector as a whole for policy to be active in monitoring the interconnections between interests within the education market.

The outcomes of this research effort also suggest three considerations for the exploration of educational futures. First, contributors noted that any discussion of technology in education and the role it may play in future developments ought to look both at its impacts at the 'micro' level of individual learners' interactions with technology, and at the 'macro' level of the institutions developing or responding to new technologies. Focussing on one or the other would lead to a distorted and unrealistic view of the effects that might be expected from new educational technologies. Second, many interviewees noted that useful educational futures would foreground the likely decrease in public funding and its effect on resources available to education, as this would challenge many of the structures and mechanisms that currently effect educational provision. Finally, and most importantly, discussions on the future of education ought to make every effort to incorporate and acknowledge the values and goals that underpin education, as these ultimately will inform whether or not education is judged to be successful in the future.

Chapter 5: The public engagement activity: understanding preferable futures

Dan Sutch, Futurelab

This section presents the findings from the Public and Stakeholder Engagement activities conducted throughout the programme. It describes the key aspirations and concerns for the future of education raised by participants in these activities, and a discussion of the key themes emerging. See Chapter 3 for the description of methods, Appendix 1 for the list of individuals and organisations involved in the process, and Appendix 5 for the detailed questions posed in the Citizen's Panel and Million Futures surveys.

Key aspirations for the future of education

Across the engagement activities, education was seen as an important part of sharing and shaping community values and cultural practices. The overarching themes that have emerged from the discussions highlight the major aspirations for education reported across the public and stakeholder groups.

Education for Citizenship
The importance of education for Citizenship, especially the role of developing civic responsibility, community engagement and participation in 'positive' social activities across the life-course, is a theme that runs throughout the responses. This issue, however, is not tied only to formal Citizenship activities, but relates also to developing attributes such as valuing others, developing good interpersonal skills and respecting others (including educational practitioners).

One important aspect of Citizenship education was seen to be participating in lifelong learning activities, with a role for the education system in enabling and creating opportunities for such participation in a wide range of educational activities (including work-based training, hobbies, etc) for people of all ages. This is reflected particularly in the data from Million Futures and from the Citizen's Panel. The responses reflect a strong ambition for communities to be friendlier and more tolerant of one another, (in relation to both immediate neighbourhoods and international relationships), with a respect for diversity of background and opinion a common theme. People thought that a future based on these principles would be a happier and more peaceful place to be, with lifelong learning activities playing an important part in fostering such cohesion. A second related theme emerging from this category is one of safety and law: that education for Citizenship would counter concerns of crime (especially violent street crime), drugs, gangs and bullying.

Within this theme is the hope that education would support the development of a strong sense of civic responsibility. The Citizen's Panel was especially keen to state the need for skills which foster a responsible sense of self in society, including respect for other people in this country and abroad. This view was more common from older people within the Citizen's Panel. The Citizen's Council accentuated this viewpoint by highlighting the education system's role in developing learners' moral framework with the aspiration for communities that have high levels of social capital i.e. are friendly, caring and supportive, and that are diverse and tolerant of difference. Some people elaborated on how such a community might come about in the future, highlighting the provision of good quality, clean local facilities (including schools) as having a role in bringing people together and reducing anonymity.

Education for social equality
Ensuring social equality is a second theme that emerges from the responses. This theme relates to ensuring that everyone has access to 'basic skills', ongoing access to education, and that the attainment for those disadvantaged is improved. This theme is also concerned with ensuring that differences in other areas of educational attainment and experience are not exaggerated by social inequalities, by ensuring the education provision is appropriate to specific need.

The Citizen's Council was strongly in agreement that social equality should be a fundamental aim of an educational system. The basis of this is that society should be inclusive and if this were the case we should be able to 'produce' more successful learners, Citizens, innovators and workers. The complexity of an educational system delivering social equity was highlighted, yet the Council agreed that this should be a fundamental aim.

Raising the educational attainment of disadvantaged young people was a very high ranking aim for education (73% of the Citizen's Panel marked this as a top 5 aim of education) and this figure is slightly higher for managers and professionals (77%) and higher for women (76%) than for men (67%). The aim tends to receive higher support within the ranking with 32% of the Citizen's Panel picking this aim as their first or second choice.

Education to world class standards
A third theme is that of aiming to achieve the highest quality of education that is comparable and competitive across the world. This theme emerged in relation to the economic imperative of high quality educational outcomes, to international economic comparisons, and also to providing the highest standards of education across the social and moral aims of education.

The educational aim of individuals progressing to achieve world class standards was considered very important and 26% of respondents selected this as the central aim of education (lower at 21% for non-parents) – the second most popular top ranking. Nonetheless, despite scoring a high number of 1s in the ranking, a significant proportion (37% and 47% of people in non-managerial/professional occupations) do not include this aim in their ranking at all - suggesting that this aim divides opinion. Men are more likely to include this aim (71%) than women (57%).

Education for the economic reality
A final theme that emerged more heavily in the second year of the programme than the first, perhaps relating to the current economic climate, was the need for education to prepare people for the economic reality. This theme brings together aspirations for building the appropriate knowledge and skills for the sorts of jobs that will be available in future. Whether creative, IT-based, vocational or science-based, the aspiration is that education aims to prepare learners for the sorts of jobs that will actually be available when they leave formative education.

Similarly, the response from the Citizen's Panel was that having the most appropriate skills for work is the most important job of the education system. This emerges from the qualitative and quantitative questions and is felt strongly across the demographic groups. 95% place it within their top 5 priorities of educational aims – the highest proportion for any of the aims. These findings are the same for men/women, workers/non-workers, parents/non-parents, home owners/renters and for different occupational grades. There is only a small difference in opinion by age; 96% of younger people and 93% of older people place it within their top 5. The importance of this

viewpoint was supported by the Citizen's Council and the responses from industry stakeholders.

The Million Futures data (159 comments about future skills) provides an insight into the sorts of skills that are expected to be needed. The recurring terms in these comments suggest that communication skills, creativity, using new technology, and lateral thinking were viewed as important skills for the future, along with the ability to adapt and be flexible (with regards to other cultures, and generally to the world as it changes).

Education processes
In addition to the aspirations for the future aims of education, it is worth noting some of the key aspirations for the processes of education. Within the public and stakeholder activities, the general aims of education were largely shared across the different groups, yet this was less apparent when looking at the processes of education. Within the following three areas the data shows some shared aspirations.

Educational 'personnel'
Agreement across all stakeholders was that there is a need for a highly professional teaching workforce. The Citizen's Panel hoped for very high quality teaching with teachers having more control in the classroom and a more engaging teaching style. The Citizen's Panel data suggests that this could be achieved in a number of ways such as attracting a higher calibre of staff through higher pay, reducing workloads and better training and support, with 54% of the Citizen's Panel highlighting the importance of supporting and valuing teachers (Q4).

Whereas the majority of the public and most other stakeholders viewed education personnel as teachers, with some reference to students, stakeholders in Whitehall, whilst supporting the general aspiration, widened the definition of educational personnel to include a wider range of adults including Teaching and Learning Assistants, parent volunteers and school support staff. The key aspiration across all of these groups was for a supported, effective and professional workforce.

Educational tools
The most frequently reoccurring terms that fell into this category were those concerning technology, ICT, computers and the internet. The context in which these terms feature ranged from the very positive, such as "new technology will facilitate communication between students and teachers" (Million Futures response) to some concerns such as "technology overload!" (As above). The theme of the creative use of technology was also mentioned, but less frequently. Emerging technologies (for example smart drugs, fabrication technologies) such as those highlighted in the Cross-challenge paper (Cliff, O'Malley and Taylor, 2008) were not mentioned.

Educational Institutions
The responses to the Million Futures site suggest aspiration for a shift from a formal large school building to small communities of learners, and in a few cases virtual classrooms. The physical environment was seen to be important: there was an opposition to large rooms with lots of desks and many students, instead there should be the freedom to move around, to have flexible hours, and to appreciate learning that happens outside the classroom. In a few cases the respondents were concerned with 'bureaucratic hoops' that needed to be jumped through and felt that the system would improve without so much central control. The other key area was the creation of a supportive environment for the students, without bullying, violence and where all are treated equally.

The Citizen's Panel supported this with a focus upon reducing class sizes (42% include this in question 4). Managers/professionals (51%), women (47%), younger people (50%) and parents (52%) feel most strongly about this. It is seen as less relevant by older people and men (both at 36%).

Key concerns for the future of education

The concerns for the future of education mirror, in many ways, the themes that are seen as aspirations for the future of education.

Communities and social breakdown
Across the stakeholder groups, a clear concern was for any potential social breakdown, particularly fears about crime, drugs, anti-social behaviour and a lack of morals. Indeed this was by far the most frequently mentioned fear for the future presented by the Citizen's Panel (in response to question 6). Within these responses 'young people' were criticised, specifically for not having enough respect and for a lack of motivation to take responsibility for their own lives. It is mainly older people, and especially those in the older age bracket of 65+ that responded in these terms. However, younger people are also worried about social breakdown, though the definition of it seems to vary widely. Some are concerned about racism, others mention consumerism and greed as potentially contributing to a socially fragmented future. A further concern is that society will become depersonalised due to a reliance on technology: this is discussed further in the section on digital identities (below), but also relates to concerns about the breakdown in communities.

A number of other potentially harmful community divides were highlighted by the Citizen's Council as areas expected to become exacerbated in light of the socio-technological change. The first between employees' experiences in their personal lives and their experiences at work (particularly in relation to the use of digital technologies), the second in the different experiences of older and younger people using technology. Both of these relate to a more general concern of the implications of digital technologies hindering interaction and understanding between increasingly diverse communities. These were noted as expecting to become intensified, particularly in relation to demographic change and technological development, in ways that may create fragmentation within and between communities. It was argued that organising learner cohorts by age would perpetuate this concern and investigating ways of integrating mixed-age and mixed-community groups would be important.

In relation to the concern of social breakdown, the Million Futures question 'What do you want your community to be like?' remained on the site for 314 days and received 120 comments in total. Respondents raised concerns about violent crime and other social problems such as drugs. Again, mirroring the aspiration for positive communities and community cohesion, the concern of fragmented communities was clearly highlighted across the stakeholder groups.

Inequality in education
A second concern that is mirrored by the aspirational themes is that of inequality in education provision and attainment. The concerns around inequalities were seen across educational provision and attainment with a particular concern for a lack of equality of access to digital technologies. This included issues of digital divides within countries and between countries, and included concerns for groups who do not wish to engage with technology at all. This concern was raised particularly by the industry and public stakeholders.

Similarly, social inequality in terms of education attainment and provision, employment opportunities and wealth distribution were all highlighted as key concerns by the Citizen's Panel (in response to question 6), and in particular by women and parents. The importance of the role of the education system in addressing such inequality was made apparent, both in formative education and also in learning across the lifecourse.

The Citizen's Panel presented a concern about too much pressure and reliance on access to welfare which could lead to a reduction, or even the removal, of benefits which are currently taken for granted (such as pensions, healthcare, free education, etc). This concern was seen to be exacerbated by trends towards an aging population, increased immigration or a combination of these.

Digital Identities and Young People

The changing nature of identity was seen as having the greatest implications for education and the work of the organisations represented by the Citizen's Council. In particular, changes to the way in which identity is formed and enacted through association, locality, ownership and networks. Particular concerns were brought to the fore about the relationship between the formation and enaction of identities in relation to the use of digital technologies, where digital technologies were seen as potentially depersonalising and challenging the traditional ways in which identities and community associations are formed.

Identity was seen in relation to a number of external elements that influence its formation: young people were seen to identify themselves in different ways simultaneously in relation to peer group, community, geography, and in relation to the ownership of technology. One concern raised by the Citizen's Council was of a specific lack of understanding of how changes to such external elements challenged the formation of identities, and whether future education provision could take into account such changes. For example, the implications of changes to the development of identity on a psychological and emotional level were raised as of particular concern to the Council, particularly in relation to the relationships young people develop as part of (a range of) communities. Similarly, involvement in new communities (for example online communities and social networks) that were seen to shape identity and relationships in new ways was an area that the Council highlighted as having potentially great implications for education and wider relationships.

In relation to the concern for social breakdown that may come about due to an increasingly diverse population; changes to the ways identity is formed amongst young people and the 'depersonalising' effects of technology emerged as a notable theme across the stakeholder groups. This is mirrored by the aspiration for greater community cohesion and Citizenship, and relates to issues of (inappropriate) behaviours and relationships.

Moral Values and Religion were themes that were consistently referred to by members of the Citizen's Council as areas that could potentially have great implications for society and education. (It should be noted that the make-up of the Council would make this perspective unsurprising). Ahesitancy in discussing basic beliefs within education was noted and that this raised problems with educating for cohesion and tolerance between communities.

The Citizen's Council further highlighted a number of areas where the relationship between changing notions of 'identity' and 'community' provided emerging challenges:

- social networking as changing the nature of community
- technology immersion as a characteristic of younger people

- contrast between in school/out-of-school practices and understanding of what constitutes 'community' to different ages
- decision makers not understanding young people's expectations, practices and identities within networked environments (in relation to 'real world' activities)
- gap between generations: technology as either bridging or widening that gap

Economic demands of education
A concern about economic hardship, in relation to international competition and a mismatch between education and the skills required for work was another key theme. Mirrored again by the aspirations for education, this is a concern about what jobs would be available for students as they leave formative education. Within discussions with industry of the potential challenges for education, economics was seen as a particular challenge: not only the economics of a school, but also national and global economic change as a phenomenon that had a profound effect upon education. This in particular was raised in light of the relationship of education to future economic competitiveness and the 'types' of jobs that young people were being prepared for.

Various contributors from the Citizen's Council stated that although there is a wish to develop autonomy and creativity within formative education, and that the personalisation agenda and Children's Plan are explicit in supporting this, the curriculum should reflect what the real opportunities will be within the workplace, rather than be premised upon, what was viewed as, an unlikely expectation that most jobs will be for 'knowledge workers'. A concern expressed by the Citizen's Council is that an education system out of step with economic reality would leave young people disillusioned and out of work and Britain lagging behind the rest of the world. It is likely that the strength of feeling about this has been influenced by the current economic climate. Industry workshops especially and also workshops with the Whitehall community support the importance of this aim of education.

Further, the Citizen's Panel highlighted that a major concern of the future is economic hardship. A lack of jobs and debt is a clear worry for the future, particularly amongst younger people in full time education and by older people in reference to their children/grandchildren. A concern was presented that Britain might be hard-pressed to compete in the global economy in the future and that the education system must play a role to prepare for, and mitigate against this.

Social interaction – process of education
The main concern highlighted across the stakeholder groups in regard to the processes of education was for the loss of social interaction that might come as a result of an increase in the use of digital technologies. This concern was expressed by industry stakeholders and members of public as potentially harmful, particularly to teacher-student relationships. The key concern identified was that with an increased focus upon the use of digital technologies, the support from, and personal relationships with teachers would become diminished. The public responses highlighted the importance of retaining social interactions between teachers and learners and for prioritising the pastoral role of teachers. Further concerns raised on the subject of teachers varied from concerns for a lack of respect and autonomy of teachers, to a concern for the poor quality of teaching and calibre of people training.

The Citizen's Panel provided a wide variety of concerns about future processes of education, some of which are contradictory. For example, some people were concerned that there will be too much emphasis on academic subjects, whereas others say they worry there will be not enough. There is general agreement that the continuation or worsening of perceived current problems such as disruptive behaviour, growing class sizes and quality of teaching staff will be future challenges as well as contemporary

ones. Behaviour problems and truancy were of particular concern to the Citizen's Council. Many people express the worry that disruptive behaviour and a lack of respect for teachers will undermine effective education for all, even for those who want to learn. A final concern was that there would be too much emphasis on exams. Although an improvement in standards is important, the Citizen's Council do not want the future to hold even more emphasis on testing children.

General issues arising relating to public and stakeholder views of technology and education

There are clear relationships between the aspirations and concerns for future education, as set out in this document. These central themes are not surprising or unexpected, and as such, this programme has been able to reaffirm some important persisting aims of education:the role of the education system in preparing a future workforce; in developing community cohesion, and in reducing inequality. These are persistent aims that are central to the current education system and are expected to remain. However, concerns have been raised as to how socio-technological trends, especially the use of digital technologies, may conflict with these aims. Trends that challenge some expectations (for example, trends suggesting improvement in distance-working) can also be seen as challenging deeply held beliefs about the central aims of education (the importance of face-to-face education). Providing opportunities to investigate how such persistent beliefs can hold within changing contexts is an important part of sharing educational futures.

The use of digital technologies in education remains a contested site of discussion, with a range of both positive and negative comments made about its role. Within the normative engagement approaches particularly stark contrasts were presented between acceptance and concern over the use of digital technologies for learning. The deliberative engagement approaches produced a narrower set of descriptions about the use of digital technologies, more often technologies being portrayed as useful for learning, although caveats were often applied. This would support further investigation of the ways in which new educational practices and tools are shared with education's stakeholders that allow stakeholders the opportunity to develop an informed opinion based upon a wider variety of information.

The 'Baby boomers', 'parents' and 'teachers' workshops run in Year 1 of this programme highlighted the importance of seeing education as more than preparation for employment. Analysis of the responses during Year 2 of the programme, however, overtly demonstrates an increase in demand for preparation for employment. The present economic climate may have played a particularly strong influence in this area of public opinion, and with that in mind it is important to be clear of the events shaping the external world to the research programme. Further, it supports the importance of continued engagement with the public, to recognise both the continuing and context-dependent beliefs about education.

Across all activities, there has been a good interest for involvement in conversations about the future of education. There was a good response from the participants invited and a willingness to continue to be involved in conversations about the future of education, despite a difficulty (observed and reported) in thinking critically about education futures. The use of current reference points (using terms such as 'schools' or 'teachers') for conversations about the future were a necessary feature of a shared language, yet were predicated upon assumptions of continuing definitions of such terms. Developing methods to support criticality in thinking about the future, especially in making explicit the assumptions made about the future was an important aspect of the deliberative engagement approaches.

Chapter 6: The scenarios: possible futures

The Scenario Architecture

The BCH scenarios are structured around:

1 A set of 3 potential future worlds that are produced at the intersection between a set of demographic, environmental and socio-technical trends and three potential future trajectories for social values (increasingly individualised, increasingly collective or increasingly contested). These three future worlds allowed us to challenge our assumptions about the values, institutions and structures within which education might be operating on a 20-30 year timescale.
2 Within each of these 3 worlds, we explore the different approaches to education that might develop in these different contexts depending upon the coherence and responsiveness of the education system's response.

This structure allowed us to acknowledge not only that there are different social and technological futures that might emerge, but that education systems and strategies might also act differently in these different environments. As discussed above, (see Chapter 3) the scenario architecture (the trends chosen to structure the scenarios) derives from an analysis of the BCH reviews and the engagement programme described in the preceding chapters. Before presenting the scenarios, this chapter provides an overview of these predetermined elements and variables.

The Pre-determined Elements

These elements are the constants that we elected to assume would remain the same in all future scenarios. Importantly, we selected these either to focus our attention on specific developments (such as socio-technical change) or to avoid distraction into areas outside our remit (the relative likelihood or otherwise of climate catastrophe). They represent settled assumptions that emerge from the challenge reviews and key concerns emerging from the public engagement programme, but they should still be read as assumptions rather than forecasts:

Element 1: Population Ageing
In all future scenarios we worked with the assumption of an ageing population in which we expect half the population of Western Europe to be aged over 50 by 2030, with a life expectancy of a further 40 years, 25% of the population to be aged over 65 and 15% to be aged over 75. We expect an ageing population in Asia and in Less Developed Countries. We do not expect inward migration to the UK to make a significant difference to this trend, even taking into account significant climate-related migration. This expectation does not factor in the potential for rise in radical longevity, nor does it attempt to account for the emergence of pandemic or other major disruptions.

We therefore expect a number of significant challenges to be faced in all future scenarios:

- Individuals and societies will be required to examine how consumption and resources are allocated at different stages of the life-course, including the stages of investment in education and learning
- Individual life-courses may change as a consequence of longevity with individuals rethinking how they balance education, leisure and work
- Exchange of resources between generations may change, with income, care and support being passed down as well as up through the generations

- Governments, individuals and employers will need to consider how to organise work to retain older workers, and to enable parental integration into the workforce

Element 2: Climate Warming and Energy Issues

The UK is currently subject to deeply conflicting policies on climate change. It is not the remit of this programme to attempt to ascertain whether the UK, and indeed the world as a whole, will succeed in mitigating all impacts of climate warming. However, we do not believe it is appropriate to produce scenarios that discount the potential implications of high levels of greenhouse gases altogether, as to do so is to risk accusations of overlooking one of the major driving forces of the 21st century as recognised in the majority of futures research (NIC, 2008; Shell, 2007).

As such, we have elected to work with a scenario that is predicated simply upon the effects generated by the levels of greenhouse gases already in the earth's atmosphere and secondary effects already in train (Unicef, 2007/ IPCC 2007). This assumes a global temperature rise of 2-3° C. This does not take into account more recent projections of a significantly faster rise in warming reported over the last year, and the expectation that even the most ambitious plans to reduce emissions will lead to a global temperature rise of 3°C.

We expect a number of significant challenges as a result of this global increase in temperature in all future scenarios:

- Increased frequency and intensity of extreme and hazardous weather events, including storms, forest fires, droughts, flooding (Unicef, 2008)
- Complex effects upon global food supply; decreasing water availability and increasing drought at mid, semi and low latitudes – this exacerbated by increasing global demand for resources (Unicef, 2008; NIC 2008)
- Increased conflict arising from conflict over natural resources, in particular over water (Global Policy Forum, 2007)
- Brunt of climate change impact will be born by the world's poorest countries, in particular Northern and Sub Saharan Africa and most vulnerable people, in particular children – likely implications include increase in mortality, reduction in attendance at schools, increases in poverty and in inequalities and malnutrition (Unicef, 2008; NIC, 2008)
- There is a likelihood of significant increases in refugees, approx 200m climate refugees predicted by 2050 (Unicef, 2008; Stern Report 2007)
- Cuts in global per capita consumption (Stern, 2007)
- Fears of environmental crisis high amongst young people , believing it presents greatest threat to world's future (DCSF, 2005)

These will pose a number of subsequent challenges to public services and current social organisation:

- Climate warming is likely to reduce the capacity of Less Developed Countries to invest in human capital.
- Public services will need to adapt to population changes, including refugees from unproductive or unsustainable regions outside the UK and changes resulting from a more mobile internal population
- Public services infrastructure will need to be adapted to cope with extreme weather events.
- The workplace may change, with existing practices having to be adapted to respond to climate warming, and with the development of new industries

This pre-determined element is also likely to have implications for energy demand and supply, which has subsequent potential implications for socio-technical development. It is not the aim of this programme to attempt to determine the extent to which future UK societies will have made the transition to low-carbon energy systems, or have responded to peak oil scenarios, or the various mechanisms by which this might be achieved. Nor is it the aim of this programme to describe the potential design of an education system in a low energy environment. Our remit is specifically to examine how socio-technical change and education might interact. As such, we are assuming in these scenarios that energy supply is maintained at current levels, although the means by which this consistency of supply is achieved (whether through scientific or geo-political means) is presently unclear and the preparation of scenarios to explore this issue in education would be an appropriate further activity.

Socio-technical developments

As discussed above, we do not believe that 'technological developments' happen in a vacuum and can have causal effects independent of social and cultural contexts. However, we do believe that current socio-technical developments, in which social actors are working to exploit the affordances of technical and scientific developments, create a set of trends that we expect to act upon any of the future scenarios:

- We will witness an increased expectation of high levels of detailed information about all elements of the world. A number of different technical and scientific developments support this, along with the increase in demands for both accountability and security. The rise of storage capacity and reduction in price, combined with the development of genomic and bio-scientific data, and the capacity to digitally tag artefacts, are likely to push towards the capacity to simply 'know more stuff about more stuff'. In other words, we will be able to gather, store and examine data about ourselves and our world, in much greater quantities than ever before. In so saying, we are not making any comments about our capacity to use and interrogate such increased quantities of information.
- People will get better at working together at a distance, as a range of technological developments combined with the evolution of social practices will make it easier to support such interactions. Trends towards distributed families will encourage the development of new ideas of 'presence' and 'intimacy' mediated by new technologies. This should not be read as a prediction about 'video conferencing' or 'immersive' reality, but as a broad movement toward a change in custom and practice supported by a range of potentially simple or complex tools which encourage collaboration at a distance. Such practices are likely to further facilitate the capacity of business to operate across local, regional and national boundaries.
- There will be increased expectations of the capacity to connect to a network, and consequently, of the ability to connect to knowledge, resources, people and tools; these expectations increase the likelihood of more porous boundaries between different sites of working and learning, and between working and personal life.
- We will see a move towards personal technologies and decentralisation of technology systems, seeing technological infrastructures being organised around the individual rather than the institution. This will be supported by increasingly mobile tools and by a rise in the ease of data storage reducing the role of the institution as centralised information manager.
- People will become increasingly accustomed to machines taking on more roles previously occupied by humans, and there will be movements to devolve more and more responsibility to machines and computing systems – with concomitant opportunities and threats. The implications of this for employment patterns and

individual autonomy in the workplace will be structured by the existing socio-cultural contexts of different economies and cultures.
- Location and geography will become increasingly important in terms of constraints and opportunities on virtual interactions – they will impact on levels of technological systems accessible, on governance and regulatory issues, and on the ways in which virtual and physical information is merged.
- There will continue to be demand for neuroscience, bioscience and computer science to lead to 'silver bullet' breakthroughs in education, it will continue to be difficult for these sciences to provide simple and universal 'solutions' which can be easily translated to educational settings.
- Drugs that enhance cognitive functioning for limited periods of time will continue to be available, potentially unregulated and operating outside the guidance of the scientific community.
- Socio-technical developments, such as those above, will continue to support the capacity of businesses to operate across national boundaries, and may be further exploited to reduce costs and increase 'efficiencies'.

A note on Economic Circumstances
At the time of commissioning the reviews, the Expert Advisory Group did not prioritise focusing attention upon the likelihood of major global economic meltdown. As such, we did not commission evidence that would enable us to build a set of predetermined elements to structure the scenarios in terms of economic factors. Given the current circumstances, however, our response to the current economic context in our design of the future scenarios was :

- To avoid assuming a single inevitable trajectory for economic development
- To envisage significant demands on public resources over the coming years – assuming that there would not be a new 'windfall' providing new resources for the public funds
- To recognize that any future 2025 will arise from a present 2009 which is characterised by deep socio-economic and socio-cultural inequalities, and that the current economic crisis is likely to exacerbate rather than reduce these inequalities.
- To recognize that social responses to economic crises or opportunities will be shaped by the dominant cultural and social values in operation at any given time

The Social Values Variable

As discussed above, the 3 'world' scenarios are structured around the intersection between the pre-determined elements and the different potential trajectories of a single variable: social values. The following provides a discussion of these different trajectories and the evidence emerging from the challenges that supports these potential directions.

Social Values 1: A world of increasingly 'individualised' social values
This world sees a concerted shift in social values to an increasingly individualised and atomised model of society and identity, in which the management of social risks and opportunities is seen as the responsibility/ privilege of the individual or family rather than a wider collective social organisation such as 'state' or 'community' or 'public'. Central to this world is the concept of independence. The following factors may be considered as plausible drivers for this shift in values:

- Developments in digital and media technologies allow individuals to 'wrap' their media and cultural experiences around personal interests and to engage electively with others with shared interests or experiences.

- Public services offer increasingly 'personalised' services tailored to meet individual needs and provide structural opportunities for individuals to 'top-up' state provision.
- Anxieties over the state of public finances lead increasing numbers to develop personal insurance and reduce their expectations of state support for education and health
- Developments in genetics and biosciences increasingly offer opportunities to tailor medical and other interventions to individual circumstances
- Significant competition for employment amongst workers in the UK and globally leads to increased incentives for personal investment in development, networks and training
- Identity boundaries - gender, cohort, generation, age, race, ability, health, capacity – continue to blur – and opportunities to move between and explore different identities in online interactions increases
- A global elite of highly skilled individuals with high levels of mobility and currency in the international labour market develops alongside increasingly standardised knowledge work for other workers
- Changing patterns of migration challenge conventional notions of 'national identity' and 'national citizenship' as individuals move between countries more rapidly and for shorter periods of time at all stages of the life-course.
- Responsibility for children and young people is increasingly 'privatised' to the family and known caregivers and away from a collective generational responsibility as a result of anxieties over child protection and abuse issues.
- Rises in obesity and uncertainty over its causality introduces the increasing possibility of the consideration of 'personal responsibility' in exchange for 'rights' to access to public services
- A diversification of providers of public services enables individuals to choose to 'consume' such services in increasingly diverse ways – including in new settings and institutional arrangements
- Increasingly aggressive legal constraints are placed on the circulation of knowledge and intellectual property and commercial knowledge is highly protected
- Distrust in centralised management of information systems and data leads individuals to increasingly protect personal data and knowledge and mistrust of external parties handling of such personal information
- There is reduced confidence in the capacity of governments, industry or community to tackle major social, environmental or economic problems, and a concomitant increase in the assumption that individuals will need to fend for and respond to these themselves

Social Values 2: A world of increasingly 'communal' social values

This world sees a concerted shift in social values to an increasingly communal model of society and identity, in which the management of social risks and opportunities is seen to be shared and distributed amongst wider social groups, rather than the right or responsibility of the individual. Central to this world is the concept of interdependence in which individual autonomy is not considered either attractive or achievable. The following factors may be considered as plausible drivers for this shift in values:

- The development of biotechnologies, personalised devices and networked technologies begins to erode the idea of a separate 'sovereign' identity and starts to normalise assumptions of connectivity to people, places and information.
- Major economic, environmental and social challenges are seen to be so significant that they cannot be addressed by individuals or communities alone, instead national and international collaboration is seen to be required.

- Individual actions and choices are seen as increasingly having wider effects beyond the person – whether in public service choices or in environmental impact.
- The capacity to share knowledge and to develop new modes of collaborative knowledge production and circulation has increased significantly as a result of web technologies.
- Developments in digital and media technologies allow individuals to access information and networks that are free of immediate local geography, family culture or personal identity – new relationships, identities and collaborations can be formed across difference social and cultural groupings
- Demands for high levels of innovation in order to achieve competitive advantage encourages investment in the 'knowledge triangle' (encouraging collaboration between different sectors) and in new collaborative processes of knowledge production, circulation and development
- Anxieties over social division and inter-cultural conflict lead to increased emphasis upon active production of citizenship and collective identities
- Voluntary work is a part of most people's lives, and increasing numbers of younger workers are reporting that they 'work to live' rather than live to work
- Post the economic turmoil of 2007-2009, co-operative and collective models are seen to offer plausible alternative approaches to social and economic organisation.
- A need to ensure women and older workers participate in the workplace increases flexible working strategies to facilitate caring responsibilities for families and employers increasingly play a role in this provision
- A diversification of providers of public services allows the rise of local, community focused provision tied closely into the needs of local communities
- The development of cheap storage of data and information enables individuals to collectively hold, archive, search and produce stores of information in common for a wide range of different purposes

Social Values 3: Communal and Individual Values in Tension
Worlds 1 and 2 are premised upon the assumption of a concerted shift in social values, in which a broad paradigm shift is achieved in assumptions about how the world works, what values we should promote, and how 'identity' is constituted. In these worlds, 'common sense' has been successfully shaped in one or other direction – either towards assumptions of an 'individual/independent' solution, or a 'communal/interdependent solution'. This 'common sense' acts as a shared resource upon which individuals and groups can easily draw when confronted by uncertainty or novel situations and it acts to dictate all areas of social, cultural and economic life. World 3 is different in that a single set of social values has not achieved prominence. Instead, in different settings and for different groups an 'individualised' or 'collectivised' approach is prioritized. All of the above factors are in evidence and they point to a more uncertain, messier future in which notions of 'individuality' and 'community' are contested, negotiated and challenged.

The Education System Variable

A persistent uncertainty throughout the BCH reviews in attempting to explore potential future trajectories for education has been the uncertainty relating to the capacity of the UK education system to adapt to or influence socio-technical change. This one factor, more than any others, is seen as likely to determine the shape of the future education system. Historical reviews, contemporary studies and future projections have all identified the capacity of education systems to actively resist socio-technical change and to reproduce existing practices, as well as their capacity for significant change in the light of policy initiatives. There is a common expectation amongst reviewers that the

speed and scale of change of the education system is likely to have significant socio-economic and socio-cultural implications for the shape of future worlds. As such, the second variable around which the scenarios are constructed is the variable relating to the speed and coherence of response of the education system to change.

In each of the three worlds created by the intersection of social values with trends in demography, climate warming and socio-technical change, we therefore have explored the different potential responses that might be made by education systems. We have focused on exploring a range of different elements of potential responses: the speed of change (not necessarily assuming that speed is a desirable attribute), the scale and coherence of change (recognizing that education systems are comprised of a diverse range of social actors and institutions and that just as coherence might be desirable for some futures, so might diversity of provision be desirable in others), the capacity of the system to respond to the social risks and inequalities produced by different social futures and the extent to which such systems might focus on developing skills and attributes to feed into or to challenge the future social worlds that we describe.

As such, the 6 future education systems described are widely diverse, offering different models of future response to socio-technical change without being constrained to one set of assumptions about the trajectory of responses.

The Scenarios

Richard Sandford, Futurelab & Helen Beetham, JISC

Scenario 1: Trust yourself

Changing work and housing patterns have led to an increase in mobility as people relocate to regions far away from their established communities and social groups, shrinking their horizons to encompass only themselves and their immediate family group. People have been forced to look to themselves for support, rather than relying on any wider social structure, and have become more used to existing independently of others. At the same time, pressure on resources - principally water and energy - and the measures put in place to mitigate the effects of climate warming have constrained people's lives, and led to an increased sense among society that it is better to live within one's means than to be any kind of burden. Taking responsibility for oneself is the preferred response to these pressures, rather than looking to wider society or the government for help or solutions. A new mood of self-reliance has arisen, and with it the conviction that everyone has the right to live their life in the way they want, provided they don't impinge on anyone else trying to do the same thing.

This affects people's notion of citizenship and what it means to be a member of society. Rather than being based on an idea of what individuals might contribute to society, today citizenship is instead centred on an appreciation of what individuals do not take from society. Being a good citizen primarily requires the individual to ask for as little as possible, and to be as self-sufficient as they can be: being a burden on anyone, state or family, is irresponsible and regarded poorly. Individuals should take responsibility for themselves and be able to exist without needing support or impacting negatively on other people. They are stewards, maintaining their particular part of the planet in a way that doesn't interfere with anyone else.

One result of this newfound sense of independence is that the state is expected to do less. It does not play a part in people's everyday lives to any great extent, except insofar as it creates and maintains the conditions for the exercise of their individual liberty. The primary responsibility of the state is to maintain public order and the rule of law, and to provide national defences against the threat of force from other states. It has a mediating role, regulating when necessary (and not before) in cases of conflicting interests or potential monopolies: it has also an administrative role, in that it provides the mechanisms to regulate these interests, though this is a mechanism of last resort given the reluctance of government to be perceived as intervening on a large scale.

Discharging even these few responsibilities is difficult. New social attitudes and modifications to voting systems have led to a greater number of smaller political parties and a larger number of different interests represented at a national level, making it complicated for the state to act in a concerted or agile manner. As a result, citizens need to take much more responsibility for their own well-being. The provision of goods and service is largely privatised, with minimal state support for those without resources and no political support for anything that looks like a handout. Private organisations may support or sponsor local amenities: however, this support is transient and conditional on companies' other interests, and in general it is up to individuals to ensure their own welfare from their own resources and taking preventative measures such as maintaining health and wellbeing through regular exercise and good diet.

For the majority of people, this is in keeping with their principles of self-reliance. The principle of being able to "opt in" to schemes and groups, rather than being under any obligation to sign up to anything, is fiercely adhered to, even to the extent that language

around memberships that are in all practical lights compulsory is framed in terms of voluntary association. When it is necessary to work with other people towards a common aim, organisations and associations come together out of self-interest, with strictly limited charters. Individuals are part of these groups for only minimal periods, working in effect to remove the need for the group's existence.

The only group to which this transient attitude does not apply is the family. The family unit in this world is central, being in effect the first and last resort outside the individual. Family members provide support for each other across generations - parents helping children with access to education or a deposit for a house, children organising care for older parents - in the understanding that if these responsibilities are not exercised then the alternatives may be beyond the resources of many. Societal responsibilities in particular belong to the family, rather than the state or other organisations: they are accountable for the behaviour of children before the age of majority, with penalties for anti-social behaviour falling on family members and debts or other obligations left unfulfilled becoming the responsibility of other family members.

The composition of the family unit is more varied than in the early years of the century. Mothers are frequently older, with the consequence in some cases that they are actively contributing to childcare for less time. Traditional child-rearing (and bearing) roles, however, have expanded, with child-care responsibilities spread across genders and ages: this is a reflection of greater numbers of people choosing to exercise their individual right to construct their own family groups outside limiting notions of the "nuclear family". Family units constituted around same-sex couples are increasing, as are diverse forms of parenthood (surrogacy, donation, adoption and so on).

These ties and responsibilities are the site of a key tension in this world, centred around the obligations between parents and children. On the one hand, families can act as a valuable source of support in the face of a highly individualistic society. On the other, the strong sense of personal identity current amongst individuals mitigates against their choosing to accept these obligations. Some place greater emphasis on "kinship" ties and the obligations that flow between them, with a broadening of the notion of "kinship" to include notions of fostering and adoption, patronage or warding. Others feel less obligation to acknowledge kinship ties that reduce their mobility and impinge on their ability to follow opportunities. The first option tends to be preferred within groups lacking resources and capital of various sorts, amongst older people and parents, while the second option is frequently preferred by offspring who are currently adequately resourced, or by poorer immigrant groups who resent supporting a population of older strangers.

Families are also an important site for informal economies - not just childcare or working in the family firm, but places where members can participate in exchanges of labour or offer support for entrepreneurial activities, making use of resources that are hard to come by in the wider world. One example of this kind of support is the family data vault: cloud computing is perceived as risky and counter to notions of self-sufficiency and personal responsibility, and consequently some family groups have invested in secure data storage and management located within the home.

The family is the source of the "family curriculum", addressing long-term values and attitudes towards society and the self that aren't the direct concern or interest of any other group (for example, sex and relationship education). This informal curriculum varies a great deal between family groups. The family is also a site of play and exploration, valued as fostering the sorts of behaviours and habits that support self-reliance and independence. Board games and other formal rule-based games are used to support group play, reinforcing the idea that co-operation can only come about when

mediated by rules and strict processes, but more free and open-ended play and exploration are valued in children as demonstrating independence, autonomy and a spirit of enquiry. There is an expectation that children should be able to amuse themselves. This is supported by a general tendency towards "free range" parenting, with children afforded greater autonomy and mobility. A general feature of this world is that children are more readily viewed as individuals, and consequently afforded greater autonomy and independence, though perhaps at times they might appreciate more support or nurturing.

Play is important. However, work is more central to many aspects of life in this world, with many elements of society previously addressed by the public sector moving to the workplace. Many formerly public services are now the responsibility of the individual. There is a straightforward imperative to earn money and maintain savings in order to live a mainstream or conventional life. Consequently, being in employment of some kind, or at least ensuring some form of income, is a vital pre-requisite for existence.

Individual qualifications and accreditation are vital to gaining employment: for those that lack appropriate qualifications, employers increasingly accept the chance to examine an individual's personal life stream, comprised of data aggregated throughout their encounters with other employers, contact with medical and educational institutions, and other personal data that may be relevant to a potential employer. In theory, an individual has as much right to reveal this sort of data as they have to keep it private, though there are concerns that those without qualifications are more likely to be forced to allow employers to assess their character and personal history than others, with all the room for discrimination and hypocrisy that entails. However, employers can't deny people their opportunity to work on the basis of religion, gender or other personal attributes. Equal opportunity in general is protected, in keeping with the dominant idea that everybody has the right to try to succeed. Employment law has taken this on, together with many other of the unions' historic concerns.

Employers are no longer prepared to invest in education "for the common good", and instead reserve their taxes for delivery of skills and educational training to meet their particular needs. Training and development thereby become a contractual relationship between individual and employer - there is a sense of an exchange between the two - and are offered in exchange for commitment and loyalty, two qualities that do not otherwise come naturally to people. The new awareness within industry and corporate organisations that they must take responsibility for ensuring the skills they need to exist within the workforce has seen the notion of lifelong learning embraced more fully than in previous decades: indeed, the understanding that the skills for a particular role will be learnt within that role is sufficiently widespread that the term "lifelong learning" is little-used, though it retains its remedial sense when it is. Education in early life, from family and the state, has supported the development within individuals of general learning skills - it is the responsibility of industry to support the development of specific workplace skills, both technical or vocational skills and more general management and interpersonal abilities.

Working for an employer is not the only way to earn money, of course, and in a world so concerned with independence there is plenty of support for self-employment, at least in terms of advice and de-regulation: loans and capital are still difficult. Sites of innovation and entrepreneurship are highly visible, and since most universities ceased to be public institutions, they in particular act as incubators for bringing new products and ideas to the market. The rhetoric of "being your own boss" has diffused throughout the workplace, with a majority of people in the workforce feeling that they are in charge of their work choices, mixing and matching their occupations and acquisition of new skills to suit their life choices. For those who would traditionally have been freelance

consultants, this is little different; for those lower down the pay scale, the return for being able to talk about their career in such independent terms is often longer hours. The idea of "portfolio working" for many people is frequently less a selection of part-time activities that add up to full-time employment than it is a selection of full-time jobs. A culture of hard work and self-reliance can conceal overwork and economic hardship.

There is increased activity within informal economies, a reflection of people's reluctance to involve the state in their lives and a determination to live life on their own terms, not mainstream corporate society's terms. Not everyone depends on money to support their chosen lifestyle, with many subsisting on a combination of personal labour and exchanges of skills with others. Some support themselves or supplement their primary income by participating in the flourishing creative economy. This is a liberal society founded on values that support and encourage self-expression, and the creative arts flourish accordingly. However, the lack of state support for the arts, and the collapse of traditional media business models have created a climate where artists and creators have a very different relationship with their audiences and the commercial world. Many different business models exist. Sponsorship of artists by individual brands is common and has led to a new form of the patronage once enjoyed by classical composers. For others, their art is subsidised by other elements of their work portfolio, or supported through directly engaging with a hard core of their audience at a grass roots level. Their audiences engage with them in a landscape defined by the death of analogue television and the reduced role of public service broadcasting. The BBC brand still exists, as a subscription channel and as a content reseller repurposing its archives, but the notion of a national broadcasting effort intended to "educate, inform and entertain" supported through public subscription has vanished. The media landscape is more fragmented, with dissemination channels specialising in particular themes and interests.

This move away from homogeneity is evident in people's consumer choices as well. Shops and products that appear clearly differentiated from generic, national chains and offer consumers something that feels unique are successful. There is an increasing tendency for those who are able to produce their own food, mend rather than replace their clothes and to carry out repairs to property and belongings themselves: this DIY culture reflects the importance of self-reliance. Individuals are producers as much as they are consumers, turning what might in earlier days have been thought of as hobbies and leisure pursuits into something closer to work. Not all free time is spent in digital cottage industries: leisure is often as much for retreat from a tiring and often bruising world. Solitary sports and pursuits are valued, such as climbing or running, and outdoor pursuits are popular, both for the opportunities they present for individual mastery and the conquering of nature and for the personal value of experiencing the sublime.

Education

Goals and outcomes

The underlying and fundamental question for education is "who am I?" - education is a means of supporting an ongoing and continual process of becoming for the individual. The aim for all learners in this world is to resource themselves at all levels, from basic survival to self-actualisation. Learning is a route to ensuring individual security through self-reliance, providing oneself with the skills and dispositions necessary to exist and adapt with minimal recourse to support from others. Learners are offering more choices to their future selves. For some, this manifests itself in the pursuit of basic skills and functional abilities in practical disciplines: for others, their educational efforts are focussed more explicitly on the construction of the self in a process of flourishing and becoming.

While these general points are reckoned to underpin all education, in reality there are three different and sometimes competing groups with a stake in education - the state, employers and the family. The state needs to ensure a minimal level of education in order to socialise people effectively, and provides this for early years and primary learners. The priority is to make sure that people have bought into the values and beliefs that underpin society, rather than to provide learners with any particular sets of skills.

Employers take responsibility for ensuring that the skills they need exist in the workforce, developing skills directly suited to the workplace, either through sponsoring further education institutions or providing opportunities within their organisations (this has replaced what used to be thought of as vocational training). One feature of this approach is that it has led to the creation of a vastly expanded market for "training wheels" courses and fast-track, modular offerings from educational institutions, in order to support gaps within learners' experiences and to provide the kind of flexibility demanded of them by learners shaping their own learning histories.

The family group is the only one of the three directly concerned with the long-term interests of the learner. As well as helping to guide individual family members through the education system in a way that results in the most useful qualifications and routes of access to employment, families are expected to foster moral values, coping and emotional skills and useful habits of mind, such as focus and discipline.

There is great emphasis on offering learners choice, and as a consequence there is huge diversity amongst educational providers. Market competition has led to the creation of more specialist institutions of higher and further learning, often funded entirely by consortia of industry partners and located within business premises. Outside the mainstream of work-related provision, there are many alternative pedagogic approaches, some based on historic educational efforts such as Steiner and Montessori schools, others based on pseudo-scientific approaches towards learning, still others intended to further ideological or cultural agendas.

These features and goals of education are shaped by the nature of the society described above. Below, we present two different possibilities for education in this world. In one, the values of the world and the characteristics outlined above have led to an education system capable of sustaining itself and wider society in that form. In the other, these values and features have given rise to an education system that is unsustainable and must eventually lead to change.

Informed choice

The state has gradually reduced its role in many areas of public life, including education, in keeping with the widespread appetite for minimising government. This leisurely pace of withdrawal has ensured that the many different providers of education have had time to evolve a system of education that is able to accommodate their diverse requirements. Industry, mainstream education providers, universities and sites of further education, families and learners themselves have been able to work together and let a patchwork learning landscape emerge: all these stakeholders have recognised that it is in their own interests to ensure that lines of communication and representation exist that allow them to work towards their own ends in awareness of other groups' activity. In particular, the hearts and minds of industry and the commercial sector have been won by the argument that training the workforce for the short term is ultimately a short-sighted approach, and that they are well-placed to foster the development of longer-term workplace skills, such as those that support good management practice or interpersonal relationships. This has been a slow and cautious process, much like the process of switching from analogue to digital television in the early part of the century, but one that has given people time to

adapt and an opportunity to respond, resulting in a system well-placed to integrate different and potentially conflicting needs. Crucially, this system is able to recognise the equivalences between different experiences that are needed for different life careers to be equally valued: this interoperability is necessary if people are able to move between different spaces within this patchwork.

Establishing such a system of mutual independence has been made possible through a common understanding of education as a long-term process, one centred on the learner's history and experience. Learning is seen as a process that looks forward and looks back along a journey lasting the length of the lifecourse. Running throughout all areas of education and underlying the majority of learning encounters is a pedagogy of recognition and acknowledgement: the central questions for educators are "What does the learner bring? Where have they been?" An individual's personal history and context are recognised as providing essential context for their learning experiences. This approach is one that lends itself easily to supporting what used to be called "lifelong learning", in that these questions can be as easily asked of a teenager as they can be of their grandparents. Indeed, it's understood that richer and deeper learning experiences are often enjoyed by older people who have amassed more experience that can be brought to bear on their education.

The locus of activity and agency is the individual, and it is their responsibility to direct their own personal learning journey, choosing areas of interest, identifying new directions and disciplines, selecting the most appropriate forum for addressing their particular learning need. However, in this they are supported by mentors from their learning institutions, their place of work or other communities who value apprenticing or other means of inducting learners into their communities of practice. These mentors are at the heart of the decision-making process, ensuring that the choices made by the learner are right for them, advising them on the educational offerings that might be available to them and encouraging them to consider their future goals and see their learning choices as part of a coherent educational trajectory. The emphasis on recognising learners' personal and educational histories presents risks for those who might be limited or constrained by their learning careers to date - mentors have a role to play in ensuring that this isn't the case.

Paying for mentorship, whether as part of a school or as a private tutor, is a burden that falls on the family group. They have an additional role to play in delivering the "family curriculum", using available resources and capital: this is often simply an informal commitment to passing on values and attitudes that the family and wider community feel would be beneficial to individual learners, often expressed in an emphasis on the "educational" benefit of certain activities. Families have always done this to some extent - the difference today is that these activities are much more frequent and the learning aims more explicit, reflecting both the greater educational burden placed on the family unit and the greater depth to which learning is embedded in areas of life outside formal education. Learning is not necessarily a replication of parents' ideas of classroom learning, however: there is a great emphasis on play and its relationship with learning, at all ages, with particular emphasis on play's capacity for encouraging autonomous behaviour and independent exploration.

Children especially are expected to be able to amuse themselves and to have experienced boredom at some point. This is not purely to support the development of independent thought, but also a reflection of the way children are thought of. Childhood is a state frequently idolised as a time of innocence and freedom from responsibility; however, placing anything on a pedestal is a way of avoiding engaging with it, and children are often placed in the position of taking responsibility for their own lives earlier than they might want.

Whatever the specific context of a particular learning experience, such an emphasis on a single lifelong learning journey means that outcomes of education are evaluated in the context of the learner's previous and subsequent learning experiences. Was it a natural progression from their previous learning experiences? Does it support their next step? Assessment is an iterative process, embedded in learning activities and providing a picture of the development of the learner over time, using the opportunities for recording, organising and presenting personal data offered by new technology.

Independent consumers
Here, political expediency and public appetites for action have supported a rapid and concerted reconfiguration of the educational system by the state, changing state provision of education radically. Building on the early 21st century commitment to personalisation and choice, supported by the widespread belief in new models of education, the state has taken a much smaller role in delivery of education, making transparent many of the relationships and processes that were already in place in the early part of the century.

There has been a move away from a national curriculum, assessment and inspection as a result of a rhetoric of freedom that encouraged teachers, schools and wider society to see the government as removing obstacles to "doing what you do best" and enabling them to set their own curricula and targets. The emphasis has been on the efficient use of public money, "tough medicine" and "cutting out the rotten wood". The speed with which this reconfiguration has been accomplished has left little time for avoiding collateral damage. In particular, the educational landscape encountered after minimal state schooling is fragmented and incoherent: the changes may have been the result of an ideological push, but there is no unifying ideology to bring the diverse providers of education together in a common understanding of the goals of education. This results in a widespread conception of education as a short-term process, in which the locus of agency and responsibility for identifying areas of educational engagement rests entirely with the individual, who is thought of not as a point on a lifelong journey but as a bundle of present needs and requirements.

Teachers as mentors still exist, but their role is broadly to help learners to find their own direction and to take responsibility for making their educational choices themselves, rather than to address wider issues of personal development or to equip them to evaluate their learning choices in the context of their educational career and future goals. A pedagogy of enquiry supposedly underlies this approach, in which learners are encouraged to ask themselves, "What do I need to learn? What am I interested in?" However, mentors frequently direct their efforts towards simply training learners to address only their short-term, immediate needs, looking for specific learning opportunities to overcome particular barriers, rather than fostering long-term dispositions or attitudes. The learner is the true motive force behind learning, and those who lack personal drive or motivation suffer.

One source of this drive and motivation is the family. The family group has become vital in providing support for learners, now that so much responsibility for their own progress has been devolved to them: not only do they help learners find motivation, but they also help learners to set their own learning directions, demand accountability and value for money from learning institutions, ensure funds exist to support access to learning activities and make sure that learners have time and space to work through their courses undisturbed. There is often less time available for play, or any activity that seems frivolous: the focus is on collecting qualifications. Learning is valorised as the pathway to success, with more time spent acquiring accreditation being equated to more

success in life, and a direct relationship imagined between passing exams and having better jobs.

The focus on the acquisition of accreditation has led to the separation of the process of evaluation from the learning processes that prepare learners for evaluation. Companies and institutions offer examinations and evaluation activities as standalone products, based on standardised pedagogies and curricula that enable learners to put their own learning plans together by combining off-the-shelf packaged learning activities according to their perceived learning needs, before taking the final exam at their convenience (or when they can afford it). Bright learners or ones prepared to gamble might choose to prepare minimally for these standardised tests: well-resourced or more cautious learners might choose to invest more. Major employers and multinational companies prefer learners and employees to choose their own learning activities: this ensures standardisation of skills across the workforce, as well as a ready market for their course materials. For learners, using a recognised company's learning materials provides reassurance, not just that the skills addressed are relevant to the company, but that they can expect a certain level of quality. Trusted brands have an advantage in a crowded and diverse marketplace.

Scenario 2: Only connect

Widespread awareness and recognition of the increased pressure on natural resources such as water, clean air and productive land has led to a change in the way mainstream society talks about them, with most people now thinking of them as finite common goods shared by all. Having such concrete examples of common goods, coupled with a wave of industry nationalisations in the early part of the 21st Century, has supported a renewed sense of the public sphere and a reinvigorated civil society. Central to the evolution and maintenance of this newly strengthened social space are the various network technologies supporting communication between people. Not only do they facilitate on a practical level the exchanges and conversations that constitute this new civil society, but the rhetoric of the early "world-wide web" established a discourse of egalitarian collaboration and democratic activism that was able to take root in the reconfigured post-recession social landscape.

This web-inspired remoulding of civil society differs from traditional formulations in a number of important regards. Developments in network and communications technology have lessened the need for social action to take place within formal organisations and groups - people are able to speak, act and mobilise others more fluidly and responsively without necessarily needing the support of a particular organisational structure. Following this, there is less of an expectation that groups will achieve particular aims in isolation. At the same time, the complexity of the problems facing society in the 2010s and 2020s are such that interdisciplinary and cross-sectoral working is increasingly seen as the only way to generate new and appropriate strategies for change. Working within disciplines or sectors, or restricting your resources only to people within your immediate vicinity or workplace, is increasingly seen as an old-fashioned and unproductive way to do business. As a result, public action is seen as achievable only through the interdependent action of individuals working across diverse settings.

This requires a certain conception of citizenship within wider society. People have begun to consider themselves and each other as custodians, sharing a responsibility towards keeping the public space - environment, governance, infrastructure - healthy and resilient, through demanding and monitoring accountability from their local and national representatives, participating in democratic processes, and, most importantly,

recognizing the importance of taking action themselves. This is not as taxing as it sounds: no single individual is expected to make a difference on their own (though there are a few remarkable people who do). Instead, aims are achieved through the cumulative effect of many small contributions - ten minutes asking for signatures online from one person, a few pounds towards a charity's administrative costs from another. There is an expectation that any task be shared, whether by a few people addressing a local issue or a federation of national charities: any positive action is understood to be the result of lots of people working together, with any credit and recognition derived from this collective action being spread around the group rather than accruing to any particular individual. The important thing is to do your bit, however small it might be, rather than seek recognition for your efforts.

Leaving recognition to the group, rather than claiming it as an individual, might have been seen as unreasonably selfless only a couple of decades ago at the start of the 21st century. Similarly, shouldering the burden of personal responsibility for real action, rather than imagining the responsibility to be someone else's, might have been seen as impossibly worthy. However, both of these are made possible through the redefinition of individual identity that has taken place over the preceding years that makes the idea of a discrete and separate identity harder to sustain. For example, as people got more used to computers and networks taking on tasks (such as managing contacts or remembering information) that they would previously have done, as hundreds or thousands of people were seen to be involved in the production of everything from material objects to computer programmes, as individuals became used to being connected to friends, family, workplaces and communities wherever they were, so the idea of the 'separate' individual became harder to sustain. A person's thinking and actions were seen to be intimately tied up with machines and other people.

People are still individuals, of course, with their own names and needs and idiosyncrasies: the difference is that everyone understands how impossible it is to assign recognition for particular individual achievements when they depend so much on other people's ideas and actions. This notion of interdependence runs deep throughout society, meaning that people have more of a sense that they benefit when wider society benefits, and when people feel some responsibility to act in the interest of wider society, they are unlikely to imagine that they will be acting alone.

With this sense of public obligation comes a wider appetite for consideration of moral and ethical issues. Rather than being seen as distorting what ought to be a secular space, the public discussion of many areas of human experience previously thought of as private moral issues is considered the mark of a properly responsible society. The emphasis on interdependence and the recognition of other people that is seen throughout civil society has a resonance with religious notions of common fellowship, and fundamentally the public sphere is no longer regarded as a place defined by its freedom from religious or moral perspectives. Equally, it is not a place where these perspectives are accorded any special privilege or exemption from the collective responsibility to maintain strong public institutions and shared values. Religious beliefs are no reason to opt out of making a contribution.

More generally, difference is recognised and even celebrated as a source of understanding and perspective, but, as in the case of religion, not privileged: the obligation to consider the interests of wider society before the interests of a particular group applies without exception. For some groups this might feel, from time to time, like an imposition, but in general people see that imposing this obligation equally is the only condition under which people can be expected to contribute to the wider good. The preferred approach is to minimise points of conflict between the aims and needs of particular groups and the wider needs of society: with the weakening of associational

thinking and allegiances to particular groups, the increased awareness of the interdependence of human action and the greater place of ethics and morals within the public sphere, these flashpoints occur far less frequently than in the past.

Where they do occur, it is the responsibility of the state to resolve them. In general, the state's primary role is to maintain civil society. This duty is discharged in part through resolving tensions, but for the most part the state's focus is on achieving this aim through creating a strong civic culture of active engagement in public life. The 'tragedy of the commons' - the failure of people to work to preserve common goods when this is counter to their short-term individual interests - is the biggest threat faced by the state, and it works to combat this tendency on a number of fronts. Where necessary, the state regulates group and individual behaviour, legislating to ensure that long-term societal interests are prioritised. It promotes interdependence between groups and fosters permeable community boundaries, attempting to lessen the identification people might feel with one particular group, helping them to move between groups, and encouraging them to look beyond individual or community interest to the broader interests of society. Where inter-relationships between groups don't exist, or connections aren't present, the state provides opportunities for these to grow: its aim is to nurture an ecology of mutually interdependent groups and individuals. These aims require it to maintain a public space for a genuine national conversation and interaction between different groups and sections of society, with the state taking an active role in ensuring that no single voice distorts this space, including its own. Its role is only possible if people trust it to maintain this space - a modest and sufficient voice, as opposed to a stridently political voice, goes some way towards this, but more formal mechanisms of accountability and transparency are still crucial.

Another source of legitimacy for the state is gained through devolving aspects of governance to local authorities and town halls on the principle of subsidiarity, ensuring that services are provided at the most appropriate level: local functions and services, such as maintaining public spaces, child and elder care, rubbish collection or community policing, are managed, funded, overseen and in some cases carried out by representative local government groups comprised of local residents. Participation in these groups is seen as an important social contribution and worth the effort needed to find time to contribute in this way. There are many socially useful tasks of this nature available, and many are undertaken by those in receipt of a state-issued benefit paid to the active retired and those who are currently not in paid employment. Participation in these groups is also a way of ensuring accountability at a local level: the state has trusted local people to monitor and service local needs using government resources and working within a national framework, and this requires genuine oversight at a local level. In practice, service provision is often provided by non-governmental and third sector organisations.

In order to support this state benefit and the administrative burden of devolved service provision, levels of personal taxation as a proportion of personal income have risen, when compared to levels a few decades ago. In part, tolerance for higher taxation reflects the degree to which arguments for greater commitment to civil society have been successful. Additionally, the effects of this taxation can be seen at a local level, as they enable people to undertake their civic functions, making it easier for people to view taxation as a means of supporting their work, rather than a way of paying other people to do the difficult jobs. There is a greater emphasis on the capacity of work to support direct improvements in the quality of life, as opposed to indirect support through remuneration. The notion of the 'triple bottom-line' that gained currency in the early years of the twenty-first century has led to a re-evaluation of the ways in which a company's success might be measured, emphasising the responsibility of all firms to consider themselves as connected to the whole of society rather than being isolated, and

consequently to consider 'profit' as the positive economic and social impacts of its activities, rather than merely its internal fiscal surplus. Similarly, for individuals, 'success' is seen now in terms of the quality of life they are able to enjoy, rather than the size of their bank balance or the number of houses they own: the fashion for less conspicuous consumption that began in the wake of the global recession in the early part of the 21st Century, coupled with the constraints imposed by new international legislation on carbon emissions and other environmental regulation, has supported this.

What this means in practical terms for employees is that they can expect their employer to recompense them in other ways than the purely financial. This might take different forms. In its most straightforward guise, many firms offer perks to employees that recognise the other parts of their life: discounts with local businesses, flexible working opportunities, job sharing - and offer these as defaults, rather than discretionary rewards. Support for employees' health and wellbeing is widely provided through well-designed work environments and allowances for wellbeing or healthcare purchases, motivated again through a recognition of the positive impact this has both for the employees and for society as a whole. At a deeper level, employees are recognised as full moral individuals, more than a brain or a pair of hands for hire, and employers acknowledge the values held by the workforce through supporting projects and causes that are aligned with the priorities of their employees, and by doing business in a way commensurate with the overriding ethical sensibilities.

The fundamental development in the culture of the workplace since the early years of the century has been to recast the relationship between employer and employee in a way that recognises that what is good for one is good for the other and good for society: that is, it is in the interest of employers to ensure that employees are in a position to contribute to society as well as its own endeavours. Indeed, in the widest sense, contributing to society is the company's endeavour, as it is for employees. Rather than trying to limit employees' interactions with other communities, then, responsible employers are those who support links into and out of the workplace, not only to wellbeing sites such as gyms and health clubs, but also to professional organisations and other companies. The past twenty years have seen an explosive growth in the number of in-kind relationships and partnerships between firms, enabling skills exchanges and internships between different companies and across sectors. Flexible working enables employees and companies to negotiate time shared between the two, perhaps for one company to share expertise in a particular area, or for an employee to gain exposure to knowledge not currently found in their present company. Employees benefit from increased opportunity in the workplace, through enlarged networks and greater skill sets, while companies benefit as they are seen to be committed to principles of interdependence, innovation and lifelong learning. By now, someone's learning history is not seen as something separate from their CV.

To enable this change of attitude, management structures have had to shift focus towards fostering a fluid working population, ensuring that working communities of practice are porous and permeable and allowing movement between them. This has only been possible through a cultural shift within industry, particularly within IT departments, as the rhetoric of control and access is replaced by facilitation and openness. As employees become more mobile, personal ICT equipment travels with them, and as information moves between companies, open standards become more important. Working across different platforms in different locations has pushed businesses to reconsider long-entrenched attitudes towards knowledge that saw it as valuable only as long as it remained within the company: new licences enable firms to share intellectual property while remaining in a position to extract value from it. Moving the greater part of the responsibility for network security and intellectual property management onto the shoulders of employees is part of this settlement: in the same way in which a certain

minimal level of literacy in computer-mediated communication approaches is necessary for entry into the workplace, a basic level of awareness of the risks attendant on the use of network technology and a knowledge of web hygiene is a pre-requisite for being trusted to participate in this flexible and fluid landscape.

This change of attitude towards knowledge and technology can be perceived within the media and leisure industries, with the same tensions between trust and control playing out over the past few decades. Producers and publishers have for the most part recognised that the principles of interdependence and public good are best served not by trying to restrict and limit the ways in which information (in this case music, film, electronic artworks) can be accessed, but by enabling it to move across different groups without restriction. For artists, the highest recognition possible today is to encounter their work preserved as they originally conceived it, although work that inspires others to use it as source material for their own work is acknowledged to make more of a contribution to cultural life. "Broadcast" events make up a minority of the media environment (the term "broadcast" refers now to any cultural experience in which the relationship between producer and consumer is one-way with no interaction: the notion that a media experience might be limited to a particular time was already quaint by the year 2010 and has no currency today at all). The majority of media is thought of as participatory - though that description says nothing about the level of engagement of the audience - and producers expect that their work will be completed by the collective action of their audience, experiencing their work as one part of a larger media stream in which they navigate between different interest groups and enthusiasms. This patchwork environment is in part the result of the new economics of media, with producers and publishers having to spread their work across many different platforms and contexts in order to fund their work, and consumers paying small amounts for each mode of engagement they desire. Everyone pays for the right to generate and distribute content: the line between "producer" and "consumer" has been considerably blurred in the past few years.

A similar blurring of boundaries has taken place within the family. Legislative changes and developments in the biological sciences have shaken the traditionally prominent position of the heterosexual couple caring for their biological children and ushered in a landscape where family ties are seen as being as much negotiated as they are inherited. Within society as a whole, there was little appetite for the preservation of "the nuclear family" as traditionally understood, given the move away from emphasising allegiances to particular groups, and plenty of support for encouraging the boundaries of this particular form of community to become as porous and flexible as those of other forms. As a consequence, supported by people's general understanding that society's business is their business, many of the roles traditionally located within families are now situated within society as a whole, and the protection of vulnerable family members, or the care of those unable to care for themselves, are responsibilities shared amongst local communities and the wider public. Families are still as much a site of love and support, suffering and insecurity as they have ever been: today, though, they are only one site of many, and easier to configure in ways that allow people to flourish.

Education

Goals and outcomes

The primary goal of education is to strengthen the public sphere, by fostering and developing dispositions and habits of mind that encourage individuals to value interdependence and recognise the impact of their actions beyond their immediate context. An essential component of this is supporting people's capacity to apprehend

other perspectives beyond those that they are familiar with, giving them a better chance of being able to work in a truly interdependent way.

A further essential aim for education is to prepare people for mobility, to encourage them to find stability and security outside a fixed locale or long-established way of being. Having a society that depends on there being few barriers to movement between different groups requires that people feel able to make the best use of these permeable boundaries, and are capable of recognising the benefits of doing so. These aims are reached through an effort within education to build shared values and spaces for collaboration, within which discussion across different learning communities is possible and accessible.

These interactions are not limited to formal learning arenas but are extended to encompass working and civil life experiences, with no upper age limit on contributions. Participation in these spaces is not expected to come to an end at the same time as school attendance does.

These features and goals of education are shaped by the nature of the society described above. Below, we present two different possibilities for education in this world. In one, the values of the world and the characteristics outlined above have led to an education system that is capable of sustaining itself and wider society in that form. In the other, these values and features have given rise to an education system that is unsustainable and must eventually lead to change.

Integrated experience

A pedagogy of authenticity runs throughout education, with a general expectation on the part of learners that the behaviours and practices they encounter in a learning context are genuinely rooted in practices outside that context. This is supported by the ease with which learners can move between contexts: now that the traditional division between "education" and "real life" has been blurred, and learning is understood and expected to be a fundamental part of any endeavour, there are more opportunities for learners to compare their learning with their experiences in other contexts. Just as learning is understood to be an element of all areas of experience, so too are those areas of experience to be found within educational settings - the movement is reciprocal and equal, rather than being based on an uneven notion of education as lacking real-world input and needing to be made "relevant".

This shift has reconfigured the relationship between teacher and learner in ways that better foreground the democratic principles education strives to exemplify. The role of teacher is still crucial in supporting and stretching learners in order to make the most of their abilities, in modelling constructive behaviour and in guiding learners and helping them flourish. But the sources of teacher authority have changed.

For one thing, learners are likely to encounter a wider range of people in a teacher role than previously: in keeping with the principles that ensure that communities allow easy movement between them, learners are not necessarily tied or affiliated to a single learning institution, often spreading the time they spend learning amongst several institutions, making use of particular facilities at one, engaging with a particular area of expertise at another, or participating in a culture unfamiliar to them. This means individual teachers might be less likely to spend time with particular learners, and certainly learners encounter a wider range of teaching approaches than in previous generations. For another, as the boundaries between knowledge domains and academic disciplines have become more porous - a consequence of the movement toward

interdisciplinary working - that part of a teacher's authority that derived from their position as a representative of a particular discipline has waned. And teachers' claims about the relevance (or otherwise) of particular learning behaviours can be verified or challenged by learners' other experiences: "you'll need this for your exam" is a sentence that doesn't have to be taken on trust, as it used to.

Of course, the traditional examination has also changed, perhaps more than the role of teacher. The emphasis on authenticity in learning has challenged the role of the examination in evaluating and assessing learning. More critically, the importance placed on collective, rather than individual, action in the wider world, has made it essential for new forms of assessment that focus on the group as the unit of evaluation. Learners generally receive accreditation that reflects the level their group achieved through delivering a project of one sort or another, rather than receiving a personal grade that reflects their own individual performance on a specific day. This approach is generally felt to be more in keeping with the ethos educators generally wish to support, does away with many of the curricular constraints that were associated with the individualistic forms of assessment prevalent in the early part of the century, and is closer to the ways in which the majority of people generally find themselves being asked to work.

Still, the system is open to abuse by freeloaders, and can be difficult for some to work within, particularly those who feel most keenly the lack of individual recognition, or whose inability to collaborate well renders their other abilities invisible. While levels of student resistance to this approach are considerably reduced from the early days of its introduction, there are still some learners who prefer to study with providers who offer individual accreditation, and are prepared to pay for it. These individual certificates are not so much an aid to finding employment - employers would rather see evidence of group achievement - as they are a form of personal validation for those who feel unrepresented by the mainstream approach, and are seen by some more as evidence of vanity than of achievement. Now that education and learning no longer have a cut-off point in the form of a single final qualification, particular qualifications matter less than an individual's general learning career.

This reflects a radical shift in public perceptions, a move away from seeing education as a finite occupation that is completed with a final examination, towards thinking of education as collaborative and contextual open-ended process that continues throughout life. This new view sees education as everyone's business, and as integrated into all areas of work, leisure and personal life. Education can no longer be seen simply as the 'place where society gets fixed' or as the means by which to shape individuals at the start of their lives. Instead, education is seen as a continuous element of everything that people do. This changed perspective was only able to gain wider public support once older generations had had the experience of substantial commitment from industry and government to lifelong learning in the second decade of the century.

Service and citizenship

Education is considered to have a major role to play in maintaining and supporting civil society. But the permeability of group boundaries and interdependence between groups that characterise much of wider society has not been reproduced within education. Instead, education's role is seen as helping learners meet the needs of particular groups and sectors, rather than the needs of society as a whole. Learning experiences are informed by a pedagogy of service in which the importance of the community or group is emphasised over the individual learner or civil society, and education's purpose is to ensure that these groups have access to the skills and qualities they require.

Consequently, the notion of a positive civic mindset is an ideal that few reach. Instead, people focus rather on their place within each group they identify with, and although the rhetoric of communal values remains, the reality is that people's various community memberships are more meaningful to them than any notion of being a part of wider civil society. This, naturally, is a threat to the health of the public sphere, and the state has had to intervene, legislating for (that is, compelling) the teaching of citizenship information, rather than enabling people to develop first-hand experience of lived citizenship. Such teaching begins to weaken the notion of personal responsibility for action in support of wider society still further.

As a sector, then, education has become more distinct from other areas of people's lives, such as their work or family. It addresses two different societal priorities. At one extreme, it acts as the primary site for the formal teaching of citizenship information, the discussion of the relationship between an individual and wider society, the articulation of the responsibilities and obligations towards society that might fall to individuals, and the emphasis of the value of thinking and acting communally (and the more these topics are considered the proper subject of education, the less frequently they arise in the wider world). At the other extreme, it has a practical duty to fit learners for the roles demanded of them by the various communities they belong to, ensuring that there are opportunities for individuals to fit themselves with the skills required to enable them to contribute to each group. There is a tension generated by these two roles: on the one hand, learners are encouraged to imagine that they ought to prioritise the needs of wider society, and on the other, it is made clear to learners that their priority is the specific community or group whose needs are being met by acquiring a particular skillset. This is a contradiction most people find easy to live with: although lip service is paid to the social contract and the responsibility shared by everyone towards maintaining a healthy civil society, in reality it is more urgent to ensure that people are in a position to contribute to the group. Either way, learners are left in no doubt that they should consider themselves to be in service to a collective entity greater than the individual.

Education is itself in the service of the learner and their communities, and the sector is expected to provide support for both throughout their lives. There are a variety of different knowledge domains and communities, each of which has its own curricula, formal and informal, and while in the professional world outside education, these areas might have cause to overlap and inform each other from time to time, when acquiring the skills and behaviours necessary for entry into these domains and communities, learners expect to encounter the relevant bodies of knowledge and practice in isolation. In part this is a consequence of imagining education to be in the service of the different elements that comprise society, and having to respond to their priorities singly rather than coherently: however, it also reflects the lack of capacity within many educational institutions to support working across domains or disciplines. As a result, learners have come to think of knowledge not as something that is developed through practice, but as something that can be acquired prior to practice: before a new skill can be employed, an individual must first have the necessary knowledge delivered to them through some sort of educational intervention. Learning is increasingly seen as something that happens outside usual social contexts, something that should be there and provide necessary input when necessary for employment, work or wellbeing support, but which in the ordinary course of things is not particularly relevant.

The role of the teacher has become fundamental to learning, although changed subtly from more traditional conceptions, and embodying the tension between social aspiration and demand-led provision of skills that sits at the heart of education. For early years instruction, where the curriculum spends much more time focussed on state-mandated explorations of citizenship and social responsibility, teachers have a role to play in fostering a social and moral conscience, encouraging learners to see themselves as

members of a group and to direct their energies towards the success of the group. In instances where the teacher's role was historically largely instruction, they have a greatly reduced part to play. The notion that knowledge can simply be acquired, combined with the rise of the amateur content producer, has meant that for some specific skills and behaviours, it is easier for learners to engage with other practitioners, through video instruction and communication forums, than it is to find and access a specialist teacher or coach.

For other areas of expertise, particularly those that require learners to engage with a professional ethos or culture, teachers still have a role, though their authority is entirely connected with their domain-specific knowledge, and they tend to be closer in spirit to what was traditionally thought of as a consultant, facilitator, coach or trainer than to the old-fashioned idea of a pedagogue. Nevertheless, when there is a need for a teacher, their role is to deliver knowledge to learners, whether in a classroom, training room or from another time zone, for a limited period culminating in a formal, individual assessment

Scenario 3: Loyalty points

The relationship between individuals and corporate entities has evolved, over the past few decades, into something more codified and managed than at the beginning of the century. As the ability of individuals to prevent their personal data becoming the property of organisations withered, it became clear that an external mechanism was needed to manage this exchange. People who attempted to keep their data from external organisations found their access and participation in society constrained: however, the organisations that benefitted most from this data proved themselves incapable of regulating this exchange fairly or effectively. It was left to the state to intervene with a personalised contract for individuals and the organisations they interacted with, ensuring that companies could run efficiently and offer appropriate services while individuals' rights were protected. This approach towards managing people's relationships with institutions and organisations grew in scope until the present day, when individuals find themselves at the heart of a lattice of affiliations and associations encompassing their work, interests, healthcare, family, leisure and consumption, all of which are articulated through contracts that manage and curtail the behaviour of groups and individuals.

Hand-in-hand with this movement towards the management of people's lives through personalised contractual agreements is a change in the role of the state. The political support for the devolution of power to local groups, coupled with the tendency for political debate to centre around single issues rather than ideological positions, has led to a shrinking of the state as people form and join associations and groups to address local needs rather than looking to government, which consequently has much less influence. Global mobility has increased and the need for people to tie their identity to their geographic location has lessened: instead, national affiliation is part of the contract individuals choose to make with the state, and attracting and retaining educated, talented, fertile and resourceful citizens is one of the challenges facing governments. This contractual citizenship, in which benefits and responsibilities are made explicit, is in tension with a legacy ideal of belonging to the UK as a geographically and culturally integrated territory.

The state's role has been reconfigured as an enabling organisation, creating the conditions for individuals to affiliate themselves to particular sets of associations. It still provides basic security and physical welfare for its citizens, in particular attempting to police collectives that might threaten the body politic and ensuring that commitments to

associations do not infringe on the distinctive role of the state. However, the traditional role of the police has in many cases been devolved to local associations, particularly in rural areas, and responsibility for the welfare of citizens is often claimed by spiritual and religious groups. Less challenged is the role of the state in providing and maintaining the technical and legal frameworks which allow contributions and benefits to be exchanged across multiple associations. These multiple associations offer alternatives to many of the offers of the state - welfare, identity, security - and as a result, the state is forced to behave more and more as 'first association among equals'.

Governance, registration and regulation of associations is a key role for the state, as well as ensuring the data systems and interoperability standards that allow free exchange. A strong logistical and economic argument supports the state's regulation of individual data records, the ultimate motivation being to support the management of 'citizenship deals'. These 'citizenship deals' are managed through personal data records, some aspects of which are managed and maintained by the individual but an official, accredited core of which is owned by the government. The state limits the capacity of associations to make use of this data, and individuals have power over how their data is presented to other individuals and associations. These requirements, and the need for personal records to interoperate with the many associations that exist, mean that managing access and ensuring data security are major technical problems. The state also manages a plethora of service-level referenda as well as national and regional elections, and supports the registration and regulation of associations.

Individuals achieve success through their own efforts and through participating in successful associations. Different models of association co-exist. Faith groups and secular values-based groups are particularly powerful because of their capacity to secure long-term loyalty and their experience in providing support services that acknowledge individual needs. Contributions and benefits in these communities tend not to be monetised, but they are painstakingly recorded to support the maintenance of reputation. Other associations are employment based, lifecourse and health based, locally based, and based around specific interests. Friendship networks, political parties, consumer groups and purely commercial organisations can all succeed in different ways. However, there is a clear distinction between associations that actively have to recruit their membership and those that are able to select members from a pool of willing participants, with some of the latter being extremely powerful and presenting high barriers to entry.

There are individuals who opt out of all but the compulsory state contracts, preferring to rely on their own resources, and others who struggle to achieve membership of any associations that might significantly improve their situation in life. Local communities generally flourish, but in areas where high house prices exclude all but the very privileged, and conversely where families have little economic, social or educational capital and thus have little to contribute to the collective, the community contract fails. Managing one's personal record and how this is manifested in various forms of public reputation is essential for survival.

This local differentiation is reflected most vividly in the varying contributions communities make through taxation. Taxes are tightly linked to the areas for which they have been collected - taxpayers can expect their road tax contributions to fund only the maintenance of roads, for example. This, coupled with the devolution of public services to local associations, allows individuals and communities to opt in or out of particular aspects of state provision, and enables non-governmental associations to offer contributions-based deals. This capacity to opt out has weakened the basic provision, and those without means struggle to get by on this alone. The positive side of these arrangements is that the state is forced to make more personalised service contracts

with individuals, and local/specialised providers flourish on the basis that they are better able to meet individual needs.

These services might be provided directly by the work associations with which people may be affiliated. The groups offering access to these kinds of benefits are similar to traditional firms, employing people directly and providing access to healthcare or development opportunities focussing on learning or personal wellbeing. However, many people spend more time working in *ad hoc* groups of individuals who come together to offer complementary skills to meet the requirements of a particular project: this sort of work is often contracted out on a piecemeal, per-project basis, with a premium on delivering high quality in a short time-scale.

Many local economies flourish, and value can be kept within local communities through exchange clubs that provide a (digital) currency for exchange of goods and skills. Sometimes this is a positive choice taken by a highly resourced community: however, some communities lack the capacity to mobilise the goods and skills their members need. Domestic work and care work are valued, whether carried out in the home or in the wider community, because contributions to the health of individuals are translated into benefits by the state. These benefits are of limited transferability, and so this work remains relatively low in status.

Managing different work contracts, deciding how to deploy personal time and talent on different kinds of work or juggling work inside and outside the home all require considerable personal organisation. Relationships with colleagues are often short-term and handled at a distance. Some communities invest in local work centres with dedicated wireless networks, where individuals can participate in online work while still enjoying real-world contact with others. Online reputation and identity trumps qualification, so individuals also have to invest in updating their skills and their capacity to present those skills to potential employers and co-workers. Some choose instead to work at a very local level to sustain their communities. There are conflicts over work-life balance and the value of domestic and care work.

These conflicts play out differently in different domestic contexts, and there are a variety of ways in which these contexts are configured. While families remain a key locus for sharing and accruing resources, caring and learning, and for defining the values and affiliations of members, definitions of 'family' are in flux. In some contexts the family acts as a unit, capable of receiving services and benefits and entering into contractual relations on behalf of its members. In other contexts families behave more like affiliations, with extended membership and loosely contractual elements. Such extended families may be global or local, kinship-based or (increasingly) friendship-based. Children are encouraged to build supportive peer networks, leading to conflict in some families about the extent to which these affiliations challenge kinship. 'Absent presence' is common as family members increasingly use the home as a physical base from which to manage virtual relationships.

Regardless of the variety of ways in which families might be shaped, the home is regarded as the focus of state provision of entitlement. There is a basic entitlement to network access from the home and connectivity within the home, and the vast majority of homes incorporate 'smart' technologies which enable devices to interoperate efficiently, save energy, and monitor occupants and environments. This offers the potential to diagnose health and care needs, to automate care within the home and even to support learning. The state sponsors smart infrastructure in poor households as part of its commitment to ensuring basic welfare provision: monitoring allows the state and other service providers to deliver appropriate care but also to ensure that individuals are meeting their contractual responsibilities to their own health and happiness. Families

therefore place a premium on keeping members healthy. In general, the onus is on all individuals to keep healthy, as taking action to enhance one's health status also gives access to services and benefits, and/or citizenship points that can be 'spent' outside of service provision, as well as reducing insurance premiums.

The age of compulsory education has been lowered (the exact age varies from locale to locale but is around the early teens), and the age of full adulthood has been raised, in part due to the length of time required to establish the network of affiliations that support people through life (again, different service providers recognise different thresholds, but adulthood is generally reckoned to be reached by the mid-twenties). As a result, there is a long period in which young people have capital within the family and power relations are contested. This stage is culturally designated as a safe playground or extended adolescence, with an expectation that young people will continue to be supported to some degree by their families while they embark on the affiliations, work and care contributions that mark full adulthood. However, a system of state and community-funded mentors and a growing network of peer affiliations mean that young people can find their niche without relying exclusively on the support of their family. Because of the pressure to build a portfolio of capabilities and a strong public reputation, children have their leisure time organised by their parents around 'valued' activities such as sport, music, youth groups, volunteering and challenges in the outdoors. Once they are able to organise their own time, young people often react to this by engaging in consciously playful, trivial or individualistic pursuits. Risky and 'anti-social' behaviours are also common in this age range. In general, these behaviours - for example, extreme sports, or abuse of drugs and alcohol - are less a feature of full adulthood, as they are excluded from healthcare and health insurance, except for emergency care, and the costs of engaging in them both socially and financially are high.

Less risky use of leisure time focuses on shopping, on non-economic forms of exchange, and on self-enhancement. Consumer power is mobilised - or perceived to be mobilised - through membership of clubs which give discounted access to goods and services, and other membership privileges. Shopping figures strongly as a source of pleasure and interaction with other consumers. There is a particular interest in leisure products that contribute to health, fitness and physical display, which help individuals to demonstrate their 'fitness' and capacity to contribute. Some hobbies and activities generate 'citizenship points' which can be exchanged for shopping club benefits: these include volunteer care work, conservation, gardening, healthful activity, leading community groups and similar activities.

Rules for sharing and managing knowledge continue to be in flux, with some organisations and individuals keeping valuable information private in order to leverage value. However, all communities and individuals make knowledge public in order to promote their reputation, and many find creative and original ways of doing so. There is therefore a plethora of entertaining, original and informative communication: the model is generally one of leveraging value (via reputation) from content rather than charging for content.

Education

Goals and outcomes

The broad primary goal for education is to promote social sustainability, ensuring that the many different perspectives and priorities within society do not pull so strongly in different directions that the interrelated networks they constitute fall apart. Hand-in-hand with this, because the agents of this sustainability are individual people, is a second aim: to support the success of the individual in this lattice of associations and

affiliations. There are many different definitions of success, varying from association to association: the generally-agreed-upon formulation is that education helps people to 'find their niche', to establish for themselves roles in which they feel valued and capable and to answer the question "what can I contribute?"

The focus of educators is directed towards fostering the skills and dispositions needed by individuals in such a context. Educated people are generally expected to be self-aware, skilled at managing their reputation and capable of juggling multiple roles, tasks and identities. Having an idea of how to be effective within a group is valuable: forming allegiances, managing conflicts, being noticed and valued and building social benefits are all essential skills. For themselves, learners need to become skilled at finding, managing and sharing information, comfortable moving between different contexts and situations, and to aspire to move beyond the thinking of a particular group.

These features and goals of education are shaped by the nature of the society described above. Below, we present two different possibilities for education in this world. In one, the values of the world and the characteristics outlined above have led to an education system that is capable of sustaining itself and wider society in that form. In the other, these values and features have given rise to an education system that is unsustainable and must eventually lead to change.

Discovery

Reflecting learners' need to navigate between diverse groups and steer between various domains and contexts, a pedagogy of discovery and exploration underpins their learning experiences. Learners are encouraged to recognise that there are many communities in which they might participate, each with its own values, priorities, demands and focus, and to draw on a variety of these in constructing their course through education. They are supported in this by mentors, whose role is to guide learners around knowledge situated within a particular community and to help them access related communities. Mentors do not simply relay established practices or patterns of thought - learners are encouraged to challenge and debate the knowledge they encounter, developing new approaches and contributing to the community in which they're participating.

The role of mentor is valued highly, in part because of its resonance with the sense of collective responsibility for young people's advancement that is current in society, but perhaps more through the experience people have of being mentors themselves, and of understanding the learning opportunities it offers and the value attached to the role by communities. Not only are they vital to the health of a particular domain or sector, building new membership for specific communities, but they also allow members of communities to be shown respect for the contributions they have made. The role can also act as a form of exchange between communities, with learners in one context often acting as mentors in a different context, making mentorship one way in which individuals can move between communities.

This mentoring takes place in a range of different settings. There are core educational goals addressed in early life: physical and mental wellbeing, group dynamics, symbolic manipulation and media production are all included in the curriculum encountered in state education. Families might choose, if able, to supplement or enhance this state provision with more personalised learning services focussing on specific parts of their network, or on areas that will help them to access specific associations later in life. Local and regional colleges provide courses focused on local needs. Where a pressing requirement for local skills is felt - for example, in urban planning or energy solutions - courses are funded from taxation. Associations and employers provide lifelong learning opportunities, either directly or using local colleges as brokers. Colleges are strong

centres for social learning, leisure learning and community cohesion. Open content and open virtual learning groups are widely available: associations make it their business to recommend, develop and evaluate particular learning experiences as a service to members. Elite universities provide research, innovation and knowledge resources. They are funded through innovation contracts for specific clients (state, commercial or third sector), through leveraging intellectual property, including mentoring materials, and through mentoring. Subject to global competition for intellectual assets, they must attract and retain international talent. Entry is on the basis of capacity to contribute to intellectual production, and the costs of teaching are borne by sponsoring associations, wealthy families and a small number of state or regional bursaries. Face-to-face contact helps to define university as an elite experience, and alumni associations are among the more powerful interest groups in society.

As learners move between these different settings and groups, their interactions with and contributions to the various knowledge communities they encounter build a portfolio of capabilities and contributions that is recorded, authenticated and shared digitally. Underpinning this are software systems supporting a large degree of interoperability, and there are a range of tools for managing and presenting, modelling and making sense of this data. In part through the use of these tools, learners acquire many skills around management of the portfolio itself, including self-review and analysis, planning, reflection, self-presentation and management of reputation.

This aggregation of data around learners' activities, habits, dispositions and behaviours is useful to the state and to families as a mechanism for ensuring accountability for the quality of learning. More immediately, they offer a fixed and continuous object of assessment, remaining associated with individual learners as they engage with different communities in different settings, and offering a narrative of their learning experiences that includes the contributions made to different communities, feedback and reviews from peers, mentors and community members and an authentic record of an individual's attributes, interests and talents.

Diagnosis

As the mark of a strong and thriving association or community becomes increasingly seen to be not the degree to which it supports and encourages exchange with other groups, but the services and opportunities it is able to provide for members within the group, so people have become accustomed to looking within their existing networks for support and development, rather than towards new communities. A shift has occurred as a result, from individuals using community membership to address their needs to communities being in a position to shape the contours of their members' lives. People make less effort maintaining their wider networks and affiliations, and focus more on ensuring that they succeed within a limited set of associations: consequently, they have fewer alternatives and the need to invest their energy in supporting their chosen associations is greater. Making sure that they are equipped with the skills and dispositions that would most benefit the community is one way of providing this support.

Individuals increasingly link their learning requirements to the requirements of particular organisations, which have consequently taken on more and more responsibility for providing educational opportunities that are likely to fulfil these requirements: as demand for education provided through specific commercial or third-sector organisations increases, state provision is weakened, and these organisations find themselves in a position to base their learning offerings on a pedagogy of diagnosis, identifying learners' talents and strengths that are of most benefit to the organisation and concentrating on developing these to their full extent. Learners are given, rather than discover, their niche.

Diagnosis of an individual's likely skills or competencies occurs at an early stage in life, through their first educational institutions: affiliated private schools for those who can afford them or digital content and distance tuition for those who are not in such a position. There has been a rise in specialist and faith-based education as families take the opportunity to ensure that their values and interests are reproduced. State provision is seen as a last resort. People who demonstrate exceptional ability in areas that are desirable to a particular organisation might find themselves actively recruited. Strengths and potential are used by teachers to match learners to needed roles within the organisation. These are then enhanced through personalised learning experiences, which continue throughout an individual's relationship with that organisation, into their working life and beyond, with in-house universities and research departments. If the specific skills being fostered are no longer thought of as particularly relevant to an organisation, a learner might be offered the opportunity to change track, though this is not always possible, and not every learner reaches adulthood as fitted for their niche as they had been led to expect.

Those being supported to learn leadership and communication skills are least likely to be troubled by this, as these are seen as more general skills that are widely applicable: organisations offering these courses are able to choose from a wide pool of applicants due to the high level of competition. The rhetoric of personalisation and learning 'styles' masks a strong stratification from an early age, with little opportunity for learners to explore other avenues of development. Individualised assessment allows organisations to track the progress of learners towards their objective, and to see how closely aligned with the current goals of the organisation their progress is.

The means used to evaluate and measure this progress differ from organisation to organisation: this diversity of assessment means that there is no common currency of accreditation, and a new 'old boy' network has arisen in which learners and their learning are valued through association with particular institutions. For those without such connections, personal self-presentation skills are the key to advancement.

Chapter 7: Discussion and possible future directions

The Beyond Current Horizons programme is an attempt to explore systematically the potential futures for education that might emerge at the intersection of social and technological change. Its purpose is to map out current and emerging socio-technical trends, the critical uncertainties in our understanding of future socio-technical developments, and the challenges or opportunities that such developments might offer to educators. Its goal is not to provide a single picture of an ideal or dystopian future toward which we are progressing, nor to promote particular solutions, but to open up the possibility of exploring socio-technical change in ways that allow us, as educators, to take informed and thoughtful decisions about which of these emergent developments we want to embrace or to overcome.

This final chapter presents a set of challenges for educators based upon the evidence and insights generated during the programme. It does not attempt to restate all of the arguments made by the synoptic reports, the scenarios and public engagement programme. Instead, it asks: if these socio-technical developments continue to play out, if these futures come to pass, how well prepared would we be to ensure that children, families and learners of all ages are enabled to flourish in these environments?

What socio-technical developments may shape the next two decades?

Should existing long-term trends continue, the following developments are likely to be critical in shaping the world within which education will be acting over the coming two decades:

The information landscape gets denser, deeper and more diverse. Social trends toward accountability and security, the decreasing cost and increasing availability of digital storage capacity, the development of new forms of bio- and genetic information, the ability to digitally tag almost any physical object, space or person, the ability to represent information in more diverse media; all of these developments increase the capacity to simply 'know more stuff about more stuff'. We will potentially be able to gather, store, examine and circulate more data, in more diverse forms, about more aspects of ourselves, and our world, than ever before.

Creating the personal 'cloud'. In the near future the capacity to connect to a network, and be constantly connected to knowledge, resources, people and tools will be taken for granted in most countries with a robust technology infrastructure. Individuals will have the capacity to remain in 'perpetual contact' with diverse networks and communities, both physical and virtual. The rise in mobile and personal technologies and the lowering of barriers to data storage mean that individuals are increasingly likely to 'wrap' their information landscape around themselves rather than managing it through institutions.

Working and living alongside machines becomes increasingly normal and our understanding of what we mean by 'machines' may change as non-human entities are more radically embedded into human bodies, and machines become semi-autonomous actors in social networks. Over the coming two decades, people are likely to become increasingly accustomed to machines taking on more roles previously occupied by humans across both professional and manual occupations and in homes and workplaces. Whether through devolving simple tasks or outsourcing the management of complex systems, such devolution of responsibility potentially brings a number of adjustments in our understanding of the respective roles of machines and humans. It may raise significant ethical tensions and generate public debate relating to questions of dependence and autonomy, and of privacy and trust, particularly when it comes to the use of complex systems to manage sensitive data and critical systems. Such debates

may play themselves out particularly between different generations with different attitudes to delegating power and responsibility to machines.

Distance matters less, but geography still counts. The separation of 'information resources' from physical location will continue. On top of this, people are likely to become more familiar with, and more used to, working together at a distance. As technological developments help to increase a 'sense of presence' in remote interactions, and as social norms and etiquette for such interactions are developed between families, friends and in workplaces, being 'together apart' is likely to become a more familiar aspect of working, personal and leisure lives. This is amplified by trends towards increased mobility within and between countries for work opportunities, and towards increasingly 'distributed' families where family members live in different places. However, geography is likely to continue to play a role in shaping the level of access that individuals and groups will have to digital networks: pricing and infrastructure, legal constraints and regulatory issues will still be influenced by physical geography. Similarly, people will still continue to use 'place' and physical location as a marker for identity, however 'virtual' their interactions, and the 'face to face' is likely to retain its importance for specific interactions. Physical proximity is also important in creating cultures of innovation and development, particularly from an economic perspective.

'Digital Natives' grow up and need to keep learning. On current trends, Western Europe will be characterised by an ageing population over the coming two decades, with over 50% of the population aged over 50 by 2030 with a further 40 year life expectancy. The adult-child relationships of the 20th century are likely to continue to be unsettled and evolve new forms, care will need to be passed up as well as down the generations, today's so-called 'digital natives' will, like their parents before them, need to learn to use new technological environments throughout their lives. Substantial changes to distribution of educational resources across the lifecourse will need to be envisaged as this cohort will be required to work (and learn) later in life. Moreover, such late life activities will be patterned by significant inequalities in health and wealth.

Weakening of institutional boundaries. The disaggregation of information from institution, the capacity to interact easily at a distance, the apparent preference for merging 'working' and 'leisure' practices amongst certain age groups and in certain workplaces, the creation of personal 'clouds' of information, people and resources, the erosion of strict boundaries between education, working and retirement as people have to work longer and develop new skills later in life, the demand for adults to manage multiple working and caring roles and for employers to find ways of enabling more flexibility in managing work practices, the increasing merging of public and private provision of public services; all of these different trends suggest that the next two decades will see an increased weakening of boundaries between institutions previously seen as separate – between workplace and home, entertainment venue and educational establishment.

The decline of the 'knowledge economy' as a utopian future. Current trends suggest that the world of work is likely to become increasingly polarised as a result of the intersection of demographic and technological trends over the coming two decades. Highly competitive R&D activities and knowledge work will continue to be needed, but the capacity for digital technologies to enable businesses to 'offshore' all forms of work to the lowest cost environment, to produce many products and services at ever decreasing cost and by ever fewer people, and to standardise and manage diverse workforces, leads to the suggestion that highly rewarded, creative and autonomous work is likely to be restricted over the coming two decades to ever smaller global elites. In contrast, ageing populations and the rise in demand for individuals to play multiple working, caring and learning roles, are likely to see a rise in demand for caring, face-to-

face and personal services roles, often roles which are poorly rewarded and valued. These developments may bring an end to current hopes of a democratic 'knowledge economy' and hasten the search either for changed social values to mitigate the potential inequalities of a polarised workforce, or for new sites of investment and development (such as in the environmental or 'virtual world' sectors).

'Silver bullets' are not expected for complex educational problems. Despite the continuing demand for quick fixes, neuroscience, computing and bioscience are not expected to provide easy solutions to educational issues over the coming two decades. Progress may be made in relation to specific disabilities or difficulties – for example, the development of better prostheses, new learning methods or targeted pharmacological enhancements for particular conditions. However, significant tensions may emerge around the ethics of such developments, their commercialisation and their wider application. Silver bullets, also, are not expected to emerge in relation to economic affairs, with constraints on public finances expected to continue and no significant new sources of revenue emerging for education.

Social and cultural values will continue to be played out through technologies. New technologies can be appropriated for diverse social, political and economic ends. Developments in remote working and automation, for example, can be used either to open up opportunities for human centred, family-friendly working practices or to make it increasingly easy for businesses to offshore work to the lowest cost, least demanding workforce. Developments in social media can enable individuals both to engage with new communities and new ideas and to reinforce connections with existing interest groups, national identities and religious beliefs. Developments in online technologies may allow both rapid and open knowledge sharing and ideas generation between individuals, and the ability to identify and control circulation of information and material, the better to protect intellectual property. Over the coming decades, emergent technologies will be mobilised to support all social, economic and cultural agendas, from progressive to conservative, from radical to traditional. In themselves, they are unlikely to sway social values inevitably towards one trajectory or another, and other forces – economic, environmental, religious – are likely to act as more significant drivers of such cultural movements than 'technologies themselves'.

What educational challenges might such socio-technical developments produce?

These socio-technical developments present a number of challenges to current educational thinking about the nature, processes and goals of education. In particular they require us, as educators, to ask the following questions:

- How would we redesign educational practices for networked individuals?
- How can we empower learners to navigate increasingly complex learning landscapes?
- How might we redesign education to take account of uncertain economic futures?

Each of these questions, when examined in turn, raises a number of challenges to current practice and begins to offer potential future models for curriculum and pedagogy, for the design of educational institutions, for the nature of the educational workforce, for assessment practices, and for policy and research.

Redesigning education for networked individuals

At the heart of educational processes is a concern with enabling individuals to learn to build, share, manipulate, communicate and generate knowledge. The socio-technical developments described above suggest that we need to pay increasing attention to the

role of social and technical networks in these knowledge processes over the coming two decades. These developments suggest that:

- We need to assume that individuals will be constantly networked to people, tools and resources
- Network technologies will amplify and intensify the existing role of social networks in shaping access to and production of knowledge
- Existing inequalities may continue to be played out through socio-technical networks

The decline of the 'sovereign individual'. In recent years, the use of personalised and mobile technologies, the development of habits of perpetual contact with friends and family amongst younger age groups, and the rise of a constantly accessible 'virtual cloud' of social, professional and familial contacts and resources enabled by mobile web access, increasingly problematises the idea of the 'sovereign individual'. Over the next two decades, the rise of pervasive and ubiquitous computing, social networking tools, increasingly widespread access to and use of cognitive enhancements, machines taking on a range of personal and professional roles and intelligent ubiquitous computing capacity embedded in the built environment, will make it increasingly difficult to sustain the distinction between the 'individual' and their wider network of resources (both human and non-human).

These developments suggest that 1) the solitary spaces of self-reflection in which the enlightenment idea of the 'individual' was forged will be increasingly difficult to find and occupy 2) there will be a new cognitive division of labour in which machines will be cooperating with human beings on most high level tasks, each according to their strengths, however, 3) to be a person, an agent, will continue to be a unique property of embodied humans engaged in human social networks.

Technology amplifies the role of social networks as sites of knowledge exchange and production. Social networks have always been used to filter, manage and generate new information. Whether the social network of the family or the workplace, the professional networks of particular disciplines or the community networks of social action, networks have historically structured individuals' interactions with knowledge. They have shaped what 'counts' as valuable knowledge, what information people have access to, and what new ideas and information is valued.

Socio-technical developments over the coming decades are likely to amplify this role. As the information landscape becomes increasingly complex, social networks take on a more important role in managing, filtering and prioritising information. New forms of searching and managing information are increasingly reliant on the values, strategies and choices of your social networks – often without individuals' conscious control of such processes. Rapid and remote collaboration spaces within networks are increasingly important sites for the production of new knowledge and ideas. Processes of consumption increasingly involve repurposing and reusing products in ways that are meaningful within and for specific social networks, and network feedback is used to rapidly alter products and services. Individuals are able to participate in an increasingly diverse set of social networks to reflect and maintain multiple aspects of their identity and different areas of personal activity – including, for example, educational, occupational, family, friendship networks. Such practices challenge individualised notions of knowledge production and traditional concepts of 'information literacy'. Instead, they require a view of knowledge generation, analysis and synthesis as a profoundly social set of practices.

Successful participation in all social networks is not inevitable. Participation is shaped both by the barriers to entry exercised by social networks, and by the capacity of individuals to develop the resources and skills to enter and participate in such networks. Different social networks will have different conditions of entry. Entrance to the increasingly global specialised knowledge communities associated with practices such as high status R&D, for example, require the demonstration of certain forms of scientific and technical disciplinary knowledge and competence before entry is permitted. Entrance to political or economic elites may require not only access to knowledge, but familiarity with the codes, practices and people already participating in these networks. At the individual level, the capacity to enter, move between and, crucially, to establish new networks is not an inevitable consequence of an increasingly networked identity. Those individuals who demonstrate expertise in mobilising online social networks are often those who already demonstrate expertise in producing and participating in offline social networks. The capacity to interact effectively in social networks also involves the development of a range of skills such as the ability to interpret complex information environments, the capacity to collaborate effectively remotely and using diverse media, the ability to manage and understand intellectual property issues, and the ability to develop trust and build reputation in such environments.

As socio-technical networks become a more important means of gaining, sharing and generating knowledge (whether personal, social or professional), so the stakes for non-participation or exclusion from such networks will be higher.

What challenges might such a model of networked individuals and networked knowledge pose for education?

In a context of networked knowledge and networked individuals, educators would to become intimately concerned with enhancing the capacities of individuals to learn, live and work in interdependence with their network of tools, resources and people. They need to focus on enhancing the capacities of individuals to enter into and work within networks that are of personal, social or economic importance to them. They need to enhance the capacities of individuals to critique, challenge and establish their own knowledge networks, and to find strategies to manage the inequalities that might emerge when knowledge and information are produced in, and through, networks.

To prepare for such possible networked futures over the coming two decades, then, we might want to ask ourselves how far our current educational practices meet the following demands:

Curriculum and Pedagogy

- Curriculum and pedagogy that takes account of and draws upon the social and technological networks that learners can mobilise to enhance their learning
- Opportunities for learners to develop the skills and knowledge needed to participate as creative or original producers as well as critical consumers in face-to-face, mediated and remote social networks. Such skills include the capacity to manipulate both print literacy and numeracy and more complex visual, gestural, virtual, remote and embodied forms of interactions
- Collaborative knowledge production as a familiar and routine element of teaching and learning practice - including authentic experience of social entrepreneurialism, establishing new networks, participation in existing real world networks, remote working, collaborative working, reputation management, identity management, intellectual property management
- Critical reflection upon the disciplinary, economic and political nature of social networks as a core component of the curriculum: examining how social networks are formed, their roles in knowledge production, how barriers to entry are

produced and eroded, and the intellectual, ethical, political and social debates raised by the production of knowledge in social networks
- A curriculum for 'human-machine relations' that includes opportunities for learners to reflect upon the increasing interdependence of humans and machines, the development of spaces and opportunities for 'disconnection' from machines, the examination of differences between human and machine intelligence, the development of understanding of computational and complex systems, and the analysis of the risks, opportunities and ethical challenges of interdependence with socio-technical systems
- A clear understanding of the curriculum and pedagogy needed for entry to powerful networks and the opportunities for learners to develop such knowledge
- *Assessment*
- Models of assessment that assess how learners, technologies (digital and biological) and collaborative networks interact to produce knowledge and information – assessment methods, in other words, that take the 'networked' individual rather than the 'sovereign' individual as their basis

Institutions
- Open and flexible institutional practices (including timetabling arrangements) that allow individuals and groups to participate in diverse face to face, local and remote social networks

Workforce
- An educational workforce (of educators, support staff, carers and mentors) that is profoundly skilled in taking on multiple roles in establishing and working within knowledge networks with learners. This includes understanding and developing individuals' capacities to participate in social networks, acting as a co-producer of knowledge alongside other learners and educators, developing learners' skills and knowledge, creating institutional contexts within which new knowledge networks can be established, building bridges between different learning networks.

Policy and Research
- Widely accessible forums, advice and guidance for educators, learners and the wider public to ensure an informed and widespread understanding of the potential affordances and limitations of pharmacological and genetic interventions in education.

Empowering learners to navigate an increasingly complex learning landscape

The socio-technical developments described above suggest that the coming two decades may see a significant shift away from the equation of 'learning' with 'educational institutions' that emerged with industrialisation, toward a more mixed, diverse and complex learning landscape which sees formal and informal learning taking place across a wide range of different sites and institutions. These developments suggest that:

- New providers from private, third sector and public sector organisations in the UK and internationally will offer widely accessible face-to-face, remote, work-based and informal education
- Distinctions between sites of education, leisure and work will erode and between stages of education, working, caring and retirement.
- Informal learning, including intergenerational learning, will play an increasingly important role in social cohesion and educational provision

New providers entering the field. Over the coming two decades the historic reasons for attending formal educational institutions – namely, that these are the sites where you can access the information necessary for learning and interact with the people who can help you to learn – are likely to be eroded. The rise of 'teaching and learning exchanges' that allow individuals to find suitable teachers, the entrance of broadcasters and social networks into the provision of both formal (accredited) and informal educational opportunities, the emergence of informal peer learning networks, the rise of 'Open Education' approaches by universities and museums making learning resources widely and freely available, all of these increase the capacity of the individual to access learning resources and learning interactions in ways that do not necessarily require continuous participation in or allegiance to particular educational institutions. As both national and global businesses increasingly offer their own accreditation, and as the forms of assessment offered by mainstream education are increasingly disconnected from the values and competencies valued outside education, moreover, the monopoly of educational institutions as awarders of formal qualifications is also likely to be increasingly challenged.

Weakening boundaries between personal, educational and occupational worlds. The increasing demand upon individuals to continue to learn throughout life sees a collapse in the previously mutually exclusive phases of education, work and retirement. As individuals live for longer and need to work for longer, while balancing occupational and family commitments, learning is seen as something in which individuals needs to participate across all life phases, and as something that is supportive of a range of personal and occupational objectives – for pleasure, for employment, for personal need. 'Education' is no longer simply something that happens at the start of life in distinct institutions; instead, learning is seen as an activity that can happen in a range of places at a range of stages in life. At the same time, younger cohorts are increasingly blending the previously distinct practices of 'working/playing/learning', and rich media and web technologies make it easier to erode physical distinctions between workplaces, learning settings and homes.

Informal learning becoming more visible and more valued. Informal learning has always been with us, it is not a distinctively new feature of the 21st century. However, over the coming two decades we expect to see a rise in the visibility of, and value accorded to, informal learning.

The demographic shift that will see significant numbers of the population move into retirement or into new relations between retirement and work over the coming two decades may play a major role here: it necessitates an increasing emphasis on ongoing knowledge exchange and transfer of experience in the workplace to ensure that whole generations of skills and expertise are not lost, and it requires older adults to continue to find ways to keep up to date with new technologies. Increased familial and global mobility also bring new demands for rapid and responsive citizenship education, and increased pressures on public resources potentially generate conflict between generations. All of these pressures mean that the value of intergenerational learning is likely to be increasingly acknowledged over the coming decades: just as the demand for intergenerational learning to play a significant role in educational provision and social cohesion increases, so also the availability of an older population able to 'teach last' and needing to 'learn late' increases.

At the same time, learning in the workplace will play an important role, as a rich information landscape leads to ever-increasing specialisation and the expert skills of those in the workplace are harder to generalise to mainstream educational settings. The resurgence of interest in the learning sciences, which increasingly contest the capacity of traditional formal educational institutions and pedagogies to develop certain skills and

competencies, will also lend support to a re-evaluation of the role of informal learning across homes, workplaces, in communities and in formal educational settings.

What challenges might such a diverse learning landscape pose for education?
All of these developments suggest that the roles played by schools and universities as the primary sites of learning for the last hundred or so years, may not inevitably continue in their current form over the coming two decades. This is not to suggest that such institutions will disappear, but these traditional sites of formal education may (as we are already seeing in some places today) be asked to adjust and to play different roles in a more complex and diverse learning environment. This environment will see more significant roles for work-based learning, intergenerational learning, social and community based learning, remote and online provision, professional accreditation, informal learning for pleasure and family learning, and will involve a recognition of learning as an activity that is more evenly distributed across both the lifecourse and across the different sites and practices of life.

If we want to ensure that we empower all learners to navigate this diverse and complex learning landscape over the coming two decades, then we might want to ask how far we are ready to meet the following needs:

Curriculum and Pedagogy

- Lifelong and free opportunities for all to develop the skills and competencies needed to find out about, access, and learn within the diverse spaces of the learning landscape. This includes ensuring that all learners have: the literacy, numeracy, information, communications and collaboration skills needed to communicate effectively in diverse learning environments, the vocabulary and competencies to reflect upon and enhance their own learning, and the capacity and information required to take informed decisions about learning choices across different sites and different stages of life.
- Public space for individual learners and communities to reflect upon the wider learning landscape, assess its strengths and weaknesses, generate new learning communities and practices, and develop a shared language to talk about and debate the role of the learning landscape in the production of the public good.

Assessment

- Universally compatible personal learning records owned and managed by learners that can be carried across diverse settings in order to create a coherent educational narrative and the inter-operable systems across educational providers that are needed to ensure ease of transfer across sites.
- Systems and standards that enable learners to demonstrate attainment and experience across diverse settings and, where formalised assessment is concerned, to transfer credits between different sites of education.

Workforce

- A cohort of lifelong learning mentors or guides to ensure learners are able to make informed choices and to tackle the potential for a more diverse learning landscape to amplify existing social inequalities. These mentors would support individuals in their understanding of the learning landscape, including the local and global resources open to them, the criteria for participating in high value learning communities and social networks, and support individuals through key transitions across the lifecourse and in ongoing decision-making about educational trajectories. Such guidance and mentoring does not simply fall into the category of 'careers education' or 'pastoral care', but requires a skilled process of bridge-building between learners' personal experiences and the development and identification of opportunities to build new skills and knowledge.

It is also a role that should last throughout an individual's learning career, namely, such a resource should be accessible throughout life.

Institutions

- Timetabling arrangements and tools that enable learners to build personalised timetables across different providers, to take advantage of learning opportunities in schools, museums, community settings, workplaces and universities, and to enable learners and mentors to schedule opportunities to learn with others.
- Formal educational institutions that have the spaces, resources and staff to network with and to host diverse learning activities, including multi-generational learning exchanges, support and mentoring, community provision, as well as access to specialised disciplinary knowledge.
- A map of the diverse learning landscape to support learners and mentors to navigate this complex environment effectively. This map would encompass the individuals, institutions, workplace, community and online provision of education across voluntary, charitable, commercial and public sectors. Such a map requires intelligent management of highly complex data to describe, manage and visualise the different forms of learning offered in different settings, the forms of accreditation available and the different forms of quality assurance in operation in these different forms of provision. The goal of such a map would be to make visible the range of offerings for all learners, not necessarily to promote competition between suppliers.

Policy and Research

- A clear understanding and language for describing, mapping and understanding the benefits of the diverse learning practices that take place across different sites in order to better understand the distinctive contribution of formal educational institutions such as schools and universities. What is it that these environments offer that informal learning, workplace learning, inter-generational learning might not be able to offer?
- A review of teachers' professional identity, teachers' roles and teacher education. In this diverse learning landscape, the diversity of people involved in 'teaching' would increase, as would the range of sites within which 'teaching' took place. Potentially new 'teacher' roles might emerge, for example, the skilled learning mentor, the specialist teacher of 'key literacies', the disciplinary expert, the network creator. There may also be new cohorts of late life teachers, or a rise in voluntary educators offering education in return for opportunities to interact with and learn from younger people or to participate in new networks.
- A review of existing child protection processes. As a more diverse learning landscape would necessarily involve the participation of a wider range of people in teaching and providing education, there are a number of issues that are raised around current approaches to child protection. Young people need to be equipped with the skills to operate safely in both online and virtual environments. At the same time, such increasingly diverse learning networks raise questions about the extent to which current child protection processes (in particular the policy of CRB clearance) will be able to function in such an environment, or whether a review of the fundamental principles of child protection needs to take place in order to ensure both that children are protected, and that the processes put in place to support them do not militate against their participation in the potentially powerful resources of a more diverse learning landscape.

Redesigning education in the context of uncertain economic futures

Since the early 1990s, the idea of the 'knowledge economy' has shaped education policy in the UK and around the world. This idea has led to a commitment to widening

university participation, raising the school leaving age, increased investment in creative practice and STEM subjects, and the demand for a universal rise in formal qualifications and accreditation of skills. The 'knowledge economy' is, itself, dependent upon a particular interpretation of socio-technical developments: it assumes that there will be increased economic competition between countries, facilitated by global information and communications infrastructure, and that this competition can be managed by ensuring that citizens are sufficiently skilled to take on high-value, creative and knowledge generating employment while low paid jobs are offshored to other countries who compete on price.

The socio-technical developments described above, however, suggest that this vision of a thriving and universally beneficial UK knowledge economy focused on creative industries, knowledge work and innovation, may be increasingly hard to sustain over the coming two decades, and that its benefits are not necessarily likely to accrue to all citizens in the form of fulfilling, well rewarded employment. These developments suggest that:

- We may see an increasing polarisation in the labour market between highly paid global knowledge workers and low skilled, low paid service workers
- One response to this polarisation may be a shift in social and cultural values towards a valuing of ordinary work, and a recognition of informal and community economies
- Another response to this polarisation may be a shift toward new sites of economic activity and increased emphasis on locally focused entrepreneurialism

Increasing polarisation and inequalities. Trends toward standardisation in multi-national corporations in which smaller and smaller elites are offered autonomy and responsibility in the workplace while other workers increasingly operate according to prescribed scripts and regulations, developments in digital technologies that begin to offer the opportunity to automate or offshore not only manufacturing jobs but also those of the previously more secure middle class professions such as medicine, law, accounting, information services or education, and increased competition for creative, high value, 'knowledge' jobs from countries such as India and China, increasingly present a picture of a polarised workforce, with reasonably small global and national elites who are highly rewarded and able to operate autonomously, involved in creative employment and generating new knowledge. Such groups are likely to be highly in demand (given the demographic shifts) and there will be competition nationally and internationally for the individuals who are seen as able to play these roles. At the same time, there will be a rise in demand for workers who are able to take on roles that can neither be offshored, nor automated. Such work, for example the potential rise in demand for caring roles in the light of demographic change, may be seen as low skilled, poorly rewarded and undervalued. Such a landscape hollows out 'the middle' and creates an increasingly polarised labour market.

Reclaiming the value of informal economies. While we may see increasing polarisation of creativity and autonomy in the workplace, the social implications of such polarisation may be mitigated by a change in social values toward a recognition of the value of 'ordinary work' and a rebalancing of priorities to recognise the contributions of individuals in their widest sense, encompassing their roles not only in the formal economy but in the wider informal economy. For example, when we think about the 'workplace' of the 2020s, we might think not only about paid work, but also about the value that is generated from caring activities, from volunteering and contributing to the wider community, from personal development and growth. We may also see an environment in which ordinary work, face-to-face services, and localised provision, is seen not as lesser than the work of the global knowledge economy but as equally

meaningful to individuals and communities and deserving, for example, of a real living wage. Such a shift in values may lead to an increasing recognition of the social, wellbeing and cognitive benefits of work. Moreoever, within this framework we might see an increase in commitment to values of collaboration and co-operation – between individuals, and between countries. Such an approach would challenge the construction of economic development as a zero sum game of winners and losers.

Entrepreneurialism and new ideas: another alternative to both of these perspectives is to reduce the reliance for meaningful employment upon multi-national corporations by developing new opportunities for such work through entrepreneurial activities, encouraging the creation of new business and enterprises that can offer highly competitive local employment while multinational companies move away from the UK as their main focus. Such an approach might be supported by a rise in 'green' businesses, community businesses and social enterprises, or in the exploitation of new opportunities in virtual worlds.

What challenges might such alternatives to the 'knowledge economy' future pose for education?

The increasing unsustainability of the mass 'knowledge economy' as a coherent future narrative for education systems poses a number of significant challenges to the goals and aspirations of education. In particular, if there are limited economic benefits for participation in education for all but a few, there will be real challenges around motivation. Polarised earnings distribution – between high skills, high wage and low skills, low wage – will act as a disincentive to participate in education or lifelong learning for significant numbers. At the same time, a more diverse model of the future economy will also pose challenges to education – to what extent are educational institutions and processes equipped to enable learners to contribute to diverse informal and community economies, or to generate new local businesses and identify new economic opportunities in alternative economic sectors?

If we want to ensure that we enable all individuals to flourish in the potentially widely diverse economic environments of the coming two decades, then, we might want to ask how far we were ready to meet the following needs:

Curriculum and Pedagogy

- A curriculum that enables individuals to explore and develop skills and competencies that enable contribution to and exchange within informal economies of care, of family, of community, understand the meaning and value of work beyond economic benefits, for example, its function in wellbeing, family and social relationships, and balance the diverse demands of caring, formal employment, community roles and learning across the lifecourse.
- A curriculum that focused on promoting young people's wellbeing, personal development, individuality and confidence to ensure their capacity to flourish in whichever potential future environments might emerge.

Institutions

- Educational institutions that are able to act as hubs for creative innovation and collaboration with local businesses, with a strong focus on entrepreneurialism and clear-sighted analysis of existing employment opportunities. Such institutions would focus on creating strong skilled communities, diversifying provision into workplaces, engaging professionals in the processes of education, and tackling disaffection by offering meaningful education in authentic contexts for learners

Policy and Research

- A coherent national strategy which reviews whether a common national curriculum to 14, mandatory attendance to 18 and a hierarchy of formal qualifications serve to meet the twin but differentiated demands for highly skilled individuals able to work in specialised global knowledge communities, and individuals able to provide high quality face-to-face services and caring roles, and the extent to which different curriculum and participation strategies would contribute to lessening or increasing social and economic polarisation.
- A clear corporate social responsibility role for education employers, which clearly identifies how they can act to provide meaningful and creative employment in local communities, empower their workforce and enhance their contribution to the informal economies of their communities .

Workforce

- A careers guidance service that is incentivised to empower individuals to make informed choices, based on robust and unbiased information about the realities of prospects in the labour market, rather than incentivised simply to deliver students in a numbers games to an academic or formal education track.

Dealing with uncertainty: towards a sustainable educational ecology for surviving the 21st century

Neither the socio-technical developments described at the outset of this chapter, nor the possible educational futures described above, are inevitable. All are subject to potential disruptions by a range of known and potentially unknown events and social forces. For example:

The socio-technical developments described above are heavily reliant upon continued energy supply, upon continued access to the mineral resources and raw materials needed to make digital technologies, and upon the continued social acceptance of the demands such technologies make upon environmental resources. Significant energy disruptions, a failure of the technology industry to recognise the need for more environmentally sustainable practices and a reduction in the supply of raw materials all pose threats to the intensification of the digital landscape. Alternatively, the emergence of new health concerns or a major privacy and security failure in online environments, could equally lead to massive public resistance to further socio-technical developments. At the same time, the social and economic landscapes we describe and the demographic assumptions we have used, are dependent upon only limited impact upon the UK from climate change. A rise in global temperatures along with the subsequent international migrations and concommitant economic implications would act to fundamentally change the contexts described above[82].

The socio-technical and educational landscapes that we have presented for the mid 2020s, therefore, should be read as probable but not inevitable futures. Not least, of course, because the very act of describing them here may prompt a range of actions. Those reading this report, for example, may begin to actively work to avoid some of the developments described, or to bring them about. The future is not inevitable, its uncertainty is an invitation to action.

It is worth bearing in mind, however, that when making decisions about the sorts of educational systems, policies and practices we might want to develop in the light of

[82] We are far from convinced that current UK or global environmental policy will mitigate such potentially significant socio-economic and environmental changes, but it is outwith the remit of this programme to begin to model the different potential impacts of different climate scenarios. Such work, we are assured, is being carried out elsewhere in government.

these potential socio-technical developments, that there are many others who have a stake in these decisions. Their opinions and aspirations are as critical to the design of educational futures as the technological affordances of any future world. At this point it is worth returning to the aspirations of those who participated in the public engagement programme. Throughout this programme they expressed the desire for education systems that:

- Promoted understanding, social interaction, caring and co-operation
- Tackled socio-economic inequalities
- Offered the highest quality learning experiences for all, with the quality of human interaction as central to these experiences
- Prepared individuals for the world of work

The uncertainties of the future, then, should not be seen as problems to be overcome by gathering ever more detailed information, but as liberating and potentially empowering for educators – in that they open up the space for us to attempt to achieve these goals. Critically, this acknowledgement of ongoing socio-technical change and of potential uncertainty relating to such change suggests that education policy makers faced with developing resilient education systems need to recognise that there will be no single educational response that will prepare learners or educational institutions for all potential future developments. Rather than creating a template of 'a school for the future', then, to which all other schools might aspire, the education system needs to commit to creating a diverse ecology of educational institutions and practices. Only such diversity will ensure that, whatever changes come about we have already begun to respond and prepare for them.

Such diversity will emerge only if educators, researchers and communities are empowered to develop localised or novel responses to socio-technical change – including developing new approaches to curriculum, to assessment, to workforce and institutions. As such, building informed debate about current, emergent and potential socio-technical change is critical to creating education systems that are able both to adapt to such changes, and, where necessary, to challenge them. This implies a new role for education policy, namely that it should be committed to:

- Creating true public space at all levels of the system to inform, explore, model and debate educational futures and educational values.
- Promoting, encouraging, archiving and sharing the development of widely diverse educational responses in order to ensure that there is diversity in the system to allow adaptation whatever changes emerge, rather than seeking out and disseminating universal and uniform solutions.

For longer-term resilience in the face of socio-technical change, then, we should witness a significant shift in the model of educational change currently in operation. This change should see time, resources and responsibility for innovation, knowledge sharing and evaluation of educational innovation being located within the educational institution and the local community of researchers, industry, public services and communities.
This report is a starting point for informing and stimulating the debate on how education institutions might respond to the diverse socio-technical changes we have described. These changes provide significant opportunities for educators and others to begin to re-imagine and debate the role of education over the coming decades. We hope that this debate will continue in a wide variety of other forums, and, collectively, through the website at www.beyondcurrenthorizons.org.

Chapter 8: Appendices

Appendix 1

Appendix 2

Appendix 3

Appendix 4

Appendix 5

Appendix 6

Appendix 7

Appendix 1: Individuals consulted

Nicolas Addison, Institute of Education
Richard Andrews, Institute of Education
Camille Baker, SMARTlab
Andrea Baron, Age Concern
John Bateman, UK Youth
Jeff Bezemer, Institute of Education
Professor Gert Biesta, Stirling University
Fiona Blacke, National Youth Agency
Dr Bob Bloomfield, Natural History Museum
Toby Borland, SMARTlab
Lewis Bronze, MD Espresso
Doug Brown, DCSF
Professor Alan Brown, IER Warwick and TLRP Associate Director
Andrew Burn, Institute of Education
Stephanie Burnett, Imperial College, London
Michael Burton, Freelance Designer
Nigel Canin and Max Wainewright, 2Simple Software
Catherine Cameron, Agulhas Applied Knowledge
Jessica Charlesworth, Freelance Designer
John Chowcat, General Secretary, Aspect
Professor Anna Craft, University of Exeter
John and Anne Crick, Cricksoft
Gareth Davies, Chair, Niace
Professor Ian Davies, University of York
Babak Davarpanah, SMARTlab
Dr Ruth Deakin Crick, University of Bristol and University of Newcastle, Australia
Jan Derry, Institute of Education
Lisa Doyle, Refugee Council
Professor Sally Duensing, Kings College London
Fiona Dwyer, Women's Aid
Dr David Eddy Spicer, University of Bath
Charles Edwards, Demos futures
Shirley Evans, Royal National College for the Blind
Dylan Evans, University College, Cork
Professor Michael Fielding, Institute of Education
Rosie Flewitt, Open University
Dr Jean Franzyk, Science Museum
Juliette Frisch, Victoria and Albert Museum
Brian Gates, Religious Education Council of England and Wales
Dr Jeff Gavin, University of Bath
Julia Gillen, Lancaster University
Lewis Goodings, Loughborough University
Lizbeth Goodman, Director SMARTlab
Adam Gordon, Future Studio
Lynda Graham, UKLA
Professor Susan Greenfield, Oxford Institute for the Future of the Mind
Christian Greiffenhagen, Manchester University
David Guile, Institute of Education
Lord Richard Harries, Former Bishop of Oxford
Alex Haw, Atmos Studios
Patrick Hazlewood, Marlborough School
Professor Anthony Heath, University of Oxford
Phil Hemmings, Director of Corporate Affairs, RM

Dr Bettina Hohnen, Byron Review
Averil Horton, Head of Foresight, DIUS
David Istance, OECD, CERI
Ceri Isaac, SMARTlab
David Jaffa, Managing Director, SAM Learning
Roger Jeans, Education Manager, Ordnance Survey
Clare Johnson, National Strategies
Dr Richard Joiner, University of Bath
Ken Jones, Keele University
Dr Garrick Jones, LSE
Professor Ewart Keep, Deputy Director, SKOPE & University of Cardiff
Jim Keravala, Transplanetary Ltd
Professor David Kerr, NFER & Birkbeck College, University of London
Alexander King, DIUS
Hugh Knowles, Forum for the Future
Gunther Kress, Institute of Education
Rachel Lasebikan, SMARTlab
Richard Lawson, JobsGoPublic
Celine Llewellyn-Jones, SMARTlab
Rose, Luckin, Institute of Education
Professor Chris Lynch, Institute of Education
Jackie Marsh, Sheffield University
Martin Maudesley, Story Soup
Simon Mauger, NIACE
Diane Mavers, Institute of Education
Dr Xerxes Mazda, British Museum
Ian McGimpsey, RSA
Andy McLeod, Cisco
Guy Merchant, UKLA
Stanislava Mislanova, SMARTlab
Tara Mooney, SMARTlab
Lya Noon, TDA
Professor Brahm Norwich, Exeter University
Peter O'Hagan, Serco Learning Solutions
Professor Jonathan Osborne, Kings College
Maria Cristina Paganoni, Milan University
Kate Pahl, Sheffield University
Tony Parkin, SSAT
Joanna Penman, Gloucestershire City Council
Julian Pixton and Gerry Daish, Logotron
Sara Price, Institute of Education
Andrew Ravenscroft, London Metropolitan University
Professor Steve Rayner, Oxford Institute for the Future of Science and Civilisation
Professor Steven Reicher, St. Andrews University
Professor Michael Reiss, Royal Society
Paul Rogers
Phil Rossall, Help the Aged
Andreia Santos, Open University
Anna Sophia Schenk, SMARTlab
Dr Ralph Schroeder, Oxford Internet Institute
Julian Sefton Green, West Hampstead Arts Centre
Staffan Selander, Stockholm University
Mark Shuttleworth, Ubuntu
Jeremy Silver, Media Clarity
Annika Small, Tony Blair Faith Foundation

Professor Richard Smith, Institute of Education
Bob Stein, Institute for the Future of the Book
Susanne Stein, SMARTlab
Paul Stenner, Brighton University
Brian Street, Kings College London
Penny Tamkin, the Work Foundation
Tim Tarrant, TDA
Steve Taylor, Stripey Design
Elisabeth Thornton, Gloucestershire County Council
Andrew Thraves, Granada Learning
Ed Tranham, Meissa Limited
Jon Turney
Professor Lorna Unwin, Institute of Education
Professor Valerie Walkerdine, Cardiff University
Dr Leon Watts, University of Bath
Ben Weaver, ESSA
Professor Klaus Wedell, Institute of Education
Professor Rupert Wegerif, University of Exeter
Vanessa Wiegand, Videographer
Geraint Williams, BT
Sarah Younie, ITTE

Organisations Consulted

@Bristol
3MRT
ACDS
Adobe
ALT
ALT FE Action Research Group
AQA
Arnolfini
Autodesk
Barnardos
BERR
BESA
Bread Youth Project
BT
BTL eLearning
Cambridge Assessment
Cambridge University Press
CAPITAL project
Cimex
Cisco
CTAD
DCSF G&T
Desq
DIUS
EdICTs
Education Publishers team
Education Relations
Education Unbound
Encyclopaedia Britannica
ESA McIntosh
ESRC
Etech Group
Ezekiels
Findel Education
Forum for the Future
Gemin-i.org
Graham Oakes Ltd
Guardian
Harcourt Education
Hewlett-Packard
Highlands and Island Enterprise
Iansyst Ltd
Intuitive Media
Kezos
Letts and Lonsdale
London Metropolitan University
LSN
Microsoft
Mike Ayres Design
Mouchel Parkman
National Archive of Educational Computing
National Commission of Enquiry into the Future of Lifelong Learning
NCSL
NES Arnold
NHS Connecting for Health
NIACE
Nokia
Norwich Union
Nottingham University
Open University
Orange
OUCS Oxford University
Oxfam
Oxford University Press
Podchains
Promethean
RaGeS
Ramesys
Rising Stars
RM
Secondary Futures
Sero
Sharp Laboratories Europe
Sibelius
SICO Europe Ltd
Skanska
SMARTlab
South Gloucestershire Council
SSAT
Steljes Ltd
Synergistics
TDA ICT Advisory Group
Teachers TV
Theworkshop
Tomorrow Project
Toshiba
Tribal Group
Two Four Learning
University of Hertfordshire
University of Leicester
University of Salford
Vehicle & Operator Services Agency (VOSA)

Appendix 2: Members of the Expert Advisory Group

Dominic Flitcroft	Team Leader, Technology Futures Unit, Department for Children, Schools & Families
Helen Beetham	JISC
Patrick Hazlewood	Head Teacher, St John's College, Marlborough
Vanessa Pittard	Director of Evidence & Evaluation, Becta
Robin Widdowson	Curriculum Adviser, QCA
Robert Wood	Director of Strategy, The Training & Development Agency
Dr Sarah-Jayne Blakemore	Royal Society Research Fellow Institute of Cognitive Science, University College London
Professor David Buckingham	Professor of Education Institute of Education, University of London
Professor Dave Cliff	Professor of Computer Science Department of Computer Science, University of Bristol
Professor Danny Dorling	Professor of Human Geography Department of Geography, University of Sheffield
Professor Gunther Kress	Professor of Education Centre for Multimodal Research, Department of Learning Curriculum and Communication, University of London
Dr Nick Lee	Associate Professor Institute of Education, University of Warwick
Professor Claire O'Malley	Professor of Learning Science School of Psychology, University of Nottingham
Professor Audrey Osler	Research Professor School of Education, University of Leeds
Professor Alan Prout	Director, Institute of Education Institute of Education, University of Warwick
Professor Josie Taylor	Director, Institute of Educational Technology Open University
Professor Rupert Wegerif	Professor of Education & Director of Research School of Education & Lifelong Learning, University of Exeter
Professor Colin Williams	Professor of Public Policy Management School, University of Sheffield

Appendix 3: Challenge commissioning processes

Challenge 1: Demography, Lifecourse and Generations: Process

Professor Sarah Harper, Oxford Institute of Ageing, University of Oxford

Commissioning Process Stage 1

15 papers were initially commissioned for the Generations and Life Course Challenge.

1 Understanding the changing brain and learning processes, Sarah-Janye Blakemore, Imperial
2 Evolving family structures, roles and relationships in light of ethnic and social change, Robin Mann
3 Ethnicity and social organisation: changes and challenges, Neli Demireva, Oxford
4 Families, care and work: changes and challenges, Andreas Hoff, Oxford
5 Life course and longevity, Kenneth Howse, Oxford
6 Migration and social integration: changes and challenges, Sarah Spence, Oxford
7 Childhood and education: changes and challenges, Nick Lee, Warwick
8 Adolescence, youth and education: changes and challenges, Bob Michael, Chicago
9 Adult skills requirements and education: changes and challenges, Ken Mayhew, Oxford
10 Adult lives and life long learning: changes and challenges, Stephen McNair, Leicester
11 Later Life and education changes and challenges, George Leeson, Oxford
12 Family structures and intergenerational transfers of learning: changes and challenges, John Jessel, Goldsmiths, London
13 Migration, ethnic diversity and education: changes and challenges, Cath Roth, QMW, London
14 Class groups and education: changes and challenges, Hugh Lauder, Bath (with Ceri Brown)
15 Life course, technology and education: changes and challenges , Clare O'Malley, Nottingham

The following instructions were given to each author.

The remit of this challenge theme is to understand:

Key trends in demographics, family structures, intergenerational relationships and ageing 2025 and beyond

Key uncertainties and potential discontinuities in these areas

How these trends potentially intersect with developments in science and technology

What range of potential futures these trends might point to from the present to 2025-2050

What the implications might be for educational goals, structures, methods and resources What evidence exists of interventions and strategies to respond to these different future scenarios

Within this theme a series of papers are being commissioned which will cover the broad areas of family, generations, childhood, ageing, life course, ethnicity, social status and migration. All reviewers will be asked to consider the future implications of changes in

science and technology and how these may impact upon their particular field. A small group, who have expertise in education, life-long learning and skills, will in addition be asked to also consider the possible impacts of these changes on trends and drivers within education.

Each paper should be between 5000-8000 words and should broadly follow the following framework.

The first half of the paper should outline current knowledge and likely future developments in their field. In other words it should be a straightforward state of the art review of current understanding. The second half of the paper should be original and exploratory and draw on your own expertise and insight into how the future may develop over the next forty years or so. In particular it should indicate future directions and current signals within the field, describe the events or changes that would challenge these assumptions.

Throughout you should consider the future implications of changes in science and technology and how these may impact upon your particular field.

If your letter has requested this then in addition you should also consider the possible impacts of these changes on trends and drivers within education.

Commissioning Process Stage 2

Following the initial commissioning processes, these were revised to 13 papers through combining:

McNair and Leeson and commissioning Leeson to write a paper on *Adult lives and life long learning: changes and challenges*, which included a specific focus on later life as one of its elements;

Demireva and Spencer and commissioning Demireva to write a paper on *Ethnicity, migration and social organisation: changes and challenges*.

O'Malley dropped out due to illness and personal circumstance.

Michael dropped out due to illness and it was eventually agreed that Harper would review his work on adolescence.

Roth and Heath asked to delay their paper *Migration, ethnic diversity and education: changes and challenges* until 2009 due to RAE. In the end Heath agreed to provide information but not a paper.

Mayhew's paper on work was not pursued due to overlap with Work Challenge.

Stage 3

A further paper was commissioned from Elizabeth Kelan, LBS on *Different future generations: the needs each generation might have and how each may view education across the life course* by 20th January.

Event

Challenge team members met in Oxford on 22nd January to review their contributions and address the five key Challenge questions;

1 What are the existing observable social and technological practices in this challenge area which we can reasonably confidently expect to continue to 2025?
2 What factors, for example events or changes in social values, might play a significant role in shaping future developments in this challenge area?
3 What are the key uncertainties in the challenge area that may lead to radically divergent future developments, and what might act as the lever for such divergence?
4 What potential future challenges or opportunities might these trends and factors present for education?
5 What existing educational practices or evidence might provide insights into potential responses to these challenges or opportunities?

Challenge 2: Identities, Communities and Citizenship

Professor Helen Haste, Visiting Professor, Harvard Graduate School of Education, USA. Emeritus Professor of Psychology, University of Bath

Four areas are explored in this Challenge;

- The relationship with technology, particularly how it is used
- The nature of identities, their development, location and processes
- How communities are created and sustained, how they change
- What is citizenship and how is civic engagement fostered?

Reviewers were asked to consider the state of trends in the field within their chosen topic area, implications for educational practice and policy, and likely (probably, plausible and preferable) future directions.

Fifteen review papers were completed, the majority of which addressed the intersection of at least two of the four areas (in some cases touched on all four) with a focus on particular topics. The papers were commissioned mainly from younger researchers with recent direct research experience relevant to the Challenge. An Advisory Group of twelve senior experts in the field acted as advisors, commentators and reviewers. Two workshops with these participants, in September and November 2008, served to refine and develop the agenda and the dominant themes and ideas, under the chairship of the Challenge Lead.

The Advisory Group

- Professor Anna Craft, Professor of Education, University of Exeter and The Open University and Government Advisor, Creative and Cultural Education.
- Professor Ian Davies, Professor in Education at the University of York, UK.
- Dr Ruth Deakin Crick, Senior Research Fellow, Graduate School of Education, University of Bristol and Conjoint Professor of Education, University of Newcastle, Australia.
- Dr David Eddy Spicer, Lecturer in Education, University of Bath.
- Dr Jeff Gavin, Lecturer in Psychology, University of Bath.
- Dr Richard Joiner, Senior Lecturer in Developmental Psychology, University of Bath.
- Professor David Kerr PhD, Principal Research Officer, National Foundation for Educational Research (NFER) and Visiting Professor in Citizenship at Birkbeck College, University of London.
- Professor Brahm Norwich, Professor of Educational Psychology and Special Educational Needs, School of Education and Lifelong learning, University of Exeter.
- Professor Steven Reicher, Professor and Head of the School of Psychology, St. Andrews University.
- Professor Valerie Walkerdine, Research Professor, School of Social Sciences, Cardiff University.
- Dr Leon Watts, Lecturer in Computer Science, University of Bath
- Professor Rupert Wegerif, Director of Research, School of Education and Lifelong Learning, University of Exeter.

Challenge 3: Knowledge, Creativity and Communication

Dr Carey Jewitt, London Knowledge Lab

The scope of the challenge

A steering group was established to ensure that the scoping of the challenge area benefited from diverse expert knowledge drawn from Sociology, Social Psychology, Cognitive Psychology, and Media and Literacy. Steering group members:

- Professor Michael Young, Institute of Education, University of London
- Professor Karen Littleton, Open University
- Professor Steven Brown, Leicester University
- Professor Jackie Marsh, Sheffield University

The steering group participated in mapping of the terrain of knowledge, creativity and communication, identifying key trends, issues and drivers and leading authors in the area; to the challenge seminar events; and peer-reviewed the challenge reviews. The scoping of the challenge was also informed by discussion with key academics, the BCH Expert Advisory Group, and key literature reviews and reports within BCH.

Review topic areas

The rationale for selecting review topics was based on three elements: first, a focus on the essence of technological and social practice rather than specific technologies (e.g. the notion of mobility rather than the mobile phone); second, looking beyond education to see the broader context for knowledge, creativity and communication; and third, the desire to engage with the complexity and lack of consensus in this area.

A set of 20 reviews was commissioned that cover a broad range of topics key to the challenge of knowledge, creativity and communication and the futures of education. These include risk, identity, global expansion, neuroscience, affect, collaboration, participation and networking, innovation, representation, multimodal design, curriculum, argumentation, information, the role of institutions, learning, community, connectivity, convergence, literacy, and knowledge construction. The reviews are written by leading figures in the area of knowledge, creativity and communication drawn from the UK, Sweden, Germany, USA, Australia, and South Africa. (A full list of authors and review titles is provided in the reference section.)

Challenge activities

Two consultative day events were held at the London Knowledge Lab in Autumn 2008 to inform the challenge, one in mid-September 2008 and the other in mid-November. The events ensured that the challenge outputs were informed by consultation with leading-edge science and social science thinkers from across a range of disciplines. The events included a mixture of presentations, workshop discussion and activities. These were attended by twenty participants from linguistics, multi-lingual studies and new literacy studies, semiotics, social psychology, cognitive psychology, philosophy, sociology, cultural studies, computer science, media studies, educational studies, and art and design.

Knowledge, creativity and communication: Event 1
Event 1 enabled key commentators from a range of disciplines to connect and engage with the futures for KCC. The event generated ideas to contribute to mapping the challenge area and reviews, and room to explore trends from a variety of perspectives

useful to the challenge area and BCH program. The tensions and difficulties of futures work that arose during the day were valuable tools for thinking through the challenge. The day also enabled initial work to begin to imagine potential futures for 2025 – 2050. The outputs of the event, which informed the scoping and interpretation of the reviews, included: detailed comments on review areas, identification of major themes and additional themes and gaps in the scoping exercise, and factors considered by participants as foundational for futures. In addition, several review authors attended the event and found the day helped to contextualise the program and inform their reviews.

Knowledge, creativity and communication: Event 2
Event 2 explored the changing face of knowledge, creativity and communication with an eye to the long term and emergent trends pertinent to the futures of education. The day's activities centered around three substantial presentations, each of which drew on a key set of review areas: 1. Changes in knowledge construction, participation and networks; 2. Creativity, entrepreneurialism and expertise; and 3. Rethinking distance, space and place. Each presentation generated a debate that focused on identifying key themes for the future. The day closed with a workshop on emerging scenarios, in which participants worked with the presenters and participants to identify key drivers and levers for change. The day's outputs, which informed this report, included the identification of key drivers and levers for change and interpretative themes and questions for debate.

Event participants

Name	**Surname**	**Institution**
Lewis	Goodings	Loughborough University
Andrew	Ravenscroft	London Metropolitan University
Julian	Sefton Green	West Hampstead Arts Centre
Kate	Pahl	Sheffield University
Sara	Price	Institute of Education
Jeff	Bezemer	Institute of Education
Julia	Gillen	Lancaster University
Brian	Street	Kings College London
Richard	Andrews	Institute of Education
Ken	Jones	Keele University
Jackie	Marsh	Sheffield University
Guy	Merchant	UKLA
Lynda	Graham	UKLA
Rose	Luckin	Institute of Education
Gunther	Kress	Institute of Education
MariaCristina	Paganoni	Milan University
Andrew	Burn	Institute of Education
Staffan	Selander	Stockholm University
Paul	Stenner	Brighton University
Rupert	Wegerif	University of Exeter
Rosie	Flewitt	Open University
Christian	Greiffenhagen	Manchester University
Diane	Mavers	Institute of Education
David	Guile	Institute of Education
Jan	Derry	Institute of Education
Nicolas	Addison	Institute of Education

Challenge 4: Working and Employment: Summary of Process

Professor Robert Wilson, Institute for Employment Research, University of Warwick

The report forms part of a much larger programme of research entitled *Beyond Current Horizons* (BCH), which is focused on the *Future of Education*. A series of initial papers were prepared for the BCH programme as part of a ground clearing exercise designed to identify any relevant research evidence. This lead to the BCH Expert Advisory Group defining a number of key *Challenge* areas, each covering issues and topics thought to be crucial to the future of education. This report focuses on one of these *Challenge* areas. It is concerned with *Working & Employment.* It builds on an earlier paper by the author (Wilson, 2008) which was one of the initial series referred to above.

The Working and Employment Challenge

There is no shortage of research and commentary on the "Future of Work". This has received a further boost in recent months, as the uncertainties associated with the worldwide financial crisis, and the subsequent economic recession, have increased. Academics and other commentators have produced enormous numbers of books, reports and journal articles focused entirely or in substantial part on the topics of future employment and work patterns. Technology and other changes are resulting in dramatic changes in how work is done and where it is undertaken. Globalisation has become the buzz word when discussing most economic and social issues. As a result of these developments, work can now easily be broken into smaller tasks and redistributed around the world. Dramatic improvements in real time communications, including the development of “virtual worlds”, are transforming the concept of what it means to be "at work".

Sifting through all this material has presented a very real challenge. There is often a tendency to exaggerate and sensationalise in order to sell books and newspapers. In-depth and evidence based research by the academic community often suggests rather more inertia, and places more emphasis on trends which are evolutionary rather than revolutionary. This suggests that there is often a large gap between the rhetoric and myths perpetrated by some commentators and the reality of life in the workplace. The report included in this document (see above) attempts to provide an assessment of what is really likely to happen over the next 15 years or so, and to identify what are the main uncertainties in the area of Work and Employment.

The BCH programme allocated resources to each *Challenge* leader to help in the task of reviewing and synthesising the evidence, including asking other researchers to produce short *Review Papers* on topics of key interest. In the case of the present *Challenge*, these resources were deployed in the following ways:

First, a *Challenge Steering Group* (CSG) was set up to help:

- to prioritise the research areas to be considered;
- to decide what specific reviews to commission and who might be asked to undertake them; and finally,
- to provide a general sounding board in developing the present report.

Second, the potential authors identified were asked to prepare short review papers on the selected topics;

Third, a series of events (small seminars/workshops) were held: to discuss the matters raised; to identify common themes and gaps; and to help prioritise the key issues with regard to the objectives of the BCH programme finally;

A series of Quick Reviews was also commissioned to fill in some of the main gaps identified;

Challenge Steering Group (CSG)

This comprised 4 acknowledged experts in the field of work and employment:

- Professor Lorna Unwin, (Dept. of Lifelong and Comparative Education, Institute of Education);
- Professor Ewart Keep, (Deputy Director, SKOPE, School of Social Sciences, Cardiff);
- Penny Tamkin, (Programme Director, the Work Foundation);
- Professor Alan Brown, (IER Warwick and TLRP Associate Director).

The Review Papers

A total of 19 Review Papers were commissioned, involving 21 authors, many of whom are recognised experts in their chosen areas of specialism. These papers are listed in the Reference section. They cover a range of topics intended to cover the most significant issues likely to affect the world of Work and Employment over the coming decades. This list was initially suggested by the author, and subsequently refined following comments and suggestions from the BCH EAG and the CSG. Without these *Reviews* this report could not have been written.

In addition to the main Review Papers, a series of Quick Reviews was undertaken by Wilson and Gambin (2008). These were intended to fill in gaps identified by the author (in combination with the BCH EAG and CSG) after the first round of Review Papers had been completed.

The general brief for the Review Paper authors was to produce for their chosen topic a short paper which covered:

- The main trends and issues in the area concerned;
- Any possible discontinuities looking forward to 2025 and beyond;
- Uncertainties and any big tensions;
- Conclusions on what the key issues will be in the future, and initial reflections on any general implications for education.

It was emphasised that the reviews were not just about assembling Evidence, based on previous research, but also highlighting key Ideas and Values. In thinking about the future authors were asked to explore: Probable futures; Possible Futures; and Preferable futures. All Review authors were asked to bear in mind issues to do with the implications for the health, Well-being and happiness for children, families and workers.

The Events

The overall project Brief called for at least two events to be organised for each Challenge. These were intended as consultation and idea generation events (workshops or symposia), with attendees from a range of relevant disciplines, in order to explore connections between items of evidence from the reviews and generate new perspectives on the impact they may have on education.

The first event for the Working and Employment Challenge was held on 9th of October in London at TLRP offices. This event involved a number of the Review Paper authors, plus members of the CSG and others. This was a ground-clearing and brainstorming event, facilitated by the author. It focused upon:

- Topics to be covered in the initial set of *Review Papers*;
- Possible gaps in the choice of *Review Paper* topics;
- Possible authors of Reviews not so far commissioned;
- Other areas of importance, for which there may be only limited research evidence.

As a result some new Review Papers were commissioned and others refocused.

Two subsequent events were held in December and January. These were smaller and focused on reviewing and synthesising the evidence assembled in the Review Papers and developing this Synoptic Report.

Challenge 5: State/Market/Third Sector

Richard Sandford, Futurelab

Activities undertaken within the Challenge

The Challenge is intended to help the Beyond Current Horizons programme understand the following overarching question:

- How might education delivery be structured and organised in 2025 in the light of changes in
  - public/private relationships and
  - development of digital and bio technologies?

Specifically, the work commissioned in this challenge aimed to illustrate:

- Key trends in the relationships between state, private and third sector provision of public services
- Key uncertainties and potential discontinuities within this domain
- How these trends potentially intersect with developments in science and technology
- The range of potential futures these trends might point to from the present to 2025-2050

Work was initially intended to be commissioned under this Challenge from July 2008 under the leadership of an external academic, on the same model as the other four Challenges within the BCH programme. However, the original Challenge lead resigned from the role in September 2008 due to pressing professional commitments. Subsequently, Futurelab have undertook the commissioning of papers, under a revised plan that reflected the compressed timescale and enabled this Challenge to meet its milestones at the same point in the programme as the other four Challenges. The revised plan was been approved by the BCH Programme Board and the DCSF.

- This revised plan comprised the following activities:
- Commissioning 4 substantive reviews in key thematic areas:
  - Public/private relationships in education
  - Existing educational provision and digital technologies: political economy, new models of delivery and developing markets
  - The digital landscape and new education providers
  - The relationships between health and education providers
- Conducting a series of interviews with leading thinkers and practitioners in industry, academia and policy sectors
- Running an event to bring together research, industry and policy sectors to identify emergent and future trends in public/private/third sector provision.

The industry, academia and policy interviews (Oct – Nov 2008)
In addition to commissioning the reviews described above, this Challenge drew on interviews carried out with individuals working at the intersection of public and private sector education provision: this reflects the comparative lack of academic evidence on the relationship between these sectors with regard to the delivery of education, and furnishes the programme with a selection of current concerns and forward-oriented insights from those shaping and understanding the interactions between these three sectors.

These interviews informed the commissioned reviews. Where the interviewee's approval has been obtained, the transcripts will also be made available as standalone resources.

The event (November 2008)
On the 19th November 2008 an event took place at the Institute of Materials, Minerals and Mining (http://www.iom3.org/content/location-map) which brought together a range of attendees from policy, academia and industry to examine the broad questions underpinning this Challenge. How might the education 'market' might be changed by the development of new digital education platforms – for example, what 'new' education providers might emerge through the development of online offerings? What relationships between commercial providers and mainstream educational institutions might develop? Is there a future for 'open' education resources? How might local and global education provision and governance change in the context of online educational resources? What relationship between public and private provision might develop?

Themes and key interactions between private, state and third sectors were identified by participants in this event: these were summarised from notes and transcripts by Helen Beetham and are incorporated in the synoptic report above.

Participating in the event were:

- Richard Sandford (facilitator), Futurelab
- David Istance, OECD, CERI
- Andreia Santos, Open University
- Julian Sefton-Green, Freelance/Futurelab
- Jeremy Silver, outgoing CEO Sibelius
- Tim Tarrant, TDA
- Steve Taylor, Stripey Design
- Ed Tranham, Meissa Limited

Aims and agenda
The Challenge 5 Event was organised with the aim of bringing together key thinkers in the Challenge area and eliciting ideas that might not yet be visible in the published literature of the field, as well as providing an opportunity to cross-check issues emerging from commissioned reviews. The overall aim, as with all Challenge Events, was to support the construction of coherent, robust and relevant scenarios of alternative educational futures.

The agenda followed the two organising themes of the Challenge:

- to describe some of the social and political factors shaping the future delivery of education, particularly shaping the likely balance between public and private sector provision
- to review some of the relevant technological (digital and biological) trends and describe their relationships with the social and political factors shaping the future delivery of education

Work commissioned under the Challenge

Public/private relationships in education (Faizal Farook)
This review is specifically concerned with understanding the current trends and potential future trajectories of public/private relationships in education, through a review of the existing evidence and current trends centred around the following indicative questions relating to the development of educational provision over the next 10-15 years:

- Who takes responsibility for ensuring access to education – individual/state/ community/workplace? Where does this responsibility lie today? How might this change over the coming years? What might lead to these changes?
- What types of education provision may be offered by the state and what by other bodies – private sector/individual/community/voluntary?
- What sort of structural institutional relationships pertain today and which might develop in managing and delivering education in different configurations of state/private/third sector relationships?
- What curriculum implications might ensure from any changes in provision?
- What workforce is implied by any changes?
- What financial arrangements might be developed to enable new forms of education delivery – vouchers/ local schemes/ local providers?
- What risks might emerge for which groups from these models of provision?
- How does accreditation and certification play out?

Existing educational provision and digital technologies: political economy, new models of delivery and developing markets (Julian Sefton-Green)

This review is concerned with understanding the way in which developments in digital technologies – both in terms of the technology industry and the resources that it develops – might change the way in which mainstream education is 'delivered'. It focuses around two inter-related but distinct subthemes: firstly, the relationship between the existing digital technology industry and state education, and secondly, the ways in which digital technology platforms create opportunities for this education 'industry' itself to change its mode and purpose of delivery. As before, this is explored through a review of the existing evidence and current trends that relate to the development of educational provision over the next 10-15 years with respect to the following issues:

- What are the relationships between digital technology industries and education provision at present? How might these develop in future?
- How are the design and implementation of digital technologies for education by commercial companies shaping delivery of education?
- To what extent do the commercial companies developing digital tools promote or facilitate particular models and ideas of education?
- How/does the involvement of digital technology industries in education change the relationship between schools and students – to what extent are students seen as a market or potential future consumers?
- How does free, libre, open source software compare with these approaches? Are there characteristic differences between these and proprietary/commercial suppliers?
- What different models of provision are offered by free, libre and open source development approaches? What are the limits or possibilities offered by these?
- How are existing education providers (schools/universities) likely to 'deliver' education differently through the use of online resources
- Will online resources enable education providers to identify new markets and extend their existing remit?
- What new models of delivery may be enabled by digital technologies? Might these models allow them to meet the needs of those they already serve differently?
- Might new models of provision enable existing providers to develop new funding streams – what are the implications of this for the 'public good' of education?
- What new opportunities do digital technologies offer to voluntary/ informal education sectors?
- Are there going to be different levels of 'access' to education for different people using different tools – i.e. those who have access to one sort of platform get one sort of access etc.

The digital landscape and new education providers (Briony Greenhill)
This review is concerned with understanding the role that may be played in educational provision by organisations and sectors who are currently rarely considered part of mainstream educational provision, or by completely new arrangements of educational provision. It is intended to help the BCH programme understand what new providers might enter the education arena and the sorts of institutional, financial, curricular and assessment relationships that might emerge.

- What new 'providers' of education are enabled by the development of web and other technologies – e.g. school of everything, 5min, you tube, homeschooling networks, commercial providers providing customer training and support
- What happens to the traditional publishing industry – how might organisations like Pearson, the Guardian and others develop?
- What happens with existing broadcasters with public service remit – what sort of educational provision might they develop?
- How might digital technologies enable workplace training and education providers to offer new models of learning?
- Might open source models of education and communities of learning flourish – and in what ways might these lead to new forms of provision?
- What are the implications of new providers for curriculum and assessment – what new offers might these providers make to learners?
- What forms of accreditation and development currently exist and might be developed in a diverse landscape of provision?
- How might learners navigate these different providers?
- What are the implications for ownership of knowledge and resources of developments in online provision from diverse parties – for example, for educational provision in Second Life, what ownership of IP models may develop?

The relationships between health and education providers (Nick Lee)
This is a broadly speculative piece exploring the potential relationships between health and education sectors in the design and delivery of education, considering in particular how the pharmaceutical industry currently relates to medical professionals and exploring whether there are potential indications there of how similar relationships might develop with education professionals. It should also explore the current relationships between the private sector (including digital technology companies) and education, and examine how the pharmaceutical industry might develop similar relationships. In particular, current attempts to site discourses of 'wellbeing' within formal education are be examined in light of developments within cosmetic pharmacology and neuroscience. How might pharmaceutical companies come to be involved in state education – in what roles? And what relationships might develop between pharmaceutical companies and individuals/professionals working in the education sector – what new codes of practice might emerge?

Appendix 4: List of commissioned reviews

FOR REFERENCING, PLEASE USE THE FOLLOWING CONVENTION:

Attwell, G and Costa, C, 2008, *Integrating personal learning and working environments*. Futurelab, Bristol, www.beyondcurrenthorizons.org.uk

Challenge 1: Final Evidence Review Papers

Dr Sarah-Jayne Blakemore, Imperial, London: Understanding the changing brain and learning processes.

Neli Demireva, Oxford, UK: Ethnicity, migration and social organisation: changes and challenges.

Dr Andreas Hoff, Oxford, UK: Families, care and work: changes and challenges.

Kenneth Howse, Oxford, UK: Life course and longevity.

Dr John Jessel, Goldsmiths, London, UK: Family structures and intergenerational transfers of learning: changes and challenges.

Elizabeth Kelan & Michael Lehnert, London Business School, UK: The Millennial Generation: Generation Y and the Opportunities for a Globalised, Networked Educational System.

Professor Hugh Lauder & Dr Ceri Brown, Bath, UK: Class groups and education: changes and challenges.

Dr Nick Lee, Warwick, UK: Childhood and education: changes and challenges.

Dr George Leeson, Oxford, UK: Adult lives and life long learning: changes and challenges.

Dr Robin Mann, Oxford, UK: Evolving family structures, roles and relationships in light of ethnic and social change.

Challenge 2: Final Evidence Review Papers

Heike Doering, University of Cardiff, UK: Communities and Citizenship: paths for engagement?

Ruth Gwernan-Jones, University of Exeter, UK: Identity and Disability: a review of the current state and developing trends.

Dr Ellen J. Helsper, University of Oxford, UK: Digital Natives and Ostrich Tactics? Thepossible implications of labelling young people as digital experts.

Louise Madden, University of Cardiff, UK: Integrating the internet into women's lives.

Dr Thalia Magioglou, Maison des Sciences de l'Homme de Paris, France: Young people's reaction to a feeling of marginalisation and the role of technology; towards a new kind of citizenship.

Dr Kyoko Murakami, University of Bath, UK: Re-imagining the future: Young people's construction of identities through digital storytelling.

Dr Nick Nash, University of Bath, UK: Future Issues in Socio-Technical Change for UK Citizenship: The importance of 'place'.

Justin Reich, Graduate School of Education, Harvard, USA: Reworking the Web, Reworking the World: How Web 2.0 is changing our society.

Dr Sarah Riley, University of Bath, UK: Identity, community and selfhood: Understanding the self in relation to contemporary youth cultures.

Dr Denis Sindic, University of Lisbon, Portugal: National Identities: Are they declining?

Dr David Studdert, University of the West of England, UK: Community and CMC: the virtual absence of online communal being-ness.

Aubry Threlkeld, Graduate School of Education, Harvard, USA: Virtual Disruptions: Traditional and New Media's Challenges to Heteronormativity in Education.

Dr Eva Vass, University of Bath, UK: New technology and habits of mind.

Olga Ververi, University of Bristol, UK: "The Civil Society Project".

Dr Dave Weltman, University of West England, UK: Popular Representations of the Working Class: Contested Identities and Social Change.

Challenge 3: Final Evidence Review Papers

Professor David Baker, Pennsylvania State University, USA: The modernizing role of schools as institutions.

Professor Steven Brown, University of Leicester, UK: Learning, Remembering and Meta-cognitive/communication skills.

Professor Anna Craft, University of Exeter and the Open University, UK: Creativity in the school.

Dr John Cromby, University of Loughborough, UK: The move from social explanations toward neuroscience.

Lewis Goodings, University of Loughborough: Changes in knowledge construction, participation and networks.

Dr David Guile, Institute of Education, UK: Learning to work in the creative and cultural sector: new spaces, pedagogies and expertise.

Professor Denis Hayes, and Dr Kathryn Ecclestone, Oxford Brookes University, UK: Affect, Knowledge, communication, creativity and emotion.

Professor Steve Higgins, Durham University, UK: Learning to learn.

Dr Helen Horst, University of California, USA: Connectivity, flow, convergence and communication: Mobile, portable and personalized.

Dr Gabrielle Ivinson, University of Cardiff, UK: The relationship between the constitution/construction of knowledge and identities, community.

Professor Ken Jones, University of Keele, UK: The dynamic relationship between knowledge, identities, community and culture.

Professor Gunther Kress and Dr Jeff Bezemer, University of London, UK: Multimodal Design: knowledge, communication and creativity.

Professor Hugh Lauder, University of Bath, Professor Phillip Brown, University of Cardiff, Dr Ceri Brown, University of Bath, UK: The consequences of global expansion for knowledge, creativity and communication.

Professor Victoria Carrington, University of South Australia, Professor Jackie Marsh, University of Sheffield, UK: Forms of literacy.

Dr Sara Price, Dr George Roussos, Taciana Pontual Falcão and Dr Jennifer Sheridan, University of London, UK: Embodiment/the body, knowledge, creativity and communication.

Professor Roger Säljö, Dr Oskar Lindwall, and Dr Asa Mäkitalo, University of Gothenburg: Technology, representation and knowing.

Professor Keith Sawyer, University of Washington, USA: The future of learning in the age of innovation.

Dr Michael Schillmeier, Universität München, Germany: Risk as Mediation: Societal Change, Self-Endangerment and Self-Education.

Dr Julian Sefton-Green, Director West-Hampstead Arts Centre, London, UK: Location, Location, Location: Rethinking Space and Place as sites and contexts for Learning.

Dr Sylvia Wolf and Professor Robin Alexander, University of Cambridge, UK: Pedagogy: Argumentation and dialogic teaching.

Professor Michael Young, University of London, UK: Professor Johann Muller, University of Cape Town, South Africa: Thinking about the future: Lessons from the sociology of knowledge.

Challenge 4: Final Evidence Review Papers

Graham Attwell and Cristina Costa, Pontydysgu, UK; Integrating personal learning and working environments.

Professor Chris Baldry, University of Stirling, UK: How will technological change affect opportunities for creating new economic activities, new sectors and new industries to the year 2025?

Professor Jenny Bimrose, University of Warwick, UK: Careers guidance, identity and development.

Professor Derek Bosworth, University of Warwick, UK: The R&D, knowledge, innovation triangle: education and economic performance.

Professor Alan Brown, University of Warwick, UK: Developing expertise – moving beyond a focus on workplace competence, assessment and qualifications.

Dr Bernard Casey, University of Warwick, UK: The changing trajectory of working lives - what will be the impact of an ageing workforce and a longer working life?

Professor Shirley Dex, University of London, UK: Review of future of paid and unpaid work, informal work, homeworking, the place of work in the family (women single parents, workless households), benefits, work attitudes motivation and obligation.

Dr Matthew Dixon, University of Oxford, UK; Information and communication technology, work and employment.

Professor Alan Felstead, University of Cardiff, UK: Detaching Work From Place: Charting The Progress Of Change And Its Implications For Learning.

Dr Lynn Gambin, and Professor Robert Wilson University of Warwick, UK: The Future of Work: What Does Work Mean? 2025 and Beyond.

Anne Green, University of Warwick, UK: The Importance of Place.

Professor Francis Green, University of Kent, UK: The Growing Importance of Generic Skills.

Terence Hogarth, and Derek Bosworth, University of Warwick, UK: Future Horizons for Work-life Balance.

Professor Ewart Keep, University of Cardiff, UK: Labour Market Structures and Trends, the Future of Work and The Implications for Initial E&T.

Stephen Overell, The Work Foundation, UK: The Meaning of Work.

Dr Nick Powdthavee, University of York, UK: Happiness and Well-being.

Dr John Round, University of Birmingham, UK: The boundaries between informal and formal work.

Dr Penny Tamkin, The Work Foundation, UK: In Search of Leadership.

Dr Lorna Unwin, University of London, UK: Connecting Workplace Learning and VET to Lifelong Learning.

Professor Robert Wilson and Dr Lynn. Gambin, University of Warwick, UK: Quick Reviews for the Beyond Current Horizons Work and Employment Challenge, (covering: Science, Technology, Engineering and Mathematics (STEM); Children's work; Entrepreneurial activity and practices; Innovation and intellectual property rights; Emerging economies and virtual/synthetic worlds; Possible negative effects of technological development).

Challenge 5: Final Evidence Reviews

Faizal Farook, Demos, UK: Private Public Education.

Briony Greenhill, Demos, UK: The digital landscape and new education providers.

Dr Nick Lee, University of Warwick, UK: Relationships between Health and Education Providers.

Dr Julian Sefton-Green, Director West-Hampstead Arts Centre, London, UK: Operating Systems? An analysis of the structural relationship between the ICT Industries and Education.

Appendix 5: Public Engagement Surveys and Citizens Panel Make-up

Citizens Panel Questionnaire

Q1 Which of the following are the most important outcomes of a successful education system? [Please rank from 1 (most important) to 5 (least important)]

Attainment and improvement in standards	
Behaviour and attendance	
Civic participation	
Healthy lifestyle choices	
Further involvement in education, employment or training	
Other (please specify)	

Q2 Which of the following are the most important five aims of the education system? [Please rank from 1 (most important) to 5 (least important)]

Ensuring that young people are safe outside of school	
Individuals progressing to achieve world class standards	
The gap in educational achievement for disadvantaged children is closed	
People of all ages participate in education activities (including work-based training, hobbies etc)	
Young people have the appropriate skills for work	
Parents receive information and support	
Young people participate in positive social activities	
Young people's health and awareness of health lifestyle choices is improved	
Other (please specify)	

Q3 Please tick the three areas you think are most important to investigate in order to plan for education in the future.

The role of teachers and schools	
The future of work and what skills are needed	
The role of technology in education	
What should be studied and how	
Where learning takes place outside of school	
The role of assessment	
Other (please specify)	
Other 2 (please specify)	

Q4 Please tick the four most important things you would want in the education system in 2025:

Teaching more foreign languages	
Supporting and valuing teachers	
Development of non-academic skills	
Involvement of the community and parents	
Changes to the curriculum in relation to the needs of employers	
Changes to assessment	
Greater focus on creativity and innovation	
Support for gifted and talented students	
Support for young people with special educational needs	

Focus on basic skills	
Reducing class sizes	
Encouraging collaboration	
Focus on social skills	
Focus on enjoyment	
Other (please specify)	

Q5 What skills do you think will be most important in 2025? [Free text entry]
Q6 What is your biggest worry about the future? [Free text entry]
Q7 What is your biggest worry about education in the future? [Free text entry]
Q8 What would you not want to see in any future education system? [Free text entry]
Q9 What are your hopes for the future? [Free text entry]
Q10 If you could time-travel to 2025 to help create today's education system, what would you try to find out? [Free text entry]

Million Futures Questions

No.	Question Text	From	To	Duration (days)	Days as featured question
1	What are your hopes for the future?	2008-02-28	2009-02-01	339	214
2	What do you want your community to be like?	2008-02-28	2009-01-07	314	0
3	What's your biggest worry for the future?	2008-02-28	2009-02-01	339	0
4	What of today's education do you want to see in 2025?	2008-11-13	2009-01-16	64	40
5	What skills do you think will be important?	2008-02-28	2009-01-07	314	0
6	What would you not want to see in any future education system?	2008-09-29	2009-01-30	123	30
7	What do you want your country to be like?	2008-02-28	2008-09-23	208	0
8	What should education be like for our grandchildren?	2008-02-28	2008-11-11	257	0

Citizens Panel Make-up

Working Status

In full time education	38
Working full time (30+ hours a week)	190
Working part time (less than 30+ hours a week)	102
Looking after the home or family	23
Retired	137
Unemployed and seeking work	4
On a government training scheme	0
Permanently sick or disabled	14
Temporarily unable to work	4
Base	512

Occupation

Managers and senior officials	40
Professional occupations	131
Associate, professional and technical occupations	18
Administrative, clerical and secretarial occupations	46
Skilled trade occupations	23
Personal service occupations	14
Sales and customer service occupation	36
Process, plant and machine operatives	5
Elementary occupation	5
Retired and not working	165
Base	483

Family Situation[83]

Single parent	45
Non-parent, married/living with partner	136
Non-parent, single	112
Married/co-habiting parents with children living at home	174
Carers	7
Base	474

[83] There is some confusion about this question probably because there is no option for parents with grown up children. Some elderly people (75+) have coded 'single parent' presumably because they are widows/widowers with grown up children. There are also an unlikely number of 60 and 70 year olds coding the 'married with children living at home' option. Therefore results about family situation need to be treated with caution.

Housing Situation

Living in ow n house	383
Living in ow n flat	18
Living in privately rented house/maisonette/shared house	31
Living in privately rented high rise flat	0
Living in social housing - house or maisonette	25
Living in social housing - high rise flat	8
Living in parental/other family home	21
Other	22
Base	508

Age on last birthday

18-24	58
25-34	55
35-44	109
45-54	69
55-64	105
65-74	84
75+	34
Base	514

Ethnic Background

White	484
Asian/Asian British	9
Black British/African/Caribbean	16
Other (please specify)	4
Base	513

Appendix 6: Public Engagement Events – Programme Year 1

Event 1 – Parents of Children under School Age

28 Parents, Bristol, December 2007

The half day workshop at Bristol Zoo on 12 December 2007 for parents and carers had three goals: identifying which of the 11 challenges from the Beyond Current Horizons programme they thought was most important to research further, identifying other challenges, and discovering what they wanted from education in 2025. Activities to achieve this included: ordering the previously identified key challenges and building their ideal or worst learning environment of 2025 using modelling materials.

Event 2 – Teachers & Students

26 teachers and 55 students, Birmingham, January 2008

The session at the ThinkTank, the Birmingham Science Centre, on 15 January 2008 was attended by 26 teachers, one consultant, and 55 students aged 12 to 17 from 24 schools around the country. The goal was to prioritise and identify what challenges this group felt were important, and to determine what they wanted from the education system. Activities in this full day workshop included: identifying positive and negative aspects of three diverse types of school and their own ideal school, ordering 11 previously identified key challenges to highlight the ones they wanted to know more about in order to "create" a desired education environment and building their ideal or worst learning environment of 2025 using modelling materials.

Event 3 – Baby Boomers

43 attendees, Croydon, March 2008

The session at Fairfield Halls in Croydon on 4 March 2008 was attended by 43 "baby boomers", ie those aged between 50 and 65 years. The goal of this full day workshop was to consider some of the aspects that have been suggested for research, and to get an idea of the purpose and nature of education according to this age group. The activities included: a paper version of the Power League, so comparing priorities and goals of education, a discussion of intergenerational learning, and building their ideal or worst learning environment of 2025 using modelling materials.

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