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Research review

A literature review of research on teacher education in adult literacy, numeracy and ESOL

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Executive summary

This report reviews research on teacher education for teachers of adult literacy, numeracy and English for Speakers of other Languages (ESOL). It includes literature on teacher education in the related subject areas of English as a second and foreign language and mathematics teaching, as well as broader relevant literature on generic post-16 teacher education. The literature reviewed refers to work on all types of professional development relevant to the needs of teachers of adult literacy, numeracy and ESOL: primarily initial teacher education (ITE) programmes, but also includes continuing professional development (CPD).

From the synthesis of the research, the review concludes that:

1. Teacher education programmes for adult literacy, numeracy and ESOL need to provide opportunities for teachers to explore their own beliefs and values relating to what and how they teach. Such reflection will be more fruitful if the teachers are immersed in practice.

2. However, reflection on a teacher's own beliefs and practice is not enough. Teachers need to have access to conceptual frameworks which will allow them to articulate their own perspectives on learning and teaching, and to reflect critically on the wider institutional, policy, social and cultural issues that enable or constrain their practice.

3. Teacher education programmes for adult literacy, numeracy and ESOL need to be based on what is known about how adults learn, both in terms of the pedagogies that participants will use with their own learners, and in terms of their own lifelong learning as adult educators.

4. Teacher education programmes for adult literacy, numeracy and ESOL should move away from an 'application of scientific knowledge' approach. They need to take into account the strong influence of context on learning, and should avoid assuming that knowledge is first 'learned' in one context before being used in another.

5. Gaining expertise in teaching is a process, and teachers have to pass through various stages. Teachers need to engage in developing personal practical knowledge and become involved in the 'protracted conversation' of learning to teach. Teacher learning should be seen as a career-long process, and licensing of newly qualified teachers granted after an extended period of structured education and development following initial training. Teaching portfolios may be suitable for this purpose.

6. While recognising that teachers of adult literacy, numeracy and ESOL, like all teachers, need to have rich, flexible networks of subject matter knowledge, teacher education programmes should not assume that raising the level of subject matter in syllabuses on its own will have an effect on practice.

7. Teachers should 'be taught as they are expected to teach' by taking part in practical professional development activities which not only support their acquisition of relevant subject matter knowledge, but help them to 'see' the subject from their learners' point of view.

8. Teacher education programmes for teachers of adult literacy, numeracy and ESOL should be wary of assumptions that the knowledge bases of the respective subjects are such disciplines as applied linguistics, sociolinguistics or mathematics. Rather, they need to take cognisance of the process-orientated and holistic nature of teachers' knowledge, and should exploit this by using data-based case-study methods which portray to trainee teachers the richness of expert teachers' cognitions underlying their practices.

9. The crucial role of collaborating mentor teachers should be recognised. These teachers need to be helped to develop a whole new set of mentoring skills. It should be recognised that being an experienced teacher does not mean that one is necessarily a good mentor of novice teachers.

10. Teacher education programmes for adult literacy, numeracy and ESOL should expose teachers to a wide range of types of professional development activity. However, it should be noted that the type of professional development activity may be less important than features of the activity such as length of time, possibility of collaboration and whether or not staff from the same teaching programme are attending.

11. As with all teacher education, initial and continuing teacher education programmes for adult literacy, numeracy and ESOL have to meet the challenge of developing adequate measures of the impact of training and professional development, particularly impact on learner outcomes.

Early drafts of the content of this review were used to inform not only the process of teacher education reform being led by Lifelong Learning UK (LLUK) and the Department for Education and Skills (DfES), but also the implications for the wider workforce reforms.

1 Introduction

The face of *Skills for Life* teacher education, and of teacher education for the UK learning and skills sector as a whole, continues to change. Recent developments and reforms have focused on upskilling and professionalising the existing teaching workforce and ensuring an adequate and continuing supply of competent literacy, numeracy and ESOL teachers.

This report reviews research on adult literacy, numeracy and ESOL teacher education. It encompasses literature on teacher education in the broader related subject areas of second and foreign language and mathematics teaching, as well as relevant literature on post-16 teacher education. While the main focus of the review is on the initial education of teachers of adult literacy, numeracy and ESOL, CPD is also included.

1.1 The context of the literature review

New qualifications were introduced in England from September 2002 for teachers of adult literacy and numeracy. These programmes are at what was then referred to as Level 4 of the National Qualifications Framework (NQF)* and were based on the subject specifications for teachers of adult literacy and numeracy developed by the DfES, working with the Further Education National Training Organisation (FENTO). A third subject specification for teachers of ESOL was introduced from 2003.

For ITE, these were offered jointly with a teaching certificate, based on the generic FENTO Standards for teaching and supporting learning in further education (FE). These programmes were the object of an NRDC study (Lucas et al. 2004) which set out to investigate their implementation. The report concluded that 'the main problem experienced by the course developers was bringing the two types of knowledge (subject knowledge and pedagogic knowledge) together'. The study showed that institutions were adopting a variety of approaches to this, along a continuum from complete integration, through partial integration of the two types of knowledge, to teaching both types of knowledge separately. There was also some concern that the focus on subject knowledge was at the expense of teaching how to teach. Some trainees, especially those with less teaching experience, showed concern about what they saw as a lack of connection between theory and practice.

1.2 Organisation of the review

Section 2 traces the recent history of adult and further education with particular emphasis on the teaching of adult literacy, numeracy and ESOL and examines how the literature has portrayed the impact of historical shifts in the political and policy context on the beliefs, values and identities of adult educators.

Section 3 sets the literature in adult literacy, numeracy and ESOL against the backdrop of

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* The revised NQF from September 2004 redefined what was previously 'Level 4' (degree level) into three sub-divisions, 4, 5 and 6 to correspond with the first, second and third year of undergraduate degree courses.

recent findings on the impact of ITE, and attempts to clarify what practitioners and policy-makers can expect to learn from such research.

Sections 4, 5 & 6 review the research on adult literacy, second and foreign language and numeracy teacher education. Emerging issues and key insights for the initial training and professional development of teachers of adult literacy, numeracy and ESOL are highlighted at the end of each of these sections. The review concludes by bringing together these issues and insights, and making recommendations for practice and further research.

1.3 Scope of the review

The review was undertaken through searches of online databases for articles in journals in the fields of general teacher education, adult literacy, numeracy and ESOL, and subject specific teacher education, including mathematics and English Language Teaching (ELT). The searches also included grey literature, in the form of reports and conference proceedings, and documents available on the websites of organisations and institutions in the field of adult literacy, numeracy and ESOL, both in the United Kingdom (UK) and internationally. A number of key players in adult literacy, numeracy and ESOL, including specialists in the three subject areas, were consulted in person or by email.

2 Some influences on and characteristics of adult educators

2.1 Traditions in adult and further education and lifelong learning

The current context is one in which there has been a shift from a situation of 'benign neglect' (Young et al. 1995) to one in which the teaching of literacy, numeracy and ESOL to adults is at the centre of a series of high-profile central government initiatives. This needs to be seen in the context of the traditions and historical development of the fields of adult education, lifelong learning, and more specifically, FE teaching, and how such historical shifts have impacted on the beliefs and values of adult educators.

The history of adult literacy and numeracy education in the UK in the past 30 years has seen a gradual move away from the philosophy of the literacy campaign in the 1970s which 'challenged the boundaries of adult education by insisting on outreach and a diversity of settings (and) drew on the practices and resources of voluntary organisations...' (Hamilton 1996). The move has been away from the more liberal and radical traditions in adult education towards a 'new realism', or vocationalism, which 'has shifted the focus away from any sense of social purpose in adult education to an image conceived of in primarily institutional and functional terms' (Benn 1997).

FitzSimons (2001) shows how the concept of lifelong learning has become narrowed over the past two decades, losing its original balance between formal and informal, and occupational and non-work-related learning:

> 'Within the last decade a vision framed within new politico-economic imperatives has placed importance on highly developed human capital, science and technology – thereby increasing the importance of work-related education and reducing the concept of lifelong learning to a narrow interpretation of equipping the workforce with necessary skills and competences.' (FitzSimons 2001)

Bagnall (2000) identifies three different 'progressive sentiments' which have underpinned the ideology of lifelong learning over the past 40 years. The 'individual progressive sentiment' emphasises individual growth and development, and liberation from ignorance, dependence, constraint or inadequacy. The 'democratic progressive sentiment' is committed to social justice and equity and liberation from all types of oppressive authority, whether autocratic, oligarchic or theocratic. The 'adaptive progressive sentiment' is committed to learning which will help individuals and organisations to keep up with rapid cultural change in the increasingly competitive global marketplace.

However, as Bagnall points out, any progressive tendencies in these three orientations to adult education have tended to be wiped out by what he calls 'economic determinism', a vision in which educational change 'is driven by considerations of cost and economic benefit, and preoccupied with educational accountability with all its implications for outcomes, accreditation, generic vocational skills (...) together with the commodification of both education and personal identities' (FitzSimons 2001).

In the context of FE, Young and Lucas (1999) identify five pedagogic traditions, which while they still exist in most FE colleges today, are being challenged by a shift from more 'insular' to more 'connective' forms of knowledge:

■ The 'school' tradition of subject-based teaching, which is based on a 'transmission' model of teaching in which knowledge is transferred from teacher to learner.
■ The training and instruction tradition, which is associated with apprenticeship and the acquisition of 'on-the-job' skills, and can be based on the assumption that teachers do not need specialist knowledge of pedagogy.
■ The pre-vocational tradition, which emphasises 'learning by doing' and the active involvement of the learner in the processes of their own learning.
■ The experiential tradition, which emphasises the adult learner's prior experience and their ability to self-direct.
■ Flexible learning, which seeks to improve learners' access to learning, often through the use of new technologies. (Young and Lucas 1999)

While recognising that much good practice takes place across and within each of these traditions, Young and Lucas see their dependence on individualistic assumptions about learning as being a major weakness which renders them inadequate to the task of developing a pedagogy for the future. They summarise recent developments in learning theory in which it is seen as a situated and trans-situational process, and offer a set of five assumptions as a basis for developing an alternative pedagogy to the five traditions:

■ Learning is a social process involving learners participating in 'communities of practice'.
■ Learning is a situated not a generic process and always takes place in a context.
■ Contexts must not be seen as bounded but themselves mediated by wider contexts from the organisational to the global level.
■ It is important to distinguish between different types of learning and their interdependence on each other.
■ Though a learner's previous experience must be taken account of, learning also involves being immersed in ideas that can provide the basis of reflection on that experience. (Young and Lucas 1999)

2.2 Adult educators' beliefs, values and identities

Adult educators themselves have unsurprisingly not been immune to the impact of these historical shifts on their own values and beliefs. Fieldhouse (1993a, 1993b) shows how the values of one cohort of adult educators shifted from the optimism, protest and radical politics of the 60s and 70s to the pessimism, selfishness and general depoliticisation of life in the 80s and 90s. The vision of adult education as 'a tool to be used in the process of personal and collective consciousness-raising, the development of critical awareness and understanding' has shifted to an emphasis on 'individual development (skills, competences, goals), self-help and student-centredness, with a narrower definition of development' (Fieldhouse 1993b: 243).

Each of the three progressive 'sentiments' identified by Bagnall has important implications for what is expected of adult educators, with each one foregrounding different sets of skills, values and attributes. In the 'individual progressive sentiment', depending on what aspect of individual development is emphasised, adult educators can be expected either to have a strong background in an academic discipline, be able to facilitate the development of autonomous, self-directed learners, or have skills in managing learning situations. In the 'democratic

progressive sentiment', teachers are expected be well-educated themselves, be involved in cultural reform, show commitment to democratic values, and have good pedagogic skills. Within the 'adaptive progressive sentiment' good adult educators are expected to bring relevant and recent professional or life experience and expertise to their teaching, to be open to change, and have the skill to be able to transfer their learning and experience to others (Bagnall 2000).

Fragments of these ideologies and ideas can impact on adult educators to create a 'mental mosaic' which may be unsystematic, incoherent, subject to influence, and even contradictory (Benn 1997). As Cranton and King explain:

> 'We encounter these and many other conflicting social norms about education daily. As we make our own meaning of the world, we are influenced by the norms implicitly or explicitly presented to us, even often assimilating them uncritically.' (Cranton and King 2003)

For example, Avis et al. (2002) found that a group of trainee teachers completing a one-year, full-time training programme for the post-compulsory education and training (PCET) sector, were in general committed to what they described as an 'unarticulated emancipatory project' which involved a concern for teaching students who had often underachieved at school and for whom FE was a second chance. However, they point out that such concerns for social justice 'were limited by a tendency towards a technicisation of pedagogic processes which meant that the wider socio-economic and political context of FE was marginalised as were the empowering possibilities of the curriculum' (Avis et al. 2002).

The trainee teachers in this study also tended to be critical of the lecturing staff in the college, who they saw to be 'out of kilter' and unable to meet the demands of the changing environment in FE. However, the trainees' critique of colleagues tended to 'take for granted the current context in which lecturers work' and failed to 'construct an analysis that takes seriously the intensification of work or the social justice implications' (Avis et al. 2002). In fact, when the trainee lecturers were faced with difficulties with students, their own comments 'seemed to come perilously near to mirroring their construction of the uncaring "bad" lecturer' (Avis et al. 2002).

Taylor (2003), in a study of 16 adult educators on a Master's programme, found that while they expressed beliefs which favoured more experience-based and interactive forms of learning, the actual meaning and purpose of teaching for these teachers appeared to be more about transmitting knowledge to students, with more experiential methods used as 'ways to make the act of imparting knowledge more active and engaging' (Taylor 2003).

Taylor found that these teachers' conceptions of teaching were deeply rooted in their own experiences of learning and of teachers in childhood. As he puts it, they had 'developed deeply rooted conceptions about teaching and learning through years of socialisation as students in the classroom that significantly influenced their present beliefs about teaching adults' (Taylor 2003). He uses transformative learning theory (Mezirow 1991) to highlight the importance of 'meaning schemes' as frameworks for interpreting experience, and points out the importance of raising such beliefs to consciousness if we want to encourage change in teachers' practices: 'Meaning schemes develop early in life and self-perpetuate unless strongly questioned and critically reflected upon' (Taylor 2003).

Other authors suggest that Mezirow's transformation theory of adult learning can form a basis for the professional development of adult educators. Benn (1997) advocates combining transformation theory with Schon's concept of reflective practice (Schon 1983, 1987) to encourage the type of critical self-reflection that would allow adult educators to 'step back from their involvement, view this in the context of a wider framework, and evaluate and consider alternatives' (Benn 1997). Cranton and King also advocate the use of transformative learning:

> 'Effective professional development brings our habits of mind about teaching into consciousness and allows us to examine critically what we believe and value in our work as educators. The goal is to open up alternatives, introduce new ways of thinking about teaching – a goal that is potentially transformative.' (Cranton and King 2003)

This review shows how this tradition has influenced research into professional development in adult literacy, ESOL and numeracy in Sections 4–6 below.

Earlier conceptions of adult learning, particularly Knowles's concept of andragogy (Knowles 1973, 1998), in which emphasis was placed on adults' prior experience and ability to self-direct their learning, have limitations, however, as a basis for a pedagogy of teacher education for teachers in post-compulsory education. Young and Lucas point out that:

> 'An uncritical celebration of experience can all too easily ignore the importance of providing learners with a knowledge base for reflecting on their experience and for understanding the complex workplace tasks that they are likely to face in the future.' (Young and Lucas 1999)

Self-directed learning, while being an important component of theories of adult learning, has major limitations as a vehicle for promoting the professional development of adult educators. As Benn points out:

> 'This approach can be too comfortable, can allow existing assumptions and prejudices to go unchallenged, and leave untouched aspects of the learner's values and actions that they would prefer not to examine.' (Benn 1997)

A framework for allowing adult educators to reflect on their experience, and examine the beliefs, values and assumptions underlying their practice is provided by Pratt (1998). He shows how adult educators' underlying belief structures, relating to knowledge (epistemological), roles, responsibilities and relationships (normative) and tactical knowledge (procedural) cluster to form what he identifies as five alternative points of view or 'perspectives' on teaching adults. These perspectives are:

- ■ Transmission – effective delivery of content.
- ■ Apprenticeship – modelling ways of being.
- ■ Developmental – cultivating ways of thinking.
- ■ Nurturing – facilitating self-efficacy.
- ■ Social Reform – seeking a better society. (Pratt 1998)

These perspectives are not to be taken as a 'menu' of teaching approaches which individual teachers can flit between depending on the circumstances, but are linked to 'complex and interrelated clusters of beliefs that give meaning to each other and to the nature of one's commitment in teaching' (Pratt 1998). Nor are any of the perspectives to be taken as superior to

the others, as each has its own strengths and contradictions. Some of the perspectives may overlap, and a teacher may identify with two or three perspectives, but one perspective will usually be dominant.

Adult educators need not only to be aware of the belief structures underlying their own philosophies or perspectives on teaching, but also to reflect on how their pedagogical 'identities' are constructed in the social and political contexts in which they work. Zukas and Malcolm (2002) identify five common conceptualisations of pedagogic identity, or 'versions' of the educator in the literatures of adult and higher education:

- critical practitioner;
- psycho-diagnostician and facilitator of learning;
- reflective practitioner;
- situated learner within a community of practice; and
- assurer of organisational quality and efficiency; deliverer of service to agreed or imposed standards. (Zukas and Malcolm 2002)

In comparing common identities constructed in the literatures of adult and higher education, they note that within adult education a familiar and recognisable identity is that of the critical practitioner. As they put it, adult educators are 'not generally surprised to be asked about the *purpose* of their pedagogic work as well as its processes' (Zukas and Malcolm 2002). On the other hand, the predominant identities for educators found in the higher education literature were that of psycho-diagnostician and facilitator of learning, often linked with that of educator as assurer of organisational quality and efficiency and deliverer of service to agreed or imposed standards. In the current context of 'economic determinism' described by many of the writers mentioned in this review, it will not be surprising to see the 'pedagogic identities' of adult educators constructed more and more within a technicist 'learning and teaching' paradigm, which reduces the educator to a kind of automaton, or 'humunculus with a toolkit' (Holmes 1999).

As Zukas and Malcolm point out, conceptions of pedagogy need to go beyond a concern with teaching and learning, to see it as incorporating a 'critical understanding of the social, policy and institutional context, as well as a critical approach to the content and process of the education/training transaction' (Zukas and Malcolm 2002). Cranton and King also advocate a vision of pedagogy which transcends the learning of new classroom strategies and technologies:

> 'Meaningful professional development must go far beyond learning to use a new piece of software or a new trick for increasing student participation. It must involve educators as whole persons – their values, beliefs, and assumptions about teaching and their ways of seeing the world.' (Cranton and King 2003)

Seeing educators as whole persons will involve a pedagogy that is operative not only in the domains of knowledge and action, but also of the self (Barnett and Hallam 1996). A pedagogy for the professional development of adult educators, especially in a higher education context, which limits itself to attending to knowledge and skills, will leave the self 'prey to the ideologies and power complexes present in situations encountered in the wider world' (Barnett and Hallam 1996). What is true for higher education pedagogy in general as it strives to prepare graduates for a world of 'supercomplexity' (Barnett and Hallam 1996) is no less true for the education of adult educators, especially as they will find themselves more and more as students in higher education:

'A genuinely higher education, as the highest form of education, has a responsibility to prepare students fully for (a) world of uncertainty, challenge and turbulence. Appropriate pedagogies for such a world are not to be caught by talk of the production of competences and skills, however 'generic' or 'transferable'. Instead they will be pedagogies that enable graduates purposively to effect change in that world, and to have the enduring will to do so, even though those graduates realise – through their higher education – that there can in such a world be no final warrant for their actions and claims, and their own sense of self.' (Barnett and Hallam 1996)

In 1997, Benn was pessimistic about the new courses for adult educators then being developed equipping graduates to reflect on wider issues and empowering them to resist the ideologies and power complexes they were likely to meet in their professional world:

'... these initial qualifications are increasingly competency-based and tend to focus on teaching skills. There is little time or space for consideration of ethical, practical and philosophical issues arising from the educational process (...) it is possible to search in vain for the advantages of this new type of training for the lecturers but see the result as the efficient production of willing, competent and compliant employees for the colleges.' (Benn 1997)

Evidence from the Avis et al. (2002) study would seem to confirm that such employees are beginning to emerge, in that some new entrants to the adult education profession seem to see the current FE context as unproblematic and are critical of older professionals who they believe are unable to cope with the changing demands of the profession. As one participant in the study commented:

'As new professionals we need to encourage change. We're coming into it, we expect all the paperwork, we know what to expect. We have to do lesson plans, evaluation, paperwork, whereas they don't want to do the paperwork. It is easier for us to change because we are not stuck in our ways.' (Avis et al. 2002)

Bathmaker is concerned about the FENTO standards being used 'to assist monitoring of performance, rather than encouraging learning and reflective practice in initial training, or the development and furthering of critical reflective practice in CPD' (2000). She sees the standards as having potential for either a narrow centralising control of the teaching functions, or as benchmarks to support professional development:

'The standards themselves could be used effectively to support an overall framework of staff development in further education; however, it is equally possible that they could be used to prescribe a very narrow definition of what teacher development looks like.' (Bathmaker 2000)

Evidence of conflicting views of pedagogy and how they can impact on professional development programmes for adult educators can be found in a report on two training packages for adult literacy and numeracy teachers in Australia. Thompson and Chan Lee (2001) compare the underlying philosophies of learning in the Adult Literacy and Basic Education (ALBE) courses developed between 1993 and 1995 (largely based on a set of competences developed by Scheeres et al. 1993), particularly the Adult Literacy Teaching (ALT) and Adult Numeracy Teaching (ANT), and the Training Package for Assessment and Workplace Training (AWT), which was being reviewed at the time of writing the report.

Thompson and Chan Lee's report reveals interesting fundamental differences between the discourses and underpinning philosophies of teaching and learning between the different programmes, which are summarised in table 1.

Table 1.

Comparison of different approaches to pedagogy underlying ALBE and AWT training packages (Based on Thompson and Chan Lee 2001).

ALBE courses (ALT and ANT)	AWT training package
Andragogical model of training	Pedagogical model of training (authoritarian, transmission-based)
Priority to learner needs and goals	Priority to industry needs and goals
Emphasis on teaching	Emphasis on assessment
Emphasis on values and attitudes	Less emphasis on values and attitudes
Emphasis on learning theory	Less emphasis on learning theory
Process orientated	Product orientated
Awareness of 'issues' and uncertainties	Emphasis on standardised procedures

While Thompson and Chan Lee recognise that the older ALBE competences have some deficiencies when compared with their 'modern' AWT counterparts (the needs of industry are overlooked, they seem to be generic competences rather than specific to literacy or numeracy teaching), they point out that 'For adult language, literacy and numeracy teachers, the understandings and values that underpin the ALBE professional development programme remain absolutely current and critical to their work' (Thompson and Chan Lee 2001). They found that a strength of the ALBE competences was their attention to generic teaching skills and underlying theory of learning, and recommended the addition of a set of competences reflecting this to the new AWT programmes.

The comparison between these two underpinning philosophies and discourses reflects differences in underlying perspectives on teaching (Pratt 1998) and the construction of educators' and teachers' 'pedagogic identities' (Zukas and Malcolm 2002). The ALBE package could be characterised as embodying a mix of Pratt's 'developmental', 'nurturing' and 'social reform' perspectives, with the AWT programmes embodying a 'transmission' perspective. In terms of Zukas and Malcolm's pedagogic 'identities' the AWT programme would seem to cast the adult educator in the role of 'educator as assurer of organisational quality and efficiency; deliverer of service to agreed or imposed standards' (Zukas and Malcolm 2002: 205).

2.3 Characteristics of teachers of literacy, numeracy and ESOL to adults

The NRDC survey of teacher participants on the professional development training created to introduce the new core curricula in England in 2001/03 found that teachers of adult literacy, numeracy and ESOL were predominantly white and female, with just over 50 per cent of literacy and numeracy teachers being 46 or over (Lucas et al. 2004a).

With regard to employment status, 42 per cent of literacy and numeracy teachers, and over 50 per cent of ESOL teachers were in hourly-paid employment. In terms of general educational qualifications, 79 per cent of the teachers surveyed had a degree-level or higher qualification at NQF level 4 or above, and 90 per cent had a qualification at A-level equivalent or above.

As for teaching qualifications, most teachers held a qualification of some kind, with the literacy and numeracy teachers tending to have Post Graduate Certificate in Education (PGCE), Cert Ed or BEd status, and the ESOL teachers holding specific English language teaching qualifications (Lucas et al. 2004). The survey also found that 'Teachers have entered the profession through a variety of routes with little or no clear progression and CPD activity' (Lucas et al. 2004).

In the United States, a survey carried out by Sabatini and colleagues (2000) on 423 adult literacy teachers focused on their preparation and previous experience, and the kind of teaching environments they worked in. They found that 69 per cent had a state teaching certification, and that 94 per cent had a Bachelor's degree or higher. However, as in the US at the time of writing there was 'no commonly recognised credential for adult literacy' (Sabatini et al. 2000). Many of these teachers, while well-qualified people generally, did not have specific professional qualifications for teaching their subject specialisms. Most, however, had participated in a range of professional development activities covering a variety of topics.

Two-thirds had more than five years' experience teaching adults, and most had four to eight years' experience teaching at elementary, secondary, or post-secondary level before teaching adults (Sabatini et al. 2000). As with the English teachers of literacy, numeracy and ESOL, they had entered the profession through a variety of routes, and many had got into adult teaching by simply 'applying for a position' (Sabatini et al. 2000).

In terms of employment status, in this survey it was hard to make a clear distinction between full- and part-time workers, as all the teachers either had a full teaching load, or worked at least 18 hours a week. This survey concluded that the adult educators were a stable, experienced, seasoned and well-educated population who were satisfied with the career choice they had made.

It should be pointed out that both the NRDC and the Sabatini et al. surveys cover the more stable and less precarious sectors in adult language, literacy and numeracy. In the NRDC study, most of the teachers worked in colleges, followed by local education authorities (LEAs)/Adult and Community Learning (ACL) provision, with smaller representation from prisons, voluntary organisations, private training and refugee organisations. Problems of access to the training probably meant that teachers outside the first two areas were probably under-represented.

The fact that the American survey restricted itself to teachers working at least 18 hours a week in colleges, left out the more 'precarious' sectors, for example volunteers and more casual workers. This is very significant for the planning and provision of ITE and CPD, for as Coffield et al. (2004) warn, placing the training of adult educators in an FE/FENTO context runs the risk of

not being able to cater for the traditional diversity of teaching population which has always been a characteristic of adult education.

A survey of adult numeracy teachers in Ireland goes some way to capturing this diversity. Maguire and O'Donoghue (2004) report a survey of 313 teachers of adult numeracy in which they identified three categories of provision:

- Non-accredited customised numeracy programmes.
- Formal mathematics (nationally accredited mathematics programmes).
- Vocational numeracy (mathematics related programmes). (Maguire and O'Donoghue 2004)

The tutors in all three categories had a range of qualifications, but many had higher education degrees or diplomas. However, only the tutors who taught formal mathematics and vocational numeracy had studied maths at degree level, with most tutors on non-accredited customised programmes having as their highest mathematics qualification the Irish Leaving Certificate.

In the first two categories, there was a full range of teaching experience, with 40 per cent in both having less than six years, but the vocational tutors were the most experienced, with most having over 11 years. The vocational tutors generally had more experience teaching maths, over 11 years, as opposed to the other two categories with generally less than six years. The vocational numeracy tutors had the most stable working conditions, with most on full-time contracts, while the formal maths tutors had a mixture of full-time and part-time contracts, and the customised programme tutors were generally volunteers or on part-time contracts.

Not only did the tutors differ in terms of the wide range of education and training environments and organisational imperatives which affected them, but they also differed in terms of their 'conceptualisation of what constitutes numeracy and their beliefs about mathematics' (Maguire and O'Donoghue 2004). Maguire and O'Donoghue point out that each of these categories of tutor has different identified training needs that must be met by a differentiated approach to professional development. They conclude that the existing professional development provision in Ireland did not meet these training needs.

In contrast, the survey by Sabatini et al. in the US found that their profiles of adult literacy teachers' training needs suggested 'more common experiences, attitudes and priorities for professional development than differences' (Sabatini et al. 2000).

These similarities cut across the different US curricular areas, adult basic education/general educational development/English as a Second Language (ESL), and the ranges of experience. However, it may be that, as noted above, this survey did not capture the full diversity of the adult education population, and thus the result could be skewed in favour of more homogeneity. However, there is a consensus in the general teacher education literature that professional development, to be effective, must take into account the perceived needs of its potential participants, which are the topic of the next section.

2.4 Adult educators' needs and priorities for professional development

Of the adult literacy teachers surveyed by Sabatini et al. (2000) nearly half chose 'techniques they could use immediately in the classroom' as the main purpose of professional development activity. Other high-ranking priorities were to learn more about teaching adults, to improve knowledge in teaching content areas, and learn how to incorporate technology in the classroom. This tendency to favour teaching techniques was also noted by Maguire and O'Donoghue in their report on professional development for adult numeracy tutors in Ireland. These tutors exhibited a 'consumer mentality', preferring instantly useable 'fishes on the plate today' activities to more advanced 'fishing lessons' (Maguire and O'Donoghue 2004).

Sabatini et al. report that, in spite of criticism of the effectiveness of workshops for professional development, this was a popular format among the teachers surveyed. Independent reading and extended activities such as university course and inquiry projects were also well-rated, as were working in collaborative teams with other teachers and attending conferences. Less popular were serving on committees, participating in internet-based courses, listservs (electronic discussion of technical and nontechnical issues conducted by electronic mail) or bulletin boards.

Sabatini et al. suggest three possible reasons for the low ratings for technology-based activities: problems in accessing or learning to use the technology, the uneven quality of courses and materials they have used. However, the relatively low ranking of technology as a format for professional development contrasted with the higher priority given to integrating technology in the classroom.

As for the content of professional development, the main priority for the adult educators was to learn instructional strategies for teaching reading and writing effectively. They also gave priority to topics of motivation in reading, overcoming fear of writing, accommodating varied student levels, and learning differences (Sabatini et al. 2000). The topics the teachers wanted to learn about showed a high degree of consistency across the range of teaching experience. The authors of this report suggest that 'some issues such as motivating adult learners to read or helping them overcome their fear of writing do not necessarily become easier with greater classroom experience', and that 'professional development experiences may still be useful even for teachers who have a great deal of experience' (Sabatini et al. 2000).

In common with the practice in the US, though the definition of 'adult literacy' teacher in the Sabatini survey included numeracy teachers, 'instructional strategies for teaching mathematics effectively' was only ranked eighth out of 11, suggesting, as Gal points out, that 'the adult educators surveyed did not see mathematics as a high priority area for training' (Gal 2002).

In terms of respondents' perceived level of preparedness to teach different topics, Sabatini et al. found that significant numbers of respondents reported themselves to be only 'somewhat prepared' in such important areas as implementing effective lessons and curriculum planning, teaching reading, teaching mathematics, accommodating varied learner levels, integrating technology and recognising and accommodating adults with learning differences (Sabatini et al. 2000).

The survey also showed that adult education teachers desired some sort of support for attending professional development activities, but no clear preferences emerged between different kinds of support such as being paid for the professional development activity, attending during work hours, or getting release time from teaching.

Smith et al. (2003) suggest that adult education teachers can be either 'settled' or 'hungry', with the settled teachers being those who were 'more satisfied with their teaching or who had no strong need coming into the professional development', and the hungry teachers being those 'who wanted to learn new techniques, new theories, or new ways to address learners' problems in their classrooms and programmes' (Smith et al. 2003). They suggest that settled teachers are less likely to demonstrate change linked to professional development activity than hungry teachers.

The NRDC exploratory study on the new teacher education programmes for teachers of literacy, numeracy and ESOL (Lucas et al. 2004) identified a variety of perspectives among teachers with differing levels of experience. Experienced teachers who were in management or training roles wanted intellectually demanding courses with a high degree of theoretical content, perhaps reflecting a desire to go beyond the more practically orientated initial training they had received. Practising teachers with some teaching experience also emphasised the theoretical content of the new courses based in the subject specifications, which contrasted with the practical nature of their previous training. New entrants to the profession, while confident about the intellectual challenges of the courses, were much more interested in developing their practical teaching skills (Lucas et al. 2004).

As Smith et al. (2003) show, individual factors relating to issues such as the amount of experience, previous training, and motivation interact in complex ways with the type of professional development experienced and contexts in which adult educators work to determine the type and amount of change they are likely to demonstrate as a result of participating in professional development activity.

2.5 Implications and emerging issues for the professional development of teachers of adult literacy, numeracy and ESOL

■ ITE programmes for teachers of adult literacy, numeracy and ESOL, while taking account of trainees' previous experience, should also immerse them in ideas that can provide bases for critical reflection on that experience.
■ The programmes should develop trainees' awareness of various perspectives on teaching literacy, numeracy and ESOL to adults, and importantly, develop their ability to articulate their own perspectives.
■ The programmes should take a wide view of pedagogy which goes beyond a concern for classroom techniques, and involves trainees in reflection on the wider social, policy and institutional contexts they work in, as well as on the content and processes of the education/training transaction itself.
■ The programmes should reflect what is known about how adults learn in terms of self-directed learning and reflection on experience, but should take care not to 'over-individualise' these processes by failing to provide access to sustained social critique.
■ The programmes should reflect the key idea that learning is a social process in which learners achieve greater involvement in 'communities of practice'.
■ The programmes should not only take into account what trainees should know and do, but should use pedagogical practices designed to develop the educator's self, strengthening them as subjects who can effect purposive change on their environments.

3 Knowledge bases for teaching and learning to teach

3.1 Knowledge bases for teaching in the general teacher education literature

Cochran-Smith (2004) describes recent research efforts in teacher education as responding to two very different but not incompatible purposes. The first is 'based on a recently emerging conception of teacher education as a policy problem, with research the warranty for its solution'. This research effort has as its purpose the identification of the aspects of teacher preparation which have greatest measurable impact on desired outcomes, particularly student learning. The second research effort seeks to 'to articulate the knowledge bases for teaching and to make research-grounded recommendations about how core knowledge for beginning teachers can be included in teacher education curricula and pedagogies'.

From the policy-makers' point of view, it is the first research effort which will be of most interest. Unfortunately, research on the impact of different teacher education options on the achievement of learners has produced very limited or inconclusive results. Cochran-Smith gives two reasons why this lack of research on measurable impact is hardly surprising. The first is that research in teacher education has traditionally been 'marginalised and underfunded', with the result that 'many modest and small-scale studies have been conducted, often in the context of one teacher education course or one preparation programme' (Cochran-Smith 2004). The second relates to *what* researchers in teacher education have chosen to investigate. Studies have focused on such topics as teachers' subject matter knowledge, teachers' pedagogical knowledge and skill, teachers' thinking and classroom decision-making, teachers' learning in the context of communities, and teachers' beliefs and attitudes. Findings in these areas, while interesting for building the knowledge base of teacher education, are of little interest for policy-makers without solid, measurable connections to student achievement.

Allen (2003), in a summary of research findings on teacher preparation, largely based on a previous review by Wilson, Floden and Ferrini-Mundy (2001), used the research to attempt to find answers to a series of questions relating to policy issues in teacher education. The questions related to the following topics: the importance of subject-matter knowledge; training in pedagogical skills; different strategies in field experience; the effectiveness of alternative routes into teaching; specific preparation for teaching in low-performing schools; the effectiveness of introducing more stringent entry requirements to teacher education programmes. The answers from the research to these questions were less than conclusive:

■ There was moderate support for the importance of subject-matter knowledge, but it is not clear how much subject-matter knowledge is necessary for specific subjects and levels.
■ There was limited support for the relationship between training in pedagogical skills and effective teaching, particularly if the pedagogical training is subject-specific. Importantly, it is less clear *how* these skills are best acquired – through coursework, teaching practice, or on the job.
■ There was no conclusive evidence about the effectiveness of different strategies and types of field experience. There was some support from descriptive studies that field experiences do have an impact on teachers' beliefs and attitudes, but no evidence as to their effects on student

achievement. Descriptive studies have identified some possible features of effective placements – student teachers should be well supervised by well-trained teachers and university staff, and they should have solid subject-matter knowledge and basic knowledge of pedagogy before beginning practice teaching.

- There was limited evidence for the conclusion that alternative routes into teaching produce teachers who are just as effective as those who take more traditional routes, but that the alternative-route teachers face more difficulties early in their careers.
- There was limited support for the conclusion that specific preparation for teaching in low-performing schools can be beneficial.
- There was no conclusive evidence that introducing more stringent entry requirements to teacher education programmes would lead to more effective prospective teachers. (Allen 2003)

> It would seem, then, that policy-makers who turn to teacher education research to inform their decisions have very little to go on. However, Cochran-Smith points out that times are changing in this respect, and treating teacher education as a policy problem with research solutions 'has now become the centrepiece in many of the most publicised and politicised debates about teacher quality and teacher preparation.' (Cochran-Smith 2004)

As Wilson, Floden and Ferrini-Mundy warn, if those who are 'inside' teacher education do not produce 'sound, robust measures of impact, others – policy-makers and critics – will produce other, less appropriate measures' (Wilson et al. 2002). As will be seen later in this review, the question of impact has been receiving attention lately in adult education circles, but still at the level of what Allen (2003) calls the 'intermediate outcomes' relating to changes in teachers' beliefs and practices.

However, the second research effort described by Cochran-Smith also merits our attention: that which seeks to articulate the knowledge bases for teaching and make recommendations about how core knowledge for beginning teachers can be included in teacher education curricula. She claims that there exists 'a body of well-defined and significant research that ought to inform the preparation of every new teacher' (Cochran-Smith 2004). It is this research which will be of interest to practitioners wishing to develop curricula and pedagogy for pre- and in-service teacher education, and one of the key questions which will need to be addressed is that of the nature of the knowledge required for effective teaching and how it is represented in ITE programmes.

Wideen, Mayer-Smith, and Moon (1998) identify what they call 'three historic, but simultaneous, traditions that reflect different assumptions about learning to teach and how the process should be studied.' They label them *positivist*, *progressive* and *social critique*. Although these traditions represent historical shifts which have taken place in teacher education research in the past 25 years, it is important to remember that the different assumptions on which they are based can be found at present simultaneously informing practice in different teacher education contexts, often within the same programme (Wideen et al. 1998).

In the positivist tradition, learning to teach is seen as an additive process in which the beginning teacher is provided with knowledge about teaching, usually based on research findings, and is then expected to integrate and implement this knowledge in the classroom (Carter 1990; Britzman 1991; Wideen et al. 1998).

The progressive tradition is characterised by a shift in research 'from determining what

beginning teachers should know and how they should best be trained to know it to attempting to understand what they actually do know and how that knowledge is acquired' (Wideen et al. 1998: 133). This tradition is reflected in the practices of one version of 'constructivist' teacher education described by Richardson (1997) in which pre-service teachers are helped 'to understand their own tacit understandings, how these have developed, and the effects of these understandings on their actions'.

The social critique tradition involves a concern with broader issues in teacher education, such as multiculturalism and gender, and is 'characterised by a recognition that research must view the traditional structures of learning to teach as problematic and at times dysfunctional' (Wideen et al. 1998).

The tension between the positivist and the progressive traditions emerges in the literature on the knowledge bases of teaching in a distinction between two types of knowledge relevant to learning to teach. The first is the formal knowledge about teaching produced by conventional scientific methods, and constitutes a body of knowledge produced not by teachers, but for teachers to use. The second type of knowledge is the practical knowledge of teaching that experienced teachers already have (Fenstermacher 1994). As Munby et al. put it:

> 'There is a tension in the teaching profession between teachers' development, understanding and use of practical knowledge, and the generally acceptable understanding that knowledge is propositional. For example, teachers know that there is much more to their knowledge than knowing the subject matter to be taught.'
> (Munby et al. 2001)

Much research effort in teacher education in the past two decades has striven to gain a better understanding of teachers' practical knowledge, and teacher educators have sought to use this knowledge in their programmes. However, as Verloop et al. point out: 'it is not at all clear how formal theoretical knowledge and teacher knowledge can be integrated and used as 'input' in teacher education (Verloop et al. 2001). Studies of the early stages of learning to teach suggest that it is a process in which novice teachers construct their own knowledge of teaching through a protracted 'conversation' that owes little to the 'cognitive and technical' knowledge presented to them in the taught sessions of their teacher education course (Wideen et al. 1998).

With the growing recognition that teachers' practical knowledge is a legitimate knowledge base for teaching and teacher education (Fenstermacher 1994), efforts have been made to capture just what it is that expert teachers know in such a way that it can be useful in trainees' learning. However, the various research traditions based on differing conceptions of teachers' knowledge, such as personal practical knowledge (Clandinin and Connelly 1987; Connelly and Clandinin 1985; Elbaz 1983), pedagogical content knowledge (Shulman 1986, 1987) or reflective practice (Schön 1983, 1987) make it difficult to create representations of what teachers know of general utility for teacher education. Added to this is the difficulty that mentor teachers can have in making explicit their tacit and intuitive knowledge about teaching for the benefit of beginning teachers (Tomlinson 1996). As Eraut puts it: 'When it comes to practical knowledge acquired through experience, people cannot easily tell you what it is that they know' (Eraut 1994).

One of the most influential research traditions in investigating the knowledge base for teaching in the past two decades has been Shulman's (1986, 1987) construct of pedagogical

content knowledge, which he described as 'the amalgam of subject matter knowledge and pedagogical knowledge that is the unique province of teachers' (Shulman 1987: 8). Shulman has shifted his position on the status of this type of knowledge on various occasions, and has recently subsumed most of its content in a new category 'understanding' (Shulman and Shulman 2004). Some researchers have, however, argued strongly in favour of the usefulness of the construct in planning and implementing pre- and in-service teacher education programmes, and helping teachers develop subject-specific teaching competence (Magnusson, Krajcik and Borko 1999).

Although links between teachers' subject matter knowledge and their practices and student achievement are not well understood, research findings suggest that teachers do need to have deep, well-organised and flexible content knowledge in order to represent knowledge to students and select among different instructional approaches (Gess-Newsome 1999). In her review of research on teachers' subject knowledge, Gess-Newsome concluded that 'teachers having low levels of subject matter knowledge often teach for factual knowledge, involve students in lessons primarily through low-level questions, are bound to content and course structures found in textbooks, have difficulty identifying student misconceptions, and decrease student opportunities to freely explore content either through manipulatives or active discussion' (Gess-Newsome 1999).

However, rather than increasing the amount or level of subject matter instruction in teacher preparation, Gess-Newsome recommends identifying 'the classroom practices that are desired and to recognise that teachers need sufficient knowledge to select and implement those behaviours' (Gess-Newsome 1999). She highlights features of these 'desired' practices which are typical of a constructivist orientation to science teaching, and concludes that the issue is not how *much* subject matter is taught, but *how* it is taught, and the recommendation is that it should be taught in ways which are congruent with the types of practices considered to be effective in teaching the subject to learners, while keeping in mind the obvious differences between these two contexts (Korthagen et al. 2001, Putnam and Borko 1997, Richardson 1997).

While the research programme inspired by Shulman's work may be seen as contributing to the effort to understand what knowledge is essential for teaching (Fenstermacher 1994), other research efforts shift the focus to what it is that teachers themselves already know about teaching. One such tradition in the study of teachers' knowledge has emphasised a shift away from empirical or 'paradigmatic' knowledge towards a conception of teachers' knowledge which respects its grounded, experiential and narrative qualities (Bruner 1985; Carter 1990).

Perhaps the most influential construct in this line of research is that of 'practical knowledge' and 'personal practical knowledge' (Clandinin and Connelly 1987; Connelly and Clandinin 1985; Elbaz 1983). Personal practical knowledge is an interpretive framework through which teachers make sense of their lived reality in classrooms. It consists of knowledge of the self, knowledge of subject matter, knowledge of instruction, and knowledge of context, and has important moral and affective dimensions. Teachers use this knowledge both to shape and interpret their practices in the classroom, and its consequences for themselves and their learners, often through images and narratives of classroom practice and events.

Another research tradition that sets out to explore teachers' knowledge in action is based on Schön's (1983, 1987) construct of the 'reflective practitioner' to explore teachers' practical

knowledge. This work uses Schön's concepts of 'knowing-in-action' or 'reflecting-in-action' to describe the knowledge of practice, which inhabits the 'swampy lowland where situations are confusing "messes" incapable of technical solutions' (Schön 1983). The concept of 'reflective practice' has become something of a mantra in teacher education, with a diversity of meanings and vagueness that place it in danger of becoming 'a confusing concept that is simply too big, too vague, and too general for everyday application' (Korthagen et al. 2001: 52). Zukas and Malcolm (2002) see reflective practice as becoming 'a rather all-embracing term, which diminishes in significance as its applications increase' and note how it is unquestioningly accepted as 'good practice' in higher education contexts.

More recent literature in teacher education has called for a re-examination of the relative contributions of deliberate reflection and implicit and intuitive processes in learning to teach (Tomlinson 1999a, 1999b; Atkinson and Claxton 2000). Others have criticised reflection on more fundamental grounds, as having the ironic effect of actually disempowering teachers, as 'the requirements of learning to be reflective are based on the assumption that teachers are incapable of reflection without direction from expert authorities' (Fendler 2003).

Another line of research emphasises the situated nature of teachers' knowledge. This has been taken up by researchers such as Putnam and Borko (1997, 2000) who use theories of situated cognition – 'the view that knowledge is situated – integrally connected with the contexts in which it is acquired and used' (Putnam and Borko 1997) to claim that the various settings for teachers' learning (for example, content courses, methods courses, field experiences) 'give rise to different kinds of knowing' (Putnam and Borko 2000).

The idea that context of use affects the learning of theoretical knowledge has also been put forward by Eraut (1994), who distinguishes three main contexts for using knowledge about education: the academic context, the school context and the classroom context. He claims that learning is intimately tied up with the contexts in which it is acquired, and that it is profoundly misleading to assume that knowledge is first acquired and then subsequently used. He makes the further claim that what is learned in one context is not easily transferred to another, and that knowledge gets reinterpreted during use, with what has been learned needing to be used before it can have real meaning for the user.

In recent teacher education research, teachers' knowledge is being described more and more from a postmodern and post-structural perspective (Britzman 1991; Carlsen 1999). These perspectives see teacher knowledge as reflecting social identity, 'who you are, your background and experience, your purposes, and your social context' (Freeman 2002). Post-structural views of teachers' knowledge see it as embedded in, and inseparable from discourse communities, affected by asymmetries of power, internal to teachers and students, and situated in historical and cultural contexts (Carlsen 1999).

The question of who produces the knowledge bases of teaching is the focus of another line of research in teachers' ongoing professional learning. The teacher-researcher movement (Cochran-Smith and Lytle 1993) rejects the assumption that teachers should be the passive consumers of knowledge produced by university researchers, and asserts that they can and should participate in the production of the knowledge bases for teaching. Using a variety of methods partly based on notions of reflective practice and action research, teacher-researchers engage in systematic enquiry into their own contexts and teaching situations, developing rather than applying theories to transform their practice in desired directions.

3.2 Research on learning to teach in the general education literature

Studies of learning to teach on ITE programmes usually cluster in the following thematic areas: prior beliefs of beginning teachers; course work and field experiences during the programme; and research which follows beginning teachers into the first year of teaching (Kagan 1992; Wideen et al. 1998).

Research has shown that prospective teachers enter general teacher education programmes with well-established beliefs about teaching and learning which originate from the socialisation process of having had thousands of hours of exposure to teaching as students themselves, what Lortie (1975) called the 'apprenticeship of observation'.

Reviews of the literature on teachers' beliefs have generally concluded that they act as a filter which screens experiences on teacher education programmes and that they are robust and difficult to change (Pajares 1992; Richardson 1996). One widely-quoted review concluded that teacher education had an insignificant effect on teachers' beliefs (Kagan 1992), but this conclusion was called into question by errors in her synthesis of the research (Dunkin 1995; 1996). However, it is generally accepted that if teacher education programmes do not take into account beginning teachers' beliefs and assumptions, the programmes are likely to be ineffective (Richardson 1996).

However, even though these beliefs tend to have a powerful influence, the types of belief and their strength can vary a lot across groups of beginning teachers (Richardson 1996). Added to this is the difficulty of studying teachers' beliefs due to the fact that they are embedded in the contexts in which programmes take place. Wideen et al. conclude that, in spite of previous reviews which suggested that programme interventions had only weak effects on beginning teachers' beliefs (Kagan 1992; Richardson 1996), until more 'robust' teacher education programmes are implemented and evaluated, the jury should still be out on 'the fixed nature of prospective teachers' beliefs' (Wideen et al. 1998).

The literature on student teachers' beliefs suggests that they are likely to hold liberal and humanistic beliefs in which caring, understanding and relating to pupils are seen as important. They are also likely to have simple and mechanical views of teaching in which it is seen as a process of transmitting information. The research also suggests that white, middle-class beginning teachers may have rather simplistic and conservative views of issues of cultural and gender diversity, which may create the rather worrying situation of 'a homogeneous population of beginning teachers who attempt to teach an ever more heterogeneous and multicultural population of students' (Wideen et al. 1998).

In terms of the impact of the course work completed on teacher education programmes, the research is not optimistic about its effectiveness in helping prospective teachers learn to teach:

> 'The notion that course work should provide teaching skills and information about teaching – and that beginning teachers can integrate and effectively implement that information – receives very little support from this research.' (Wideen et al. 1998)

However, characteristics of coursework that tended to have some positive effect were: longer duration of courses, working in smaller groups, and, most importantly, consistency among the messages emanating from a particular course with the orientations to teaching found on the programme as a whole.

Research on the teaching practicum suggests that we need to question the idea that teaching practice is where the novice teacher puts into practice the 'theory' learned in course work. The story told by this research is often one of misunderstanding and disappointment, in which the conflicting expectations of teacher educators and trainee teachers lead to a sometimes 'dysfunctional' experience. Teacher educators see the practicum as an opportunity for student teachers to try out non-traditional ways of teaching and reflect on their experience. For student teachers, survival takes precedence over reflection as they often see their images of teaching shattered and have to deal with conflicts for which they feel they have been inadequately prepared (Wideen et al. 1998).

Much of the research advocates student teachers examining their beliefs early in teacher education programmes. However, a study by Tillema (2000) challenges the assumption that examination of beliefs prior to practical teaching experience leads to any significant change, and suggests that reflection on beliefs after immersion in practice is a more fruitful way of effecting belief change. This study also suggests that the links between beliefs and actual behaviour may not be as strong as is generally assumed. Tillema notes that 'the relationship between student teachers' beliefs and their performance is quite low, indeed almost non-existent' (Tillema 2000).

This finding suggests treating with caution calls to have pre-service teachers engage in lengthy bouts of examination of their prior beliefs outside contexts of immersion in practice. Tillema claims that reflection is only meaningful when there exists a repertoire of experiences gained in practice. This finding would support approaches such as 'realistic teacher education', in which learning in student teaching is seen as experiential and consisting of five phases: action, looking back on the action, awareness of essential aspects, creating alternative methods of action, and trial (Korthagen et al. 2001).

Research lends support to the provocative conclusion that 'beginning teachers actually learn how to teach when they enter the classroom during the first year' (Wideen et al. 1998). Interestingly, this takes place through a process in which teachers construct their own knowledge of teaching through a protracted 'conversation' that owes little to the 'cognitive and technical' knowledge presented to them on their teacher education course. Wideen et al. conclude that 'the focus on the knowledge base of teaching during teacher preparation, as something to be applied during the first year, has limited value for beginning teachers'.

The research on the first year of teaching paints a rather negative picture of beginning teachers struggling to cope with a situation that their training course has not prepared them for. Many programmes do not seem to make much impact on beginning teachers' beliefs, and they find that what they learned on the programmes is often "at cross-purposes" with the experience of actually beginning to teach. On the positive side, there is evidence that some programmes do make a difference, particularly if they are longer, have a consistent approach, offer strong support to trainees, and encourage exploration and reflection (Wideen et al. 1998).

The picture of learning to teach which emerges from the literature is one that strongly undermines the positivistic 'training' model of teacher education in which 'the university provides the theory, methods and skills; the schools provide the setting in which the knowledge is practised; and the beginning teacher provides the individual effort to apply such knowledge' (Wideen et al. 1998). More 'progressive' approaches such as constructivism, reflective practice and action research, in which the emphasis shifts from providing beginning

teachers with knowledge to a focus on the *process* of learning to teach, while important, will not on their own do much to improve teacher education.

These approaches continue to focus on the beginning teacher, while leaving out the 'bigger picture' – the social and cultural contexts and the other players who impinge on the process. Wideen et al. advocate an 'ecological' approach in which factors such as courses, programmes and wider structures, along with other players such as supervising teachers and teacher educators are no longer considered 'unchallengeable and operating in isolation', but 'interconnected and regarded as examinable and problematic in both research and practice'.

3.3 Implications for teacher education in adult literacy, numeracy and ESOL

A key issue in the training of teachers of literacy, numeracy and ESOL to adults is the integration of subject matter knowledge with classroom pedagogy. In its report on initial teacher training in FE, Ofsted found that: 'The quality of the trainees' teaching is affected adversely by their limited knowledge of how to teach their subject' (Ofsted 2003). The NRDC exploratory study concluded that the main problem faced by course developers was 'bringing the two types of knowledge (subject knowledge and pedagogic knowledge) together' (Lucas et al. 2004). The DfES consultative paper on the future of teacher education for the learning and skills sector put it succinctly:

> Teachers in our sector need two sets of skills – to be expert in their subject, and to be trained to teach it. (DfES 2003)

However, it may be precisely in this conceptualisation of teachers' knowledge as 'two sets of skills' which are somehow integrated when the teacher 'delivers' instruction in the classroom that the problem lies. This vision of integrating two types of knowledge or skill may reveal a tendency towards a 'training' model in which 'the university provides the theory, methods and skills; the schools provide the setting in which the knowledge is practised; and the beginning teacher provides the individual effort to apply such knowledge' (Wideen et al. 1998).

This reflects the positivist tradition in teacher education described above, in which theory or propositional knowledge is applied in practice. It is a perspective which fails to take into account the increasingly complex picture of what it is teachers need to know in order to do their jobs, which is described in the literature on the knowledge bases of teaching, and the more process-orientated accounts of teaching and learning to teach.

The findings from the teacher education research reported by Wilson et al. and reviewed above, while not necessarily generalisable to a UK adult education context, nevertheless suggest that caution should be exercised in assuming that raising the level of trainees' subject knowledge (or, more accurately, the level of the syllabus content) will have a measurable impact on their effectiveness in the classroom.

As Gess-Newsome (1999) points out, it is not how much subject knowledge is taught, but how it is taught. A more fruitful approach may then be to use a version of Shulman's 'pedagogical content knowledge', which identifies pedagogic strategies that student teachers might use in their own classrooms, and supports them in acquiring the subject knowledge implicit in such activities. This would also lend support to the 'integrated' approach used in some of the ITE courses examined in the NRDC exploratory study. It is supported by the finding reported in the

general literature that there is some support for the relationship between pedagogical training and effective classroom practice, especially when such training is linked to subject matter.

The finding that we know little about *how* pedagogical skills are gained (through course work, field experience or on the job) could be identified as a fruitful area for further research.

Although the main body of research into field experience in school teacher education failed to find any conclusive evidence as to the impact of different types of field experience on student achievement, the findings from more descriptive studies that ITE programmes can have an effect on teachers' beliefs are supported by research in teacher education for teachers of adults, which takes a broader definition of the meaning of 'impact' (see Section 6.2). The need for trainees to be supported by well-trained mentors is echoed in recommendations made by Ofsted (2003), DfES (2003), and in the FENTO position paper which sets out proposals for the implementation of a licensing system for qualifying teachers (FENTO 2004).

A developmental phase after initial training would allow both new and experienced teachers to integrate the different types of knowledge, developing the 'personal practical knowledge' of teaching and becoming involved in the 'protracted conversation' of learning to teach which could be documented with evidence in teaching portfolios. It would also help to avoid the 'frontloading' of theory into packed syllabuses in pre-service teacher education programmes (Eraut 1994).

Work in the situated cognition tradition, which suggests that what is learned in one context is not necessarily easily transferred to another would also support a developmental phase. Although the work in this area in general teacher education focuses mainly on the contrasts between the contexts of course work and field experiences, this perspective may help to further understanding about how teachers acquire underlying teaching competences across a range of teaching contexts, linking to the research gap identified above as to how novice teachers gain teaching expertise.

The school teacher education literature calls for pedagogy to go beyond both the 'positivist' or 'progressive' perspective to adopt an 'ecological' approach (Wideen et al. 1998) in which all the factors which influence teacher education are problematised. This is echoed in the calls in the adult education literature for a teacher education pedagogy which fosters critical reflection on the wider social and cultural issues which impinge on what teachers do.

4 Knowledge base of adult literacy teacher education

4.1 Issues of definition and scope of research literature on literacy teacher education

In identifying and engaging with the research literature on adult literacy teacher education, the reader first encounters a problem of definition. Many interesting studies are not specific to adult literacy, but address basic skills, while clearly having adult literacy as a major component (for example Scheeres et al. 1993). In other studies such as Sabatini et al. (2000) discussed above, the definition of adult literacy includes adult numeracy. In section 7 we briefly consider why adult numeracy has had to struggle free from umbrella definitions of literacy as including numeracy, establishing its own distinctive knowledge bases and pedagogical concerns. In this section we will therefore take a relatively broad view, drawing on findings from studies framed in terms of basic skills, where the focus is clearly on literacy, not excluding studies such as Sabatini et al. (2000) where the distinction between adult literacy and numeracy is blurred, and indeed drawing on relevant literature from teacher education for school literacy teachers. There is, for example, a reasonably substantial literature on teachers' beliefs in relation to literacy (though not specifically adult literacy). Some of this work may be relevant to the teacher education agenda in relation to adult literacy and its potential contribution will be discussed below. Illustrative references are: Alexander, P. A., et al. (1991); Commeyras, M. & Degroff, L. (1998); Poulson, et al. (2001).

With all these provisos, it is still fair to say that research specifically focused on literacy teacher education is scarce, which will become particularly apparent in contrast to the relatively well-developed research agenda for language teacher education that will be presented in section 5. Indeed, there is some suggestion in the literature that such research is becoming less common. In a review of research funded by the Canadian National Literacy Secretariat 1998–2003, St. Clair (2005) suggests that 'over the five-year period of the review six categories of projects have become less common: projects designed to result in programme prototypes, organisational development, materials, programme evaluations, infrastructure and professional development.'

4.2 The knowledge base and characteristics of the effective literacy teacher

There is, however, relevant research from which findings on the knowledge base and characteristics of the effective literacy teacher can be extrapolated (Scheeres et al. 1993; Hammond et al. 1992), and this can be compared with similar research in school literacy (Medwell et al. 1998). The National Foundation for Educational Research (NFER) *Progress in Adult Literacy Study* (Brooks et al. 2001), for example, set out to study what factors influence learner progression in literacy classes. The profile of teachers, including their professional development experience, was included in the variables considered. The teacher component of the study is based on 177 questionnaires completed by adult literacy tutors, which elicited data on their professional development experience. While very few factors influencing differential achievement were identified, a statistically significant correlation was established for progress in reading when all tutors had qualified teacher status. The authors suggest that 'this would appear to support the case for the professionalisation of the adult literacy

teaching force' (p.74). An interesting qualitative finding was the response to the items aimed to identify the tutors' professional reading, which, it suggested, lagged significantly behind current theory. The authors conclude that in the teaching contexts they investigated, despite the best efforts over the years of a number of agencies starting with the Adult Literacy and Basic Skills Unit, professional development opportunities were somewhat patchy, although it must be noted that the study was carried out pre-Moser and *Skills for Life*. Providing some useful contextual information, the study also gives a minor example of Cochran-Smith's (2004) first type of research designed to measure the impact of teacher education on teaching and learning.

The second type of research identified by Cochran-Smith aims to articulate the knowledge bases for teaching in order to inform teacher education programmes. We will now review the findings of three such studies: Scheeres et al. 1993, which used a research-informed methodology to propose competences for adult basic education (literacy and numeracy) professionals in Australia; Hammond et al. 1992, which sought to establish the pedagogical relations between adult literacy and ESL; and Medwell et al. 1998, which sought to establish the characteristics of effective teachers of literacy in school contexts. Using a research-informed methodology for establishing competency standards in the professions (Gonczi et al. 1990), Scheeres et al. 1993 combined a modified functional analysis technique, critical incident analysis, observations and interviews to develop a competency framework for the effective adult basic education practitioner that has seven dimensions:

1) Adult learning and teaching approaches and practices.
2) Selection and placement of students.
3) Managing learning situations.
4) Monitoring learning.
5) Evaluation of programmes.
6) Community communication and consultation.
7) Professional development and training.

An illustrative example of the approach taken in Scheeres et al. (1993) is the following element of the adult learning and teaching competency taken from their framework.

> '1.1 Applies knowledge of theories of language and language learning and teaching to develop adult literacy and numeracy skills.'

The competency dimensions provide a framework onto which professional development curricula can be mapped. It is perhaps fair to say that this is a research agenda of a profession at an early stage of its formation, one that is in the process of inventing itself. Much of the commentary in the literature, including the comments by Lucas et al. (2004a) and Brooks et al. (2001) above, echo this. We have suggested earlier that this contrasts quite strikingly with the relatively more developed research agenda on language teacher education.

Medwell et al. (1998) investigate the characteristics of effective teachers of literacy in the UK school system, and it is interesting to compare these with the dimensions identified by Scheeres et al. Their report (Scheeres et al. 1993) aimed to identify: a) the subject knowledge of effective teachers of literacy; b) teachers' beliefs about literacy teaching; c) subject knowledge and beliefs about teaching literacy as exemplified in teaching practices; d) expert and novice teachers of literacy; and e) becoming an expert teacher of literacy. Based on their research, Medwell et al. were able to identify the following characteristics of effective teachers of literacy:

■ They had an extensive knowledge of the content of literacy, even though this was not generally a knowledge that could be abstracted from the context of their teaching action.

■ Because of this knowledge they were able to see and help their students to see connections between the text/sentence/word levels of language.

■ They had coherent belief systems about literacy and these were generally consistent with the ways they chose to teach.

■ These belief systems and hence their teaching practices tended to emphasise the importance of students being clear about the purposes of reading and writing, and of using this clarity of purpose as a means of embedding teaching of grammar, phonics etc into meaningful contexts.

■ These teachers were teaching literacy in lessons clearly focused on this area (i.e. literacy hours). Within these lessons they used a mix of whole-class interactive teaching and small-group guided work, with occasional individual teaching usually undertaken by a classroom assistant.

■ A good deal of their teaching involved the use of shared texts, through which the attention of a whole group was drawn to text, sentence and word-level features. (See the proposal in the National Literacy Project (NLP 1997) framework that 'text-level work provides the essential context for much of the work at the sentence and word levels'.) (Adapted from Medwell et al. 1998)

Space does not allow us to detail the interesting differences between the characteristics for effective school literacy teachers and those of the adult literacy teachers, but it is sufficient to say that the characteristics in Medwell et al. (1998) are highly focused on the teaching and learning event, while those in Scheeres et al. (1993) are more broadly contextualised, including assessment and placement of students and community liaison, more characteristic of adult education contexts. It is also important to be aware of the dangers inherent in extrapolating findings from school literacy contexts to adult contexts in an uninformed way.

Hammond et al. (1992) investigated the pedagogical links between adult ESL and adult literacy in another study which, while not being exclusively focused on teacher education research, has nevertheless some interesting research-informed contributions, both concerning the knowledge base of adult ESOL and literacy and the comparative state of professional development provision. The interpretation of the term 'pedagogical' adopted by the project involved four dimensions:

■ Policy.
■ Theoretical considerations.
■ Professional development.
■ Teaching practice and curriculum.

Again in this study, teacher respondents were asked to identify the characteristics of an effective literacy teacher. Among those identified were:

■ Practice is theoretically underpinned.
■ Knowledge of/sensitive to adult learner.
■ Flexibility, course design by negotiation.
■ Ongoing professional development.
■ Appropriate pedagogy.

In an admittedly rather small respondent group (91), both adult ESL and adult literacy tutors were agreed on the ranking of these.

While identifying a high degree of consensus between adult ESL and literacy teachers on what constitutes a good literacy teacher, the research also finds that the professional development opportunities open to adult literacy tutors are more patchy and less developed than those for adult ESL. This was, of course, noted by Brooks et al. (2001) for adult literacy in the UK, although without a contrast made with adult ESOL. The authors attribute this to the more recent emergence of adult literacy as a professional field.

4.3 Literacy and teacher education: a Brazilian example

Kleiman (2000) reviews Brazilian research literature on literacy and teacher education which focuses on the knowledge and skills base of the adult literacy teacher, albeit from a critical social perspective. She explains the starting point of this research, arising from a widely-held view in the Brazilian media that adult literacy teachers themselves lack the literacy skills to be effective teachers. Citing research from Guedes Pinto (2000) she writes:

> 'If, for example, we consider newspaper articles on this subject in the last five years, we see that teachers are repeatedly depicted as a group who are not competent in their chosen profession: they are described as being unable to choose a good text book; being incapable of writing a paragraph of straight coherent prose; making appalling spelling mistakes when they write; not having the habit of reading; not liking to read and not reading for pleasure.' (Kleiman 2000)

She argues that this is a misrepresentation, drawing on a conception of literacy based on a literary canon, citing research in Sao Paolo by Ribeiro (1999), which suggests in contrast that the functional literacy (i.e. not literary) levels of teachers in the study were similar to those of other professionals. She compares this finding with the findings reported in the US by Bruschi & Coley (1999) who analysed teachers' literacy levels in terms of the International Adult Literacy Survey (IALS) framework of prose, document and quantitative literacy as part of a larger study of everyday literacy. They produced similar results to those reported by Ribeiro (1999).

Kleiman goes on, however, to cite research such as Batista (1998) which suggests that the issues concerning teachers' literacy knowledge are more complex:

> 'Studies on teachers' social extraction, confirmed by those studies which investigate teachers' lack of disposition or interest in reading, have shown that the great majority of primary and secondary school teachers in Brazil come from families with much lower schooling than that which they achieved : often a primary school teacher is the first literate member of his/her family and his/her successful studies and diplomas are usually the result of a concerned cooperative effort of his/her whole family, working together to bring about that particular member's rapid social class ascension through schooling.' (Kleiman 2000)

This rapid class ascension is not without its 'hidden injuries': Kleiman summarises Batista's conclusion that 'teachers are a victim of a cruel situation, because their late introduction to the so-called literate culture has not permitted them to feel secure about their membership; they do not perceive themselves, nor are they perceived by others, as legitimate members of the literate groups; their schooling has made them more conscious of what they lack, and they forever despair of acquiring the status as readers and users of writing that could give them legitimacy' (Kleiman 2000).

Instead she proposes a critical research agenda for teacher education, based on the idea of workplace literacy, aiming to promote teacher legitimacy and empowerment. Adult literacy teachers' literacy knowledge base should be assessed not on the basis of the literary canon, but on their professional uses of and purposes for literacy, including the main location of their work, which is in the classroom.

Citing data from classroom-based research in adult literacy she examines the construction of didactic discourse in the classroom, using instances of conflict and miscommunication to identify genuine issues and problems in literacy and spoken language use in the classroom. These included difficulties in explanatory discourse, difficulties with word definitions, difficulties in accepting that there is potentially more than one reading of a text with a corresponding tendency to de-legitimise the readings of students. Such issues can form the basis for a literacy teacher education curriculum.

It is interesting to try to read this research from a UK perspective. Although the language of literacy crises is well developed in the media and falling standards are regularly decried, it is not often linked explicitly to appreciation of the literary canon. Lucas et al. (2004) have pointed out the level of qualifications of the *Skills for Life* workforce, which is not typically characterised in terms of literacy deficit. There are, however, interesting parallels with adult numeracy, where the lack of an effective mathematical knowledge base is often referred to in the literature, as will be seen in section 6. Kleiman seems to be pointing to a 'literacy anxiety' corresponding to the more widely recognised 'maths anxiety'. How explicitly is pedagogical discourse presented in adult literacy teacher education courses, and indeed in *Skills for Life* more generally? Kleiman, working from a critical and social reform perspective, poses awkward and challenging issues for adult literacy teacher education.

4.4 Practitioner research as continuing professional development

So far, the emphasis has been on the initial and early stages of teacher training. However, we have also seen how Tillema (2000) recommends an ongoing process of examination of teachers' beliefs and their implications once they are immersed in practice beyond initial teacher training. There is a small literature concerning the continuing professional development benefits of engaging in such reflective inquiry, for example Sanguinetti (1994) , Pates & Fingeret (1994). Sanguinetti describes how teacher-based participatory action research can be a way for teachers to 'take the initiative in articulating, documenting, critically reflecting on and valuing what we actually do in the classroom...'. (Sanguinetti 1994). Such work – and we will see counterparts in the sections on adult ESOL and numeracy below – builds on the literature on critical reflection and transformative learning identified in the discussion of research on adult educators' beliefs, values and identities in section 2.2, emphasising the phased and ongoing nature of professional development.

4.5 Implications for teacher education in adult literacy

■ Overall, the current state of research into teacher education in adult literacy suggests an emergent field where the issues addressed are primarily to do with establishing the characteristics of effective adult literacy teachers and their knowledge bases. There needs to be some foundational agenda-setting research on literacy teachers' knowledge and beliefs about language, literacy and learning and how these influence their practice.

■ There seems to be a lack of a research agenda based round the concept of teacher knowledge, which, as we shall see, is characteristic of the language teacher education research.

■ Kleiman's 2000 research suggests that it would be profitable to use classroom-based research to inform literacy teacher education curricula (and also ESOL and numeracy), since such studies, particularly those involving fine-grained analysis of classroom interaction, can give invaluable insights into the effectiveness or otherwise of teachers' pedagogical practices.

■ Since the professional development of teachers is a staged, unfolding process, forms of CPD, including practitioner research, need to be included.

5 Knowledge bases of adult ESOL teacher education

5.1 Recent developments in language teacher education

In the last 10 to 15 years, general education theory and practice have had an increasing influence on language teacher education. Crandall (2000) identifies four major shifts that have been taking place as a result of the influence of trends in the general education field. First, there has been a move away from the 'positivist' tradition in general teacher education towards more constructivist, process-orientated approaches to learning to teach. Second, there has been a shift away from decontextualised 'best practices' towards recognition of the situated nature of teacher cognition and practice. Third, there has been recognition of the powerful influence and resistance to change of teachers' prior beliefs, and of the need for conscious reflection on them by pre-service teachers. Fourth, there has been a move towards teachers taking more control of their own professional development through research and inquiry, rather than being the passive consumers of outside knowledge on short workshops or training programmes (Crandall 2000).

In a series of books and articles, Freeman and Johnson (1998, 2004; Johnson 2002) reflect these trends by claiming that second and foreign language teacher education is undergoing a 'quiet revolution'. No longer can it be assumed that the knowledge base of language teaching is propositional knowledge of applied linguistics. Johnston and Goettsch support this change of emphasis by claiming that 'in language teaching, it is the teaching that is most important, not the language' (Johnston and Goettsch 2000). However, this 'quiet revolution' is being resisted by applied linguists who seek to maintain the importance of applied linguistics as the knowledge base of language teaching (Muchisky and Yates 2004).

Since the early 1990s, the field of language teacher education has reflected the shift in the general education literature from a positivist view of 'scientific' knowledge as the accepted base for effective teaching knowledge to an effort to develop a greater understanding of the knowledge practising teachers actually have. According to Burns (2003), until the early 1990s, 'teacher education focused primarily on what teachers needed to know and how they could be "trained" to deliver teaching.'

The broad trends described above in the general education literature have been echoed in the language teaching literature: personal practical knowledge and narrative enquiry (Golombek 1998; Golombek and Johnson 2004; Johnson and Golombek 2002); reflective practice (Wallace 1991; Richards and Lockhart 1994); action research and teacher as researcher (Burns 1999; Edge and Richards 1993; Freeman 1998; Wallace 1997).

Language teacher research has been on an 'inward' trajectory, as the application of 'outsider' knowledge and the observation and measurement of external behaviour has given way to a focus on teachers' mental lives, what Freeman (2002) calls the 'hidden side' of teaching. S. Borg (2003) uses the term *teacher cognition* to refer to the 'unobservable cognitive dimension of teaching – what teachers know, believe and think.' However, he concludes that, while this type of research has provided valuable insights, it lacks unity and has yet to explore major areas in language teaching.

The move from the paradigmatic to the narrative ways of knowing is reflected in research which uses the construct of personal practical knowledge and narrative research techniques to explore what language teachers know and do (Golombek 1998; Johnson and Golombek 2002; Golombek and Johnson 2004). According to Golombek and Johnson, 'narrative has emerged as the predominant means of getting at what teachers know, what they do with what they know and the sociocultural contexts within which they teach and learn to teach' (Golombek and Johnson 2004).

This work places emphasis on the affective factors that drive teacher development as teachers use narrative enquiry to resolve tensions and 'cognitive dissonance' in their work, and highlights how expert knowledge or 'theory' must engage with personal practical knowledge in order to have an effect on their classroom practices:

> 'Although teachers use expert knowledge to understand and name their practice, they still must work through the transformative process in a personally meaningful way that enables them to change their teaching activities.' (Golombek and Johnson, 2004)

The complexity of experienced teachers' cognitions as they take pre-active and interactive decisions while planning and delivering courses is described by Woods (1996). Pre-active thinking occurs in advance of teaching, for example in teacher planning, in contrast with interactive thinking or decision-making while teaching. He claims that strict distinctions between different types of knowledge such as subject matter and instructional knowledge are 'not tenable' (Woods 1996). Any element in the structure of teaching can be perceived by language teachers as either declarative content knowledge or procedural instructional knowledge. According to Woods, this implies that 'teachers' knowledge is not of two distinct types, but can be labelled, accessed and used as one type or the other depending on its relationship to other knowledge being considered' (Woods 1996). Woods posits the term BAK, an 'integrated network of beliefs, assumptions and background knowledge underlying teachers' interpretive processes' (Woods 1996).

The complex nature of teachers' pedagogical knowledge in language teaching has been portrayed by S. Borg (1998). His study of an English language teacher's beliefs and practices relating to grammar teaching provides a rich description of a 'personalised, pragmatically orientated system of pedagogical beliefs and practical theories that was powerfully influenced by his perceptions of what worked well, but that in turn served as a filter through which he processed continuing experience' (S. Borg 1998).

Johnston and Goettsch (2000) use three categories of teacher knowledge: content knowledge, pedagogical content knowledge, and knowledge of learners as analytical tools to throw light on how language teachers acquire a knowledge base in teaching, and also to raise more general questions about the knowledge base of language teaching and curricula for teacher education programmes. The study shows how four experienced English language teachers added to their knowledge base of grammar teaching in three ways: by building databases, by working through problem-solving processes, and by using external sources such as reference books and native-speaker informants.

An important finding of this study was the process-orientated nature of the teachers' knowledge. Rather than regurgitating static knowledge for students, the teachers needed to engage with students in problem-solving activity, come up with feasible examples of grammar structures, and give on-the-spot adjudications as to the correctness of examples. This kind of

process-orientated knowledge is grounded in narrative as opposed to paradigmatic ways of knowing which tend to be 'undervalued in teacher education' (Johnston and Goettsch 2000), in which different types of knowledge are modularised. This has obvious implications for language teacher education programmes, which should:

> above all acknowledge the situated, process-orientated, contextualized nature of the knowledge base, so that the boundary between what is thought of as theory (knowledge of language) and what is thought of as practice (teaching) finally begins to be erased. (Johnston and Goettsch 2000)

Freeman (2002) sees the 'hybrid' forms of teacher knowledge such as pedagogical content knowledge and personal practical knowledge as inadequate to capture the fusion of content and process which is characteristic of language teaching. He uses McDiarmid, Ball and Anderson's (1989) concept of 'subject-matter representation' which 'mediates between how the teacher conceives of, and represents, content to students and how they conceive of, and learn, that content' (Freeman 2002). Subject-matter representation goes beyond the 'hybrid' forms of teacher knowledge to 'confound the basic binary structure of content and process, creating a different perspective that has definite implications for educating language teachers' (Freeman 2002).

S. Borg (1998,1999) shows how these rich, holistic descriptions of teachers' knowledge and practices can be used in giving a process orientation to teacher education and development. Studies such as S. Borg (1998) can provide teacher educators with 'detailed, authentic descriptions of teachers' thinking and action', which go beyond simply showing trainee teachers pedagogical options, but can 'illustrate when, how, and why Level 2 teachers in real classrooms draw upon these options.' These rich descriptions of classroom practice can be used to develop a 'data-based' approach to teacher education (S. Borg 1998), and can also be used in professional development contexts to stimulate teachers to explore their own theories and 'examine the many experiential, psychological, and contextual factors which shape their practices" (S. Borg 1999). In the CPD of more experienced teachers this can be achieved through activities such as engagement in practitioner research, including action research, as Burns (1999) suggests. Burns provides a case study on the impact of involvement in a collaborative action research project on the CPD of a participating teacher, which echoes in many ways the emphasis of Taylor (2003) discussed above on the need in continuing professional development to work transformatively on deeply rooted conceptualisations of teachers about teaching and learning and their influence on practice.

5.2 Impact of teacher education on language teachers' beliefs and practices

The research on language teacher education also reflects the concerns in the general literature about the impact of teacher education on pre-service teachers' cognitions and practices. In his review of the research on teacher cognition in language teaching, S. Borg (2003) identified three key themes which need to be taken into account when considering the effect of language teacher education on pre-service teachers' cognitions and practices.

The first is that the outcomes of teacher education vary across individual trainees, who make sense of the training programmes in different ways. The second is that we need to distinguish between changes in thinking and behaviour as a result of teacher education, and to bear in mind that one type of change does not imply the other. The third key theme to emerge is the

need to distinguish between the content of teachers' cognitions and the processes and structure of cognitive development, especially as much of the literature which suggests weak effects of teacher education limits itself to discussion of the content of teachers' cognitions (S. Borg 2003).

One example of a study which focused on the process of teacher cognitive change as opposed to that of content is Cabaroglu and Roberts (2000), which looked at how 20 trainees' beliefs developed on a PGCE in modern languages. They found that belief change was variable (different people change in different ways), and that there were different types of change such as 're-ordering' in which beliefs are rearranged according to their importance, 're-labelling' in which concepts were renamed, and 'reversal' in which the opposite of a previous belief was adopted. Features of the programme which facilitated such belief changes were the early confrontation of pre-existing beliefs, and self-regulated learning opportunities. However, Cabaroglu and Roberts recommend that a condition for early awareness-raising of pre-existing beliefs is that activities include a 'direct experiential element' (Cabaroglu and Roberts 2000).

Further support for the impact of teacher education in language teaching comes from S. Borg's (1998) study of a teacher's pedagogical system for teaching grammar. This teacher had been profoundly influenced by his initial training to the extent that it was able to override both his pre-existing beliefs about teaching grammar and to withstand student objections to his approach. Borg suggests three factors which may have caused the impact of the training course on this teacher: the fact that it was an intensive, four-week programme, the trainers' skill in blending content and processes, and the practical nature of the course, with daily teaching practice sessions (S. Borg 1998).

It may be that the nature of short, intensive language teaching courses such as the Cambridge ESOL Certificate in English Language Teaching to Adults (CELTA) causes them to have a greater impact on trainees' beliefs and practices than what would be expected for the general education literature. In a study of trainee teachers' beliefs on a CELTA course, M. Borg (2002) identifies some strengths of the course in which she gathered her data. The trainees learned from each other in an authentic setting, in which the trainers used a relatively cohesive discourse and modelled the concepts and techniques the trainees are expected to learn. Like the pre-service teachers described in many of the studies in the general teacher education literature, the CELTA trainees had strong prior beliefs, which were resistant to change. Fortunately, unlike many courses, the trainers and experienced teachers in the setting did not share these beliefs.

The main weakness observed on the course was the lack of opportunity for the trainees to discuss and become more aware of their prior beliefs. Overall, and probably due to the time constraints and the 'survival' nature of the course, reflection was neglected. Trainees did not have the opportunity to reflect on *why* certain techniques should be used, or choose among alternatives, but were expected to use what they had been taught.

While Borg recognises that the 'survival' approach may meet some of the needs of pre-service teachers, she points to the danger of the rather prescriptive approach and the lack of recognition of the trainees' beliefs and reflection leading to a situation where 'trainees who graduate from the CELTA may not simply struggle to adapt to their new teaching situation but also may fail to develop as professionals' (M. Borg 2002).

She recommends that for the CELTA to function properly as a survival level entry-point to the profession, what is required is a clearer framework and incentives for beginning teachers to progress to a post-experience qualification.

Roberts (1998) suggests that the CELTA's preparatory nature could be highlighted by linking it to a more advanced qualification, thus giving it 'the equivalent status to the early survival phase of longer and more developmentally orientated courses.' With CELTA being offered as part of the new ESOL teaching qualifications in England, some of the problems with the survival and unreflective nature may be alleviated in the UK ESOL context by the fact that it is now one stage on the road to a full teaching qualification.

5.3 Implications of the research for adult ESOL teacher education and professional education

The research on the knowledge bases for second and foreign language teaching reviewed in the previous section suggests the following implications for the initial and continuing professional education of teachers of ESOL to adults:

■ Teacher education programmes in adult ESOL need to reflect the shift in the language teacher education literature away from decontextualised concepts of 'best practice' and to recognise the importance of context in determining appropriate methodologies, and the situatedness of knowledge about teaching.
■ Teacher education programmes for adult ESOL should recognise the complexities of what constitutes 'subject knowledge' in language teaching, and how it is inseperable from 'teaching knowledge' and involve participants in activities which capture the fusion of content and process typical of language teaching.
■ Programmes need to be wary of assuming that the knowledge base for adult ESOL teacher education is applied linguistics, sociolinguistics, or any other discipline-based knowledge.
■ The findings of the teacher cognition literature should be reflected in recognition of the complex nature of ESOL teachers' cognitions underlying their behaviour, and again this can be captured in a data-based case-study approach.
■ Attention should be paid to the process–orientated, narrative and personal nature of what language teachers know, and there should be an attempt to capture this in data-based forms of teacher education pedagogy in which participants in adult ESOL teacher education programmes are allowed insight into expert teachers' decision-making processes in real cases.
■ It should be expected that there will be variable outcomes of adult ESOL teacher education programmes, with change depending on individual factors, affecting beliefs and/or behaviour, and relating to the structure of belief systems, not just their content.
■ Teacher education programmes for teachers of adult ESOL should encourage teachers to reflect on their underlying beliefs about teaching, but should do so in contexts where the teachers are immersed in practice. In a CPD context, this can be achieved by various types of practitioner research, including action research as proposed in the work of Burns (1999).

6 Knowledge bases of adult numeracy teacher education

6.1 Knowledge bases of adult numeracy as a subject

In the literature on adult numeracy teaching, debates have centred around the epistemological roots of the subject itself, especially pertaining to its relationship with mathematics. There has also been a struggle to 'emancipate' numeracy teaching from literacy teaching, and a debate about the different orientations towards and degrees of sophistication in defining the scope of adult numeracy in different countries, as well as the different domains of numeracy and the possibility of 'numeracies'. There has been debate too about what adult numeracy teachers need to know to do their job, both at the level of the conceptualisation of the subject itself, and at the level of adult numeracy teachers' personal numeracy skills, and on the breadth and depth of knowledge of mathematics they need.

As research on teacher education and professional development for teachers of adult numeracy is 'extremely rare' (Coben 2003b), it is perhaps not surprising to find research on adult numeracy teachers' practical knowledge sparsely represented in the literature, though recent work from adults learning mathematics (ALM) and the US Adult Numeracy Network is beginning to contribute (Coben 2001), along with more recent work from the NRDC Maths4Life project.

If adult education has been the poor relation of school and university education, then adult numeracy is the 'poor relation of the poor relation' (Coben 2003). It has been "under-funded, under-researched, and under-theorised" (ibid.). In the US, the picture is not very different. Gal laments the lack of an 'ongoing dialogue to clarify the goals and appropriate methods for developing adults' quantitative skills and the mechanisms for enhancing the capability of the adult education system to carry this mission' (Gal 2002).

What dialogue there has been has tended to focus on definitions of 'numeracy' and the limits of the field itself and its distinction from sister fields of mathematics and literacy. As Coben points out in the NRDC research review on adult numeracy, the term 'numeracy' itself is 'a deeply contested and notoriously slippery concept' (Coben 2003b). Much of the debate has centred around the relationship between mathematics and numeracy, particularly around the question of whether numeracy can be considered a subset of mathematics. The authors of the influential 'Adult Numeracy Teaching: Making Meaning in Mathematics' (ANT) training pack, in Australia, were clear on this matter:

> 'There's a sort of accretion, adding things to maths – to teach numeracy is to teach the skills, together with conceptual understanding, context, critique … and perhaps culture. So we could claim that this numeracy is not a subset of maths at all. In fact, we could say that numeracy is not less than maths but more!' (Yasukawa and Johnston 2001)

However, according to Coben (2004), the current *Skills for Life* definition of adult numeracy learning sees it as an aspect of adult mathematics learning. This view of adult numeracy learning is not unique. Internationally, as government agencies tackle the issue of poor

numeracy skills in the adult population, they have initiated and implemented national 'numeracy' curricula overlaid with standards and the requirement for measurable learning outcomes. The complex relationship between numeracy and mathematics causes difficulties in devising a 'numeracy' programme that does not read like a mathematics curriculum couched in terms of real life (Maguire and O'Donoghue 2003).

In comparing adult numeracy practices across different countries, Maguire and O'Donoghue (2003) propose an organising framework which describes the development of the concept of numeracy education towards greater sophistication along a continuum which includes three phases: formative, mathematical, and integrative. The formative phase sees numeracy as consisting of basic mathematical skills, while the mathematical phase emphasises contextual factors and the importance of mathematics in everyday life. The integrative phase consists of the most sophisticated conceptualisation of numeracy as 'a complex, multi-faceted, sophisticated construct incorporating the mathematics, communication, cultural, social, emotional and personal aspects of each individual in a particular context' (Maguire and O'Donoghue 2003).

Coben (2002) sees adult numeracy existing in two distinct domains, which are manifested in different approaches to curricula, and which have consequences for the professional development of teachers. Domain One is numeracy as formalised, standardised knowledge, expressed in the language of competency and outcomes, with assumptions about the benefits of numeracy for individuals and society. Domain One numeracy has high exchange value in that certificates can improve employment prospects, but low use value. Domain Two numeracy is about the informal mathematical practices of everyday life, akin to what Kelly et al. (2002) describe as 'mathematics as a social practice'. This numeracy has high use value but no exchange value beyond the contexts it is normally used in (Coben 2002).

Coben locates adult numeracy education in *Skills for Life* in England in the Mathematical Phase (using Maguire and O'Donoghue's framework) and operating primarily in Domain One, because numeracy is defined as a basic skill learned and practised by the individual. Coben concludes that numeracy and mathematics are not totally distinct. In some conceptualisations, numeracy encompasses mathematics, whereas in others mathematics encompasses numeracy, with the result that the relationship between mathematics and numeracy remains ambiguous. (Coben 2004)

While recognising that in the *Skills for Life* policy environment, adult numeracy is moving into the mainstream, Coben is concerned about how adult education policy is being driven by management technology and business interests, leading to a de-professionalisation of the workforce and an impoverishment of the curriculum. She cites work by FitzSimons (2002) in Australia, and Wolf (2002) in the UK on how business interests lobby for key skills in education and training. The result is that adult numeracy is still seen as 'remedial' and a 'basic skill' and important skills such as algebraic and problem-solving thinking are left out of the Adult Numeracy Core Curriculum (Coben 2003a).

Citing work in situated cognition by authors such as Lave (1988) and Lave and Wenger (1991), she goes on to advocate consideration of a socio-cultural approach to numeracy in which mathematical knowledge is seen as socially situated and rooted in adults' 'commonsense' knowledge of everyday contexts, a version of the 'social practices' perspective referred to above. She makes the interesting point that a socio-cultural perspective would probably have produced a different curriculum, which would have taken learners' situated practices as the

starting point, something which would have profound implications for teacher education in the subject. Such a concept of numeracy is 'ideological' in Street's (2001) sense in that it recognises variation across contexts and cultural norms, and sees numeracy influenced by factors such as identity, gender and belief, and power relations.

In endeavouring to see adult numeracy as 'more than maths', teacher educators have set out the various perspectives through which numeracy teaching can be seen. Johnston et al. (2003) describe how three contrasting views of knowledge have implications for learning and teaching adult numeracy. Depending on whether one has a positivistic, constructivist, or critical constructivist view of knowledge, there will be very different effects on learning and teaching numeracy to adults, and on the preparation of teachers to do so.

The conceptualisation of the knowledge base for the subject will have profound effects on teacher education in so far as there is a coordinated effort to link the different knowledge bases. This is the case in Denmark, where until recently there was no one-word equivalent for the term 'numeracy'. The term *numeralitet* was only introduced in 2000 (Maguire and O'Donoghue 2003). Denmark has subsequently introduced an adult mathematics curriculum and has developed a teacher education course alongside it (Lindenskov et al. 2003).

In England, a broadly similar approach has been taken, in which national standards, curriculum and tests in basic numeracy were developed. Subject Specifications for teachers of adult numeracy at NQF levels 3 and 4 were introduced in 2002 to form the basis of new teacher education programmes described in section 1.1.

In Ireland, Maguire and O'Donoghue have proposed a theoretical model of professional development for tutors of numeracy. 'SENAME' (Successfully Engendering Numeracy in Adult Mathematics Education) uses the integrative view of numeracy from their framework as its underpinning philosophy and incorporates a view that professional development is not a one-off activity. It is something that allows for the development of a wide range of skills and knowledge, increasing complexity and specificity in particular areas, in the context of a tutor's own lifelong learning. The model is dynamic and capable of responding to the developing needs of tutors to accommodate change in an integrated way. The SENAME model for professional development holds promise for guiding and implementing effective professional development programmes in the future (Maguire and O'Donoghue 2004).

6.2 Teacher education in school mathematics teaching

Working from the premise that numeracy has mathematics at its core, the experience with school teacher training in mathematics is of relevance for the professional development of teachers of adult numeracy. However, as numeracy is seen as being more than mathematics, being a good teacher of mathematics is only part of what is required to be a good numeracy tutor. There is also a need to identify what clearly differentiates a good adult numeracy tutor from a good teacher of mathematics, if indeed there is a difference.

Boero et al. (1996) identify three extreme orientations in mathematics teacher education:

1. The teacher must become more and more competent in mathematics 'he who knows mathematics knows how to teach mathematics'.
2. The teacher must develop his/her professional competence like an artisan.

3. The teacher's professional competence must be grounded in different domains, mathematics, sciences of education, didactics of mathematics.

    The experiences with the ANT programme in Australia, and the recent Danish experience with numeracy tutor professional development have confirmed that tutors do need to know mathematics. Cooney (1999) found that pre-service teachers have a poor understanding of school mathematics, having last studied it as teenagers and that even experienced secondary school teachers have a limited ability to translate their mathematical knowledge into tasks that require a deep and thorough understanding of mathematics.

    In the UK, student teachers are required to take a numeracy test in order to gain qualified teacher status although the appropriateness of this kind of test has been questioned (Johnson 2001). However, it has been shown that mathematical knowledge alone does not translate into better teaching (Shulman 1986). In-service education is far more complex than simply increasing teachers' knowledge of mathematics. One aspect of this complexity is the relationship between what is taught and the medium by which it is taught. Teachers need to learn mathematics as they are expected to teach it (Cooney and Krainer 1996).

    Workers in the field of school mathematics have shown that teachers need knowledge of at least three kinds to be able effectively to choose worthwhile tasks: to be able to initiate discussion and create an environment for learning; to be able to analyse their teaching; and to be able to analyse student learning. These three kinds of knowledge can be characterised as knowledge of mathematics, knowledge of pedagogy of mathematics, and knowledge of students (Lappan and Theule-Lubienski 1994).

    The pedagogical content has been described as knowing ways of representing and formulating the subject matter, having an understanding of what makes the learning of specific topics easy or difficult, and appreciating the conceptions and preconceptions that students of different ages and backgrounds bring with them to the learning situation (Markovits and Even 1999). Graeber (1999) extends this view to incorporate the need to understand a student's approach to justifying a claim or understanding a concept and also incorporating strategies that allow students to reflect. She goes on to suggest that pre-service teachers should develop the ability to:

■ Understand students' current understanding.
■ Distinguish what students understand from what students can do.
■ See intuitive knowledge as both an asset and a liability.
■ Use certain instructional characteristics that appear to promote retention.
■ Use alternative representations and recognise and analyse alternative methods.

    Teachers who have a broad and integrated knowledge of mathematics, in advance of the mathematics that they teach, are also more likely to have a perception of the nature of mathematics as fallible and changing (Irwin and Britt 1999).

    It has been shown that, in the classroom, what teachers know is fused with their sense of purpose as a teacher of mathematics, their philosophy of teaching and learning and their sense of responsibility, given the community in which they teach. (Thompson 1992; Oldham 1997). Theories that attempt to explain human learning identify five basic orientations: behaviourist, cognitivist, humanist, social learning and constructivist (Merriam and Caffarella 1999; Safford 1999). The practice of adult education has to a large extent been associated with

a humanistic approach (FitzSimons and Godden 2000). However, this approach has been criticised for failing to be emancipatory, merely changing the form of regulation while maintaining the power, knowledge and authority of the discourse (Benn 1997).

A constructivist view of learning sits comfortably alongside a belief that mathematics is about solving problems. However, teachers with Platonist and instrumentalist beliefs may nonetheless dispute constructivist approaches to learning, seeing them as inappropriate ways for students to acquire relevant knowledge and/or skills (Oldham 1997). A constructivist approach also seems particularly appropriate for mature students.

In Oldham's work with primary school teachers, this particular approach led to mathematics being seen as a collaborative cross-curricular activity, involving more than doing sums. This approach gave the students a new view of mathematics. It was exciting to find that mathematics was not just sums. As one of her students said: 'It has given me a new way of looking at mathematics'. Another said: 'I would not say that my understanding of maths has changed greatly, but my understanding of myself and maths has' (Oldham 1997: 202).

Ernest (1995) maintains that for change to be effective, it depends essentially on individual teachers changing their approaches to the teaching of mathematics. Teaching reforms cannot take place unless teachers' deeply held beliefs about mathematics and its teaching and learning also change. Mathematics teachers' beliefs have a powerful impact on their practice of teaching. The way a teacher transforms a belief into practice is affected by the constraints and the opportunities of social context (expectations from students, peers, superiors; issues relating to curriculum and assessment) and the level of teacher thought. The autonomy of mathematics teachers depends on all three factors: the teacher's mental model of the learning of mathematics, the considerations of what behaviours and mental activities are involved on the part of the learner; and what constitute appropriate and prototypical learning activities (Ernest 1995).

The culture of the classroom is the product of what teachers and learners bring to it, in terms of knowledge, beliefs and values. Consequently the goals being pursued by the teacher and the adult learner and the values relating to them may be different, especially in the adult classroom (Nickson 1992). Ernest (1995) argues that the values and conception of school mathematics, rather than a philosophy of mathematics, are the primary factor determining the image of mathematics in the classroom and consequently the public image of mathematics.

Bishop (1988) identified three sets of complementary values associated with mathematics education: rationalism/objectism; control/progress; openness/mystery. He identifies ways that teachers can promote these values in the classroom. Teachers' conceptions of mathematics, instruction and assessment also have a significant influence on what happens in the classroom. However, changing teachers' conceptions is difficult (Amit and Hillman 1999).

If the vision of a more student-centred classroom is to be realised, it must begin with the teacher reflecting on what mathematics means to them and how they envisage the teaching of mathematics (Cooney 1999). Teachers' orientation in in-service programmes is largely practical, and teachers may fail to see themselves and their professional development in a broader context. There is considerable slippage between the intent of an in-service programme and the means by which teachers translate what they learn into their own localised interpretation. Mathematics and pedagogy must be integrated, if the expected

outcome is to be improved practice in the classroom (Cooney and Krainer 1996).

Wittmann (1998) advocates a view of mathematics education as a system. The function of the system is inhibited and its efficiency is reduced if a mechanistic-technomorph control is exerted that suppresses the spontaneous powers inside. Good practice promotes a view of a systematic evolutionary system that is a spontaneous, self-generating order, exemplified best by the 'living organism'. Wittmann suggests that teacher education should incorporate a specific conception of 'mathematics in the education context' where cognisance is taken of the fact that elementary topics are far more important for teachers than advanced topics and that teachers need to experience mathematics as an activity. According to Wittman, a good way of doing this is to use 'Substantial Learning Environments' (SLEs), which, he suggests, could contribute greatly to making mathematics meaningful for teachers (Wittmann 2000).

An SLE, according to Wittmann, is a teaching/learning unit that:

- represents central objectives, contents and principles of teaching;
- relates to significant mathematical contents, processes and procedures and is a rich source for mathematical activities;
- is flexible and can be adapted to the conditions of special classrooms; and
- involves mathematical, psychological and pedagogical aspects of teaching mathematics in a holistic way and offers a wide potential for empirical research.

The creation of SLEs in the context of adults learning mathematics might provide a new approach to adult numeracy teacher training. SLEs recognise teachers as adult learners but also as teachers of adult learners and ensure that the approach used can be translated by tutors following the programme. Teachers would develop appropriate (in terms of the level they teach) mathematical knowledge. They would develop through their own experience as adult learners and consequently be more understanding of their own adult learners.

Tout and Marr (1997) describe a number of criteria that promote good teaching practice in adult numeracy. These criteria differ from those of the 'traditional' mathematics classroom and include:

- Building positive attitudes – through discussion and the use of non-threatening activities, so that learners experience early success.
- Teaching/learning strategies that promote and involve:
  – Interaction and co-operation.
  – Practical activities and hands-on materials.
  – The use of relevant contexts built upon adult experiences and knowledge.
  – Social, historical and cultural awareness.
  – Enjoyment, laughter and fun.
- Integration of language and mathematics.

These criteria suggest that although the literature on school mathematics teaching has many important insights to offer teachers of adult numeracy, it is essential to offer specialised professional development opportunities, so that they may be enabled adequately to respond to their particular role.

6.3 What adult numeracy teachers need to know

The developers of the ANT course in Australia in the mid-90s identified three strands of knowledge that adult numeracy teachers needed to have: knowing about maths, learning and teaching maths, and doing maths. (Johnston et al. 2003). The last strand, doing maths, was seen as central, as they took the view that 'clearly to teach numeracy you must know how to do mathematics' (Johnston et al. 2003).

However, to what extent a teacher of adult numeracy needs to 'know maths' is an interesting question raised in the literature. Coben (2001) describes her own background as a non-maths specialist who became involved in adult numeracy teaching, and describes strategies she used (and taught her students to use) when she was working near the limits of her competence:

> 'If I got stuck, I would try any or all of the following: go back to first principles; try a variety of approaches to see what worked; use a calculator or other aid; simplify the problem as far as possible, breaking it into stages, and substituting awkward numbers for 'easy' ones; discuss what I was trying to do with other people; look up the answer if there was one in the back of the book, and work back from there.' (Coben 2001)

The New York City Math Exchange Group raises interesting questions about mathematics knowledge for teachers of adult numeracy. Using Ma's (1999) concept of 'Profound understanding of fundamental mathematics' they claim that elementary mathematics is anything but basic or superficial, and that the really interesting question to ask about teachers' maths knowledge is not "how far?", but "how deep?" (Brover et al. 2001). A profound and rigorous understanding of so-called 'elementary' mathematics by both students and teachers of numeracy is likely to help them to 'build on strong foundations and make connections in mathematics throughout their lives' (Brover et al. 2001, in Coben 2003).

In support of Coben's description of working at the edge of her competence in the well-known syndrome in teaching of keeping just ahead of the students, Ma makes the interesting point that:

> The key period during which Chinese teachers develop a teacher's subject matter knowledge of school mathematics is when they teach it – given that they have the motivation to improve their teaching and opportunity to do so. (Ma 1999; Coben 2003)

This provides further support for the notion that real teacher learning takes place on the job, and again shows how unrealistic it may be to try to 'frontload' beginning teachers with the knowledge they need.

In broadening the discussion of knowledge of 'doing maths' to the more general attributes and abilities considered necessary for adult numeracy teachers, it is interesting to compare two recent lists of such attributes. The list in the left-hand column is the result of a brainstorming session held by a professional development discussion group at Adults Learning Mathematics Forum 9. They were responding to the following question: 'What would a good numeracy teacher, who had undertaken our (fantasy) numeracy professional development course, know, believe and be able to do after it?' The right-hand column contains a list of 'attributes and abilities that adult numeracy teachers need (not in any order of priority)' (Coben 2001).

Table 2

**Comparison of competences of adult numeracy teachers in
ALM 9 discussion group and Coben 2001**

Professional Development Discussion Group ALM 9	Coben (2001)
Be familiar with curriculum.	Have an understanding of the influence of cultural factors and language on approaches to mathematics.
Know about the theory of curriculum development.	Recognise the different ways in which mathematical understanding can be expressed, including cultural differences in the ways calculations are made.
Know about teaching ideas.	
Profoundly understand the subject.	
Understand adults as learners.	Describe their own thought processes in solving a problem.
Understand adults and mathematics.	
Talk/cope with own emotions and values and internal conflicts.	Show awareness of different methods for solving a problem – the ability to rethink concepts in order to represent them in different ways (e.g. multiplication as repeated addition, etc.).
See and internalise visions for the programme.	
Understand – from illustrating examples – what numeracy/mathematics is and how it is relevant.	Show awareness of differences in individuals' uses of methods and an ability to understand and respect learners' methods.
Be able to communicate in partnership.	Show awareness of the appropriateness of different strategies in different contexts.
Be aware of linguistic issues to help learners.	
Recognise and come to live with the field as 'not fully understandable and rational''.	Show awareness of the language used to formulate problems, consider them, solve them and formulate an answer.
Feel pride in the profession as an adult mathematics/numeracy teacher and tutor	Be able to investigate a mathematical topic and formulate general statements about it.
Believe that teaching adults mathematics/numeracy is not teaching at a lower level, but really at a higher level because of the complexity of adult mathematics/numeracy.	Have an understanding of the way in which different mathematical topics relate to each other, e.g. fractions, decimals, percentages, algebra and co-ordinate geometry.
	Be able to be critical about the gathering of statistical information and its presentation.
	Show reflectivity about one's own learning process.
	Have knowledge of ICT (calculators, graphical calculators, spreadsheets).
	Show awareness of the relationship between 'standard' mathematics and everyday uses of mathematical vocabulary.
	Have knowledge of mental calculation strategies.

The first list seems to emphasise more affective and professional factors, while the second focuses on more cognitive factors, with the concept of awareness given prominence. A quick perusal of these lists would support Coben's (2001: 156) assertion that 'the issue of subject knowledge and subject competence for teaching numeracy is extremely complex.' As she says, it is a 'daunting' list, but this list, and others produced by practitioners and researchers such as the one produced by the professional development discussion group at ALM 9, may be, as Coben points out (2001), 'the beginning of an agenda for ITT and CPD for adult numeracy.'

In a separate, but overlapping, discussion at the same forum a number of other important issues were highlighted, including the need to develop creative approaches to teaching mathematics and numeracy, the need for the integration of information technology, the need to raise questions about the level of numeracy qualifications held by tutors and the need to know what numeracy qualifications are actually necessary. The disparity between these two latter topics was raised in connection with the UK FENTO standards which were introduced in September 2002. These standards require numeracy teachers to hold a qualification in mathematics at NVQ Level 4, depending on their employment status. This requirement was an emotive issue for many of the delegates attending the conference (Polkinghorne 2003).

6.4 Forms of professional development for teachers of adult numeracy

There has been very little research into what constitutes effective professional development for teachers of adult numeracy. However, the almost universal increases in funding seen in most countries that participated in the IALS survey coupled with the development of numeracy curricula for adults (for example in Britain and Denmark as discussed in section 5.1 above) and the move in many countries to reassess literacy and numeracy requirements of adults through a national reporting scheme, and/or the need to integrate literacy and numeracy with the vocational and education training sector, have brought the issue of teacher competence and qualification to the forefront internationally.

Six models of professional development have been identified in the literature: conference sessions; short-term in-service programmes; long-term in-service programmes; and postgraduate study. The first four were identified by Marr and Tout (1997) and an additional two, teaching materials and research, were added to the list by Johnston (2002).

The in-service model of conference sessions and workshops is exemplified by the approach of the Maths Institute (US) and the National Adult Literacy Agency (NALA), Ireland. It gives teachers the opportunity to network and a 'taste' of different issues/ideas/approaches through themed workshops.

Short-term in-service programmes are often used to inform teachers about change taking place, for example, the introduction of the new curriculum. A three-day programme aimed to:

- Give teachers a good working knowledge of the core curriculum.
- Prepare teachers to apply the core curriculum in their teaching.
- Update teachers on recent development on theory and pedagogy.

In-service is also used effectively in the communication of the results of particular developments in the field. For example, the resources for the assessment of adult

mathematics that are learner-centred and meet the criteria laid down by national standards may also be communicated in this way (McGuirk 2001).

With regard to providing in-service training for more fundamental change, long-term professional development is required to ensure that enough time is available to focus on teacher attitudes and the 'hidden' theories upon which participants' current teaching is based.

Several qualifications from City & Guilds in the 1990s offered longer programmes (Coben and Chanda 2000). The programmes were criticised for not exposing teachers to relevant knowledge, and for not allowing teachers an opportunity to reflect on their own practice. The lack of popularity of these programmes among tutors was confirmed by Joseph (1997).

If professional development is to be successful, then it must be designed to meet teachers' training needs. However, the training needs of teachers of adult numeracy remains an under-researched and under-theorised field, when compared with research activity in other areas of adult mathematics education.

In the US a team in Massachusetts is currently developing mathematics learning standards for adult basic education teacher certification as well as a basic certification course in teaching maths/numeracy for adult basic education teachers.

The most widely known and internationally respected long-term professional development programme for tutors is the 'Adult Numeracy Teaching - Making Meaning in Mathematics' Programme (National Staff Development Committee for Vocational Education and Training and the Commonwealth of Australia 1995). As outlined earlier, this course was based on three assumptions: first, it assumed that learners have usually failed in a transmission-type mathematics education and will need different teaching approaches; second, that teachers needed to develop a critical appreciation of the role of mathematics in society; third, it recognised that a teacher must be able 'to do' mathematics in order to teach numeracy.

The ANT development team started with the same question that focused the discussion at the professional development discussion group outlined earlier. In this instance, the team response was to ensure that tutors should have a critical appreciation of mathematics in society and should be able to initiate appropriate learning activities by identifying and responding to the actual needs of learners.

The ANT course articulates with postgraduate adult basic education teacher education courses (Johnston 2002). However, professional development programmes need to be revised and updated in line with other developments in the sector. Johnston (2002), one of the authors of the programme, points out that the development team did not include a strong emphasis on workplace education, and that this exclusion is now a shortcoming in the programme. The ANT programme is currently undergoing revision to incorporate a focus on both work-based learning and financial literacy.

The ANT team took a holistic view, not related to any particular curriculum. In contrast, the Danish professional development programme that has recently been developed incorporates strong links to the new adult numeracy curriculum in that country.

Few taught postgraduate courses that specifically focus on adult numeracy are available.

However, the growing number of MSc and PhD theses that have covered the research domain will increase the body of knowledge in the area.

Having teaching materials available that are geared specifically to adults in both style and content can help to shift teacher practice in the adult classroom. Collaborative practitioner research projects of different kinds offer insight into the sixth category of professional development. The European Project ARKS (http://www.2ctl.org.uk/arks/indexe.html) allowed teachers from a number of European countries the opportunity to discuss and develop resources in adult numeracy and other areas. Similarly the recently published *Adults Learning Mathematics Across Borders* allowed teachers from Denmark, Norway, the Netherlands and Belgium to share teaching approaches and resources (Van Groenestijn 2003). On a smaller scale, Allen (2004) reports on a use of cooperative inquiry and educational biography techniques with a group of adult numeracy teachers to investigate deeply held patterns of beliefs about teaching and learning that might influence their practice. In arguing for cooperative inquiry as a suitable methodology for investigating deeply held views on teaching and learning, Allen suggests that 'established patterns of work by teachers and students in the classroom are difficult to change. Both teachers and students in an adult educational setting bring beliefs about the teaching and learning that have developed through experience. This research method is particularly suited to this area and the issues it raises because it requires participants who are ready for change and who are prepared to take risks' (Allen 2004). This suggests that Allen's group are an example of Smith's (2003) 'hungry' teachers discussed above.

Malcolm Swan describes approaches that encourage active learning in a connectionist manner, with learners collaboratively working on appropriately challenging mathematics. His research shows that such approaches lead to deeper and longer-lasting learning (Swan 2006). His professional development philosophy reverses that often seen elsewhere: it asks teachers to, if necessary, suspend their disbelief and try the approaches. Many are then 'won over' by the positive effects, leading to changes in beliefs and attitudes. The Maths4Life *Thinking Through Mathematics* project trialled these same approaches to teaching, learning and professional development in the *Skills for Life* sector. It found that there are significant barriers to changing teachers' practice (such as lack of mathematics knowledge, lack of subject-specific pedagogy, lack of time, fragmented support across all areas involved in mathematics within an organisation), but that over the course of six months the majority of teachers moved from more transmission towards more connectionists orientations (*Thinking Through Mathematics Research Report*, forthcoming 2007).

Inappropriate professional development can arouse anxieties and a lack of confidence in the teacher (Irwin and Britt 1999). In practice, there is considerable slippage between the intent of the in-service programme and the means by which teachers translate what they have learnt into their own localised interpretation (Cooney and Krainer 1996). Teachers need the opportunity to engage in professional dialogue about problems they deem important and mathematics and pedagogy must be integrated if in-service is to prompt reasonable translations into classrooms (Cooney 1994). As Serrazina and Loureiro point out:

> 'True professional development, which results in meaningful and long-lasting qualitative change in a teacher's thinking and approaches to education is an autonomous activity chosen by the teacher and not externally mandated by the hierarchy or imposed by career progression.' (Serrazina and Loureiro 1999)

The need for school teacher education programmes to exhibit the following goals was emphasised by Cooney (1994). These also have relevance in the context of tutors of adult numeracy:

■ Enable teachers to develop knowledge of mathematics that permits teaching from a constructivist perspective.
■ Offer occasions for teachers to reflect on their own experiences as learners of mathematics.
■ Provide contexts in which teachers develop expertise in identifying and analysing the constraints they face in teaching and how they can deal with those constraints.
■ Furnish context in which teachers gain expertise in assessing a student's understanding of mathematics.
■ Afford opportunities for teachers to translate their knowledge of mathematics into viable teaching strategies. (Cooney 1994)

Cooney and Krainer (1996) describe the 'consumer mentality' that teachers often bring to in-service with them. They have an expectation of materials that can be directly copied and handed out to be used with their learners. In terms of delivery the opposite extreme is to present research results and inform teachers that it is their task to put theory into practice. The consumer attitude often causes problems and resistance amongst teachers who have come with different expectations.

Effective professional development of teachers in adult numeracy must address a number of issues at once. It must satisfy the requirements outlined by practitioners to the question: 'What would a good numeracy teacher, who had undertaken our (fantasy) numeracy professional development course, know, believe and be able to do after it?' It must take cognisance of the extensive research that is available in relation to professional development of mathematics. It must recognise that the learners are not children but adults, and that they may require different pedagogies in practice to ensure the provision incorporates the appropriate goals and gives tutors the opportunity to engage in professional dialogue about problems they deem important. It must integrate mathematics and pedagogy if professional development is to translate into more effective practice in the adult classroom. Most importantly, it should not be viewed as a discrete, compartmentalised entity, but within much broader parameters where its relationship with the wider political, social and economic context is kept to the fore (Coolahan 2000).

7 Models of professional development and their impact

7.1 Characteristics of effective professional development

In a study carried out in New England, Smith et al. (2003) set out to investigate how teachers of teachers of literacy and ESL changed as a result of participating in one of three different types of professional development, multi-session workshop, mentor teacher group, or practitioner research group. All the professional development activity was on the topic of learner persistence, chosen for its relevance to the contexts in which the teachers worked. Interestingly, they found that the model of professional development was not one of the most significant factors affecting change.

However, they took care to point out that this does not mean that the model of professional development was not important (Smith and Hofer 2002). All the models of professional development they used influenced teacher change in subtle ways, with the practitioner research group being linked to slightly more change overall and the mentor teacher groups supporting more integrated change.

Mentor groups were particularly useful for teachers who wanted to connect theory and practice, but lacked the skills to do so. For these teachers, a direct approach in which strategies for linking theory and practice are directly taught may be useful. This type of professional development can 'walk teachers through the process of thinking about a problem, taking action to address it, analysing how it worked for learners, and reflecting on what this means for one's beliefs about teaching and learning' (Smith and Hofer 2002).

This research suggests that there is no *a priori* reason to believe that any of the three models is inferior or superior to the other. As they suggest, 'factors related to professional development exposure (hours attended) and quality are more important than model, so that any model contributes to change as long as it is well-run, well-designed, and teachers attend for an adequate number of hours' (Smith et al. 2003).

As a result of their study, Smith et al. made a series of recommendations about the features of effective professional development. Professional development should:

- Be based on adult learning principles.
- Be of high quality.
- Offer a variety of models.
- Give teachers clear guidance on what to expect where non-traditional or 'reform' methods are used.
- Go beyond offering 'bags of tricks' to help teachers build theories of why to use particular techniques.
- Include activities to help teachers deal with possible impediments to implementing what they learn in their professional development. (Smith et al. 2003)

Other writers in adult education, in advocating particular models of professional development, have identified features which they claim to be central to effectiveness. For example, Jackson

(2000), in advocating action technologies, particularly action research, highlights three factors which she claims are important in ensuring effective professional development: participants working in small groups, having enough time, and having access to mutual support.

Of interest for the professional development of adult literacy teachers are recommendations made about effective teacher preparation for elementary reading instruction in 'Prepared to make a difference', a research report carried out by the International Reading Association's National Commission on Excellence in Elementary Teacher Preparation for Reading Instruction (International Reading Association 2003).

The Commission gathered data on eight programmes offering a quality four-year baccalaureate in reading teacher preparation, with the aim of identifying critical features of excellence common to all the programmes. Based on this research, which measured impact on learner growth and achievement, they identified eight critical features of effective teacher education programmes. These features were:

1. Content: teacher educators guide pre-service teachers towards a cohesive knowledge base for effective decision-making.
2. Apprenticeship: pre-service teachers have the opportunity to engage with excellent models and mentors in course-related field experiences.
3. Vision: the programme is centred around a vision of literacy, quality teaching, and quality teacher education.
4. Resources and mission: the programme has sufficient intellectual, financial and professional resources to ensure quality teacher preparation.
5. Personalised teaching: teacher educators value diversity, and can respond to pre-service teachers' needs by adapting the curriculum.
6. Autonomy: teacher educators are able to adapt and negotiate with their institutions to ensure the best possible quality of preparation.
7. Community: teacher educators create a learning community which involves themselves, the pre-service teachers and the mentor teachers.
8. Assessment: teacher educators continually assess all aspects of the programme, the students, and themselves to ensure the ongoing improvement and development of the programme. (International Reading Association 2003)

The authors point out that 'while the features are focused specifically on effective reading teacher preparation, the issues they raise likely will require a broader consideration of teacher preparation in general.' This has important implications for the present review, as, unlike the research on adult education reviewed above, it focuses on the *initial* preparation of literacy teachers. Also important for the issues raised in this review, particularly with respect to the FENTO standards and subject specifications, is the authors' comment that 'educators should view the features not as a rigid, one-size-fits-all approach to excellence, but as centring points for conversations and inquiry that will lead to programme improvement'.

7.2 Impact of professional development in adult education

In the current climate in adult basic education (Belzer 2003; Kerka 2003), the question of impact where it most matters, on learner outcomes, is likely to gain in importance, with policy-makers showing more reluctance to fund professional development activities which do not have clear outcomes for improving practice and student achievement (Tolbert 2001).

However, as Belzer and St. Clair point out:

> 'There is no empirical evidence that links participation in professional development to improved learner outcomes in adult basic education, and it seems likely that positive learner outcomes are brought about by a complex of factors.' (Belzer and St. Clair 2003)

Guskey (2003) points to a lack of consensus among professional development researchers as to what constitutes 'effectiveness'. He sees some defining it as 'teachers' self-reports of professional development features that increase their knowledge and lead to changes in their instructional practices', while others 'look for consensus in the opinions of professional development writers and researchers'. Such inconclusiveness is likely to 'frustrate policy-makers and practitioners who want simple answers to their questions about effective professional development' (Guskey 2003). However, in spite of such frustration, he recognises that:

> 'the characteristics that influence the effectiveness of professional development are multiple and highly complex. It may be unreasonable, therefore, to assume that a single list of characteristics leading to broadbrush policies and guidelines for effective professional development will ever emerge, regardless of the quality of professional development research.' (Guskey 2003)

In order to assess the outcomes of professional development activity it may be necessary to use more subtle frameworks for analysing its impact. Kirkpatrick (1996) and Guskey (1998) see impact of professional development moving along a continuum from reaction, practitioner learning, through changes in practices to learner outcomes. Belzer (2003) suggests that a more realistic approach would be to broaden the definition of 'impact' to include five areas: classroom practice, thinking and knowledge about teaching and learning, affective change, impact at programme level, and general impact on the field of adult basic education (Belzer 2003).

In the Smith *et al* study referred to above, the authors hypothesised that teachers would change in different ways and amounts according to the type of professional development they participated in and that this change would be influenced by three types of factors:

- Individual factors – their experience, background, and motivation as they come into the professional development.
- Professional development factors – the quality and amount of professional development attended.
- Programme and system factors – the structure of and support offered by the programme, adult education system, and professional development system in which they work, including teachers' working conditions. (Smith et al. 2003)

They identified four types of change: no or minimal change, thinking change, acting change, and integrated (thinking and acting) change. Change towards the integrated end of the continuum was preferred, though no distinction was made between the two types of non-integrated change – thinking and acting. Change could be either on the topic, that is, related to the content of the professional development – learner persistence, or off the topic, related to gains in knowledge or practice in adult basic education generally.

Of the participants who completed the professional development 72 per cent demonstrated non-integrated change, most of which was in their thinking. A further 24 per cent demonstrated integrated change, and this group also made more change overall, which was more sustained and significant across the three arenas of classroom, programme and field. Almost all of the participants gained some new knowledge either on or off the topic, but for many it was limited to one or two concepts. Most of the participants took some action, on or off the topic, but again for many it was very limited.

The research found that the most important individual factors which influenced the type and amount of change were participants' motivation to attend the professional development, their years of experience in the field of adult education, whether or not they began their teaching in adult education, and their academic qualifications. The most important professional development factors were the quality of the activities as rated by both participants and researchers and the number of hours attended. Surprisingly, as noted above, the type or model of professional development had less impact. As for the most important work factors, they were whether or not the topic of the professional development was already being addressed in the programmes they worked in, how much say they had in decision-making at work, and working conditions such as access to preparation time and benefits such as paid holidays.

The researchers conclude that:

> 'Teachers' pathways to change were neither simple nor linear; change was complex and shaped by interaction among who they were as individuals, the quality and amount of professional development in which they participated, and the features of the programs and systems in which they work.' (Smith et al. 2003)

Burghes' report on the use of 'university practice schools' in initial teacher education focuses on the early phases of teaching practice for novice teachers. Drawing on international models, the research explored the use of collaborative approaches to teaching practice. The model involves trainee teachers working in small groups with the same group of learners, with peer observation followed by an evaluative feedback discussion with peers, expert mentors and teacher educators.

Trainee teachers took part in critical reflective analysis from the outset and became adept at evaluating their own and other's teaching. The evaluation concluded that the 'model represented a real enhancement in the quality of ITE particularly for the first teaching placement for trainees' (Burghes 2006) and that it established stronger links between theory and practice.

This collaborative practice school approach echoes what Derrick and Dicks (2005) describe as a 'scaffold approach' to teaching practice, which similarly organises small groups of trainee teachers to work under the supervision of a teacher educator with a shared group or class of learners.

The reported strengths of the scaffolding model and use of 'training groups' parallel the findings of Burghes (2006) in their advantages.

'University practice schools' – collaborative approaches (Burghes 2006)	'Training groups' – scaffolded approaches (Derrick and Dicks 2005)
Trainee teachers saw good teaching and took part in critical, reflective analysis from the start.	Everyone makes suggestions on the basis of a shared experience with a known group of learners.
Support was given by peers, with group discussions continuing in and out of school.	Trainees learn from watching each other and develop a support network to carry them into the next phase of their TP. They develop ways of working collaboratively and offering mutual support.
High standards were set for the trainee teachers to aspire to.	
Trainee teachers were quickly made aware of potential problems that they might encounter.	Trainees benefit from co-planning the teaching practice with their peers and their teacher trainers.
Trainee teachers quickly became reflective and able to evalutate their own and others' teaching.	They get a lot of feedback from the teacher trainer and their peers. They are also assessed and receive written feedback on each TP with praise and clear targets for development.
Trainee teachers shared ideas and innovations and learned from the mistakes and strengths of others.	Trainees learn from watching the teacher trainer.
Trainee teachers quickly came to realise whether or not they were suited to a career in teaching.	Teacher trainers can set practice teaching tasks to ensure trainees try out a range of methods and cover a range of subject knowledge.
	It is an intensive model in which trainees learn a lot very fast.
	If the two groups of trainees swap over to the other group of learners, trainees can practise working at two different levels or in two different contexts.
	The model saves enormously on travel time for trainers.

8 Summary and conclusions

8.1 Implications for the professional education of teachers of adult literacy, numeracy and ESOL

Each of the literatures reviewed in this report (adult education, general education, literacy teacher education, language teacher education, mathematics and numeracy teacher education) has thrown up key issues relevant to that particular area. However, throughout the review, certain key themes seemed to emerge across the different literatures and subject areas, suggesting that they might be important insights for the three areas taken together. In this section, these insights are presented in summary form, and they represent the main implications from the literature review for the professional education and development of teachers of adult literacy, numeracy and ESOL. They are as follows:

1. Teacher education programmes for adult literacy, numeracy and ESOL need to provide them with opportunities to explore their own beliefs and values relating to what and how they teach. Such reflection will be more fruitful if the teachers are immersed in practice.

2. Reflection on a teacher's own beliefs and practice on its own is not enough. Teachers of literacy, numeracy and ESOL to adults need to have access to conceptual frameworks which will allow them to articulate their own perspectives on learning and teaching, and to reflect critically on the wider institutional, policy, social and cultural issues that enable or constrain their practice. An 'ecological' or critical approach would allow courses to problematise such factors as programmes, wider institutional structures, supervising teachers and teacher educators, as well as the content and process of the education/training transaction itself.

3. Teacher education programmes for adult literacy, numeracy and ESOL need to be based on what is known about how adults learn, both in terms of the pedagogies participants will use with their own learners, and in terms of their own lifelong learning as adult educators. Approaches such as transformative learning theory may be fruitful for enabling teachers of adult literacy, numeracy and ESOL to critically reflect on the wider issues that impact on what they can do in the classroom. The potential for critical reflection and transformative learning may increase as teachers become further immersed and experienced in practice.

4. Teacher education programmes for adult literacy, numeracy and ESOL should move away from an 'application of scientific knowledge' and 'training' approach. They need to take into account the strong influence of context on learning, and should avoid assuming that knowledge is somehow 'learned' in one context before being used in another.

5. Gaining expertise in teaching is a process, and teachers have to pass through various stages. Teachers need to engage in developing personal practical knowledge and become involved in the 'protracted conversation' of learning to teach. Teacher learning should be seen as a career-long process, and licensing of newly qualified teachers granted after an extended period of structured education and development following initial training. Teaching portfolios may be suitable for this purpose.

6. While recognising that teachers of adult literacy, numeracy and ESOL, like all teachers, need to have rich, flexible networks of subject matter knowledge, teacher education programmes should not assume that raising the level of subject matter in syllabuses on its own will have an effect on practice. Programmes need to pay attention to *how* subject matter is represented, and there seems to be a consensus in the literature that teachers should 'be taught as they are expected to teach' by taking part in practical professional development activities which not only support their acquisition of relevant subject matter knowledge, but help them to 'see' the subject from their learners' point of view. The concept of 'pedagogical content knowledge' may be of some utility here.

7. Teacher education programmes for teachers of adult literacy, numeracy and ESOL should be wary of assumptions that the knowledge bases of the respective subjects are such disciplines as applied linguistics, sociolinguistics or mathematics. Rather, they need to take cognisance of the process-orientated and holistic nature of teachers' knowledge, and should exploit this by using data-based case-study methods which portray to trainee teachers the richness of expert teachers' cognitions underlying their practices.

8. The crucial role of collaborating mentor teachers should be recognised. These teachers need to be helped to develop a whole new set of mentoring skills. It should be recognised that being an experienced teacher does not mean that one is necessarily a good mentor of novice teachers.

9. Teacher education programmes of adult literacy, numeracy and ESOL should offer a wide range of types of professional development activity. However, it should be borne in mind that the *type* of activity may be less important than *features* of the activity, such as length of time, possibility of collaboration, whether or not staff from the same teaching programme are attending, quality of the activity as perceived by participants. For example, training workshops, if they have features of effective professional development, may be no less effective than less 'traditional' methods.

10. As with all teacher education programmes, initial and in-service teacher education programmes for teachers of adult literacy, numeracy and ESOL will have to face the challenge of developing adequate measures of impact of training and professional development, particularly impact on student outcomes.

11. Teacher education programmes for teachers of adult literacy, numeracy and ESOL should recognise and build in a design for meeting the differing needs and priorities of participants, by allowing them to take optional modules in which some could explore more 'theoretical' issues and others could develop more 'practical' skills. Related to this, programmes need to recognise that there are variable outcomes from teacher education, and that teachers will require differing levels of support to help them develop along different learning pathways.

12. All teachers face difficulties in using what they learn in professional development activity in their own teaching contexts. Teacher education programmes for adult literacy, numeracy and ESOL should recognise this by building in activities which help participants see the possible impediments to putting certain ideas into practice, and which support them in the process of effecting change in their practices.

8.2 Conclusions and suggestions for further research

This review of the literature relevant to the initial and continuing education of teachers of adult literacy, numeracy and ESOL has identified a number of key themes broadly relating to the 'who', 'what' and 'how' of developing competence in teaching the three subjects. From the literature on the professional and pedagogic identities of adult educators, perhaps the most important conclusion is that such identities are largely constructed through the policy, political, social and cultural contexts in which these teachers work, and a teacher education which does not address such issues will not equip adult educators to cope with the complexities of their roles in the real world.

Teacher education which limits itself to the technologies of teaching and learning and does not engage teachers with their deeper purposes and values – in a word, why they got involved in education in the first place – is likely to impoverish the enterprise for all concerned, leaving both teachers and learners at the mercy of forces which they may be powerless to question, let alone control.

As for the 'what' of learning to teach the three subjects, perhaps the main insight from the literature is that of the rich, holistic and process nature of teachers' knowledge, and of the need for a pedagogy of teacher education which provides access to such knowledge rather than an emphasis on the application of propositional knowledge in contexts other than the ones in which it was acquired.

In the NRDC exploratory study on the new ITE and CPD courses there was a concern with linking 'theory and practice'. Perhaps attention to the process-orientated nature of teachers' knowledge, and the use, albeit in modified form, of such concepts as 'pedagogical content knowledge' may help to alleviate the sterility of the 'theory-practice' divide. Such holistic, contextualised and process-orientated accounts will also expose the inadequacies of a decontextualised 'competences' approach to teacher education, in which teachers' knowledge is reduced to 'best practice' or technologies for the delivery of 'teaching and learning'.

The key insight on the 'how' of professional development for teachers of adult literacy, numeracy and ESOL perhaps relates to the 'who', in that types of professional development which do not take into account the diversity of participants and their professional development needs and priorities are unlikely to lead to any substantial change in their beliefs or practices. Rather than looking for cause-effect relations between models of professional development and teacher and learner outcomes, it may be better to attempt to identify features of effective professional development, particularly as perceived by participants, irrespective of the 'modes of delivery' chosen.

While this review has surveyed a rich literature in adult, further and higher education, it is noticeable that the subject-specific literature on learning to teach on initial teacher education programmes, both in the general school teaching literature, and in the specific areas of second and foreign language teaching and mathematics, is not replicated in the world of adult literacy and numeracy education. Studies which explored trainees' prior beliefs, tracked them during course work and field experiences, and followed them into their early experiences of teaching would be welcome. Process-orientated studies which attempted to portray the cognitions underlying the expertise of effective professionals would not only further understanding of competence in teaching adult literacy, numeracy and ESOL, but would add to the databases available for teacher education purposes.

As with school teacher education research, research into adult literacy, numeracy and ESOL teacher education is not immune from being seen as a solution to policy problems. In our accountability-orientated times, the training of teachers of adult literacy, numeracy and ESOL will have to turn its attention to the question of impact, not just on the 'intermediate outcomes' of teachers' cognitions and practices but on their students' learning. While research in general teacher education has not produced much hard evidence of impact, this does not exempt researchers in the professional development of teachers of adult literacy, numeracy and ESOL from studying the impact of teacher education not only on teachers' beliefs and behaviour, but on outcomes for their students.

Research in teacher education seems to be pulling in two directions – that of a solution for policy problems, and search for the knowledge bases of teaching. However, as Cochran-Smith, (2004) points out, these two purposes of research need not be incompatible. As the teacher education of teachers of adult literacy, numeracy and ESOL moves into the mainstream as never before, with the concomitant gains in profile and funding, it will have to respond both to demands for greater accountability, particularly in terms of impact, as well as intensify the search for the knowledge bases of teaching the three subjects. If this is done by those 'inside' the profession, there is more chance that gains in either one of these research efforts can be made without being at the expense of the other.

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