Deep learning with technology in 14- to 19-year-old learners - Executive summary

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Introduction

This executive summary presents the outcomes from the 14-19 deep learning project carried out by the University of Bristol from October 2008 to April 2009. The Bristol group carried out a neuroscience review and conducted case study research in one secondary school and one further education college. This executive summary contains details of the project, key findings and recommendations.

Project overview

The focus of this project was the question: “What knowledge and skills do learners need in order to be effective deep learners now and in the future?”

Our aim was to investigate the relationship between ICT and deep learning in authentic, practical settings (in a school and a further education college), looking holistically at the context in which learning takes place, the relationship between the practitioner and the group, the design of the learning and the use of ICT tools, organizational issues, and the relationship between learning and use of ICT in and out of school or college settings.

In addition to the empirical study, we hosted an invited workshop to present the studies from the Bristol and Warwick teams and investigate key questions which emerged during discussion with an invited audience of national and international experts drawn from the research, practice and policymaking communities. The outcomes of these discussions were then intended to inform and develop our findings and conclusions.

How can technologies support deep learning?

Technology cannot and should not be treated as a single, amorphous medium. Different types of technologies have different uses in different environments. Technology has the potential to undermine learning just as much as it does to transform and enable deep learning.

The findings suggest that there is no blueprint which can be applied to guarantee that learning is deep, or that ICT will facilitate learning, since the context in which such learning takes place is the product of a rich and subtle blend of many factors. Our empirical work only presents a snapshot over a period of a few days.

Key findings

There were three key themes that emerged from the empirical work:

* Subject culture is one of the main drivers for how students use technology. There is some evidence for features of deep learning in different subject cultures.
* The issue of emerging adult identity is very much connected to how young people select and use different technologies.

The ways in which technology bridges the formal and informal learning contexts – and their implications for deep learning – are complex and require further study.

Subject culture

There were clear differences in the subject cultures we observed. There was a real distinction between the vocational-oriented media and engineering courses and the academically-oriented law and science courses. Teachers on the vocational courses seemed to work as a team. Therefore the students expected joined-up input from the different but related units of work. The use of three-hour blocks within the media programme allowed considerable opportunities for students and staff to meet and follow up on different aspects of project work. This type of joined-up work allows learners to use deep learning actions of reflection and application – and potentially to transform their learning.

In more academic subjects, such as law, applying deep learning principles is problematic given the short class session times and the way teachers work in and across subject teams. The students studying law do so for only part of their curriculum. Therefore, for the other courses they were taking (English, maths, etc.), they were encountering teachers and cultures which were different. This suggests that, whereas the media and engineering students were supported in extending their learning beyond a specific subject, the law students had to find the links between subjects for themselves.

The subject cultures all suggest that different disciplines have very different student expectations, goals and practices. These may be related to the academic nature of some disciplines over others. There would also appear to be an age-related difference in the approach which students take to the subject matter and to learning in general. It should be noted that the students in the further education college were all over 16 and may have reached a level of maturity – having chosen to continue studying in either vocational or academic disciplines – which students in the secondary school have not. Differences may also be related to the institutional structures which frame the learning experiences.

Developing identity and maturation of 14- to 19-year-olds

Evidence suggests that 14- to 19-year-olds are still developing neuroscientifically. One specific area of research concerns the amount of activity generated by developing regions of the brain which allow people to understand other people. These regions are also associated with mental states, emotions, and change both structurally and functionally.

In the 14-19 age group the social dimensions of learning are very important, as the areas of the brain associated with social behaviour are still developing and the brain does not process interactions automatically. Recent neuroscience research suggests that the social use of technology, communication and identity-building can be seen as potentially important aspects of developing capacities for deeper engagement with learning. Therefore it may be beneficial to maturation for young people to spend time on social networking sites and instant messaging rather than in face-to-face interactions.

Young people make use of digital technologies in their personal and out-of-school activities, some of which may be considered to be discovery, exploration and play associated with the construction and reconstruction of personal identities, and the display of this identity “work”. Although young people may be developing identities as learners through this kind of activity, evidence of this was not explicit in this research. Similarly, we did not find evidence that young people were using skills and knowledge gained from their own social explorations via digital technologies in their school and college learning. Practitioners commented on young people’s methods of using the web for research, suggesting that autonomous self-directed use had not yielded a quality of practice that met their expectations.

Bridging the formal and informal

Our work suggests that it might be beneficial to develop approaches which identify and draw on young people’s informal uses of technology. What is clear from our work is that there is a difference between the technological tools used in educational settings and those chosen by the young people themselves. In particular, the use of mobile phones, social networking sites and gaming play a large role in the learning experiences of many young people outside of college or school.

Conclusions and recommendations

In this project, we set out to examine the ways in which ICT might support a deeper approach to learning within the 14-19 age group. We looked for examples where ICT was enhancing the learning experiences of young people in study situations in both further education and school settings.

Our findings suggest that there is no guarantee that learning is deep or that ICT can necessarily facilitate learning due to the complexity of learning contexts. In this short study, our empirical work could only present a snapshot over a period of a few days; what is really required in order to identify evidence of deep learning is in-depth, longitudinal classroom observation and engagement with young people’s informal practices over time. We have found examples of the range of factors and conditions that need to be present or demonstrated in clear and holistic examples of good practice. These include:

* engagement and participation in the subject discourse and practices
* sufficient time to engage in the task and in the subject discourse
* a high level of control over task, time, and ways of working
* appropriate level of maturation for the requirements of the task
* relationship and engagement with peers and others, including tutors
* relationship between personal identity and the subject discourse and practices

easily navigable communication and tasks which bridge the formal and informal, including bridging the school/college setting and the home setting.

Core attributes associated with an independent learner, such as meta-cognitive approaches and critical thinking, involve a level of maturity that might not always be present in younger learners. Furthermore, we suggest that collaboration is contingent on being able to take a different perspective, and there is good evidence from neuroscience to suggest that this social task is very challenging. We would therefore suggest that the social uses of technology outside of the study setting are instrumental in assisting with this maturation, as well as with the development of the social self and independent learning skills. This is also closely linked to the development of identity in young people of this age.

Finally, we would also suggest that different kinds of learning approaches are needed to meet different requirements, and therefore the notion that all learning needs to be ‘deep’ to be of value can and should be challenged.