Deep learning with technology in 14- to 19-year-old learners: Executive summary
Ian Abbot
Andrew Townsend
Sue Johnstone-Wilder
Lynne Reynolds

The Warwick Institute of Education, University of Warwick

Project overview

This executive summary contains the findings from a small-scale study funded by Becta concerned with 14-19 deep learning. The study – consisting of a literature review of deep learning and a co-ordinated series of action research projects – was carried out by researchers from the University of Warwick between October 2008 and April 2009. The action research reports are available to view online in both [PDF](https://files.warwick.ac.uk/andrewtownsend/browse#DL+Reports+Final/PDF) and [Word](https://files.warwick.ac.uk/andrewtownsend/browse#DL+Reports+Final/Word) format. This executive summary contains details of the project, key findings and recommendations.

The term ‘deep learning’ has gained considerable interest as a key element of the transformation and personalisation of the learning process. How we prepare young people for life, leisure and work is a question that employers, governments, parents, educators and young people themselves are asking, particularly in response to the changing landscape of the 21st century. The 14-19 curriculum is evolving rapidly to address the needs of young people with changes to teaching, learning and assessment. Central to this is the changing role of the learner. No longer the passive recipient of knowledge, the learner is an active part of every facet of the change process, from design to implementation.

A deep learner is thought to be one who approaches knowledge and learning by relating new knowledge to previous knowledge. This is described as ‘knowledge transformation’ by Entwistle (2000). A deep learner also relates theoretical ideas to everyday experience; distinguishes between evidence and argument; organises and structures content into a coherent whole; combines knowledge from different sources; and is self-motivated (Atherton, 2005). These attributes are highly desirable as they describe the flexible and independent learner who will succeed in a changing society. Initiatives such as personalised learning provide the foundation for deep learning to take place. As outlined by Simms (2006), “Deep learning is secured when, through personalisation, the conditions for student learning are transformed.”

Operating against the background of major reform in the 14-19 education and training sector, this project 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, across a range of subject areas, at a number of levels. In particular, the project developed an action research approach with thirteen co-researchers in further education and schools to answer the following research questions:

* What knowledge and skills do learners need in order to be effective deep learners now and in the future?
* Which technology-enabled practices and structures in the 14-19 context support these goals and how do they do this?
* Which practices accelerate the learning gains afforded by technology in the 14-19 setting, and how? What are the causative links between the practices, the learning gains and the technology, if any?

Action research: Key findings

Perspectives on the nature of deep learning

Practitioner action researchers in this project felt that deep learning was both a phrase they had encountered and also a concept that had relevance for their work. The connections between deep learning and practice that seemed to have the most relevance for the action researchers are summarised below:

* **Deep learning is not achieved through a limited focus on examination performance.** While deep learning might be associated with a better performance in tests or exams, deep learning as an aspiration involved developing complex perspectives on the concepts in question. Such complex perspectives are not easily measured and so would not be easy to assess. On a more principled point, however, deep learning is believed to be an aspiration towards more holistic views of subjects under study in ways which interacted with other subjects and with learners’ lives. Thus an aspiration to achieve deep learning is much more than – and in principle different from – learning associated with outcome test performance.
* **Deep learning involves learners developing a sufficiently comprehensive grasp of concepts to apply them to differing contexts.** When associated with the concepts being taught, deep learning is believed to be achieved when learners have a sufficiently firm grasp of the concepts to recall them with ease and apply them creatively to conceptual and subject areas other than those in which they were first encountered.
* **Deep learning involves learners developing their skills in such a way that their use becomes instinctive and supportive of conceptual learning.** Deep learning was associated with the development of skills, including the use of particular ICT applications. In this case, deep learning is considered to take place when the skill in question is instinctively repeatable by the student and can then be applied creatively to settings and problems other than those in which the skill was first learnt.
* **Deep learning takes times and is cumulative.** Deep learning was perceived as being an outcome which had to be worked at and developed over a period of time. This is in part because it involves a full understanding of issues and concepts from multiple perspectives, and in part because it is associated with retained knowledge and skills. Both of these require sustained attention from learners and are built up over time. In the views of action researchers, deep learning is not quickly or easily achieved.
* **Deep learning is based around learners’ individual development, which ties it to independent learning and to attempts to personalise learning.** This does not mean that deep learning can only be achieved by students learning on their own. Rather, the implication practitioners perceived was that learners attempting to achieve deep learning take ownership of the concepts and skills being learnt. While this can happen in a social setting and through the support of tutors, the goal is student ownership of the learning content.

**Deep learning involves making links between different conceptual areas and between experiences and learning in differing contexts.** This is actually an issue which is referred to above but which was so significant that it was felt worthy of examination separately. Action researchers believed that learning that is viewed as deep involves making links between the multiple areas of learners’ lives. This is both an outcome (for example, in learners being able to relate conceptual issues across subjects) and a process (for example, in requiring learners to relate their work to life outside their educational institution).

In addition to making comments on the nature of deep learning, action researchers also identified a number of ways that ICT can be used to enhance deep learning. These are identified in the following section.

Perspectives on the potential for ICT to enhance deep learning

The action researchers who participated in this project were not necessarily highly competent in the use of ICT (although some were). They were, however, enthusiastic to try to use ICT to achieve deep learning. The following summarises the potential that these action researchers felt ICT had for enhancing deep learning:

* **ICT can provide an approach that allows learners to experience concepts from multiple perspectives and in ways which would not have been possible otherwise.** Subjects which require an understanding of abstract concepts can provide a particular challenge to learners. The development of 3D modelling and associated learning environments can provide learners with a range of perspectives on these concepts, which encourages a more complex and complete understanding of them.
* **The use of learning platforms gives learners the chance to engage with learning materials online, at the same time giving them control of the timing of their own learning.** The use of learning platforms was a popular focus for action researchers. These were associated with deep learning in that they provided learners with opportunities to engage with learning materials at times which they could decide. In other words, they encouraged student self-direction in learning. The use of learning platforms was enhanced by making the content more varied and interesting, but the interactive components of learning platforms were not well used by learners.
* **The use of ICT can change the culture and climate of educational organisations and of individual classrooms, thereby creating greater potential for deep learning.** In addition to providing a stimulus and process for learning, the use of ICT also has the potential to influence learner motivation and interaction with others. This has the potential to influence the context of learning in ways that are more conducive to all learning. While this does not achieve deep learning in itself, it enhances the potential for doing so.
* **The functional use of some applications lets learners focus on interrogating the broader concepts in hand, rather than being bogged down in the minutiae of their tasks.** The use of some applications provided learners with the opportunity to focus on the wider implications of their work without having to be concerned with the specifics of the task in hand. This encouraged a more holistic perspective on the task in question, which meant that the specifics of the activity given could be seen in relation to the overall purpose of that activity.

**The use of ICT must be seen in relation to the overarching pedagogic approach; it cannot enable deep learning on its own.** ICT is not an automatic enabler to deep learning. In order for its potential to be realised by tutors and learners alike, its use must be built into pedagogic approaches in ways which achieve the connections highlighted in the previous section.

Learners do not necessarily have to be highly competent in the use of ICT; however, learning the skills necessary to make the best of technology is one feature of a deep learning approach that employs ICT. The use of ICT can be seen in and of itself as a skill which can be learnt and developed. With increasing confidence and competence, it can become a facilitator rather than a barrier to learning.

Conclusions

Despite the rhetoric, there is still a great deal of uncertainty surrounding the understanding, interpretation and implementation of deep learning.

Deep learning is both a phrase that practitioners had encountered and a concept that had relevance for their work. Their findings show that deep learning is not achieved through a simple focus on examination performance. It involves learners in grasping concepts that can be applied to different contexts. It also involves learners in developing their skills such that the use of these skills becomes instinctive and supportive of conceptual learning.

ICT can enhance deep learning by providing an approach through which learners can experience concepts from multiple perspectives in ways that would not have been possible otherwise. However, the use of ICT must be seen in relation to the overarching pedagogic approach. As part of this wider pedagogical approach, learning platforms can provide learners with the opportunity to engage with learning materials online and so take charge of the timing of their own learning.

The practitioner has a key role to play in developing a range of skills. There is a need for staff development programmes to enable practitioners to take advantage of the opportunities provided by deep learning.

References

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