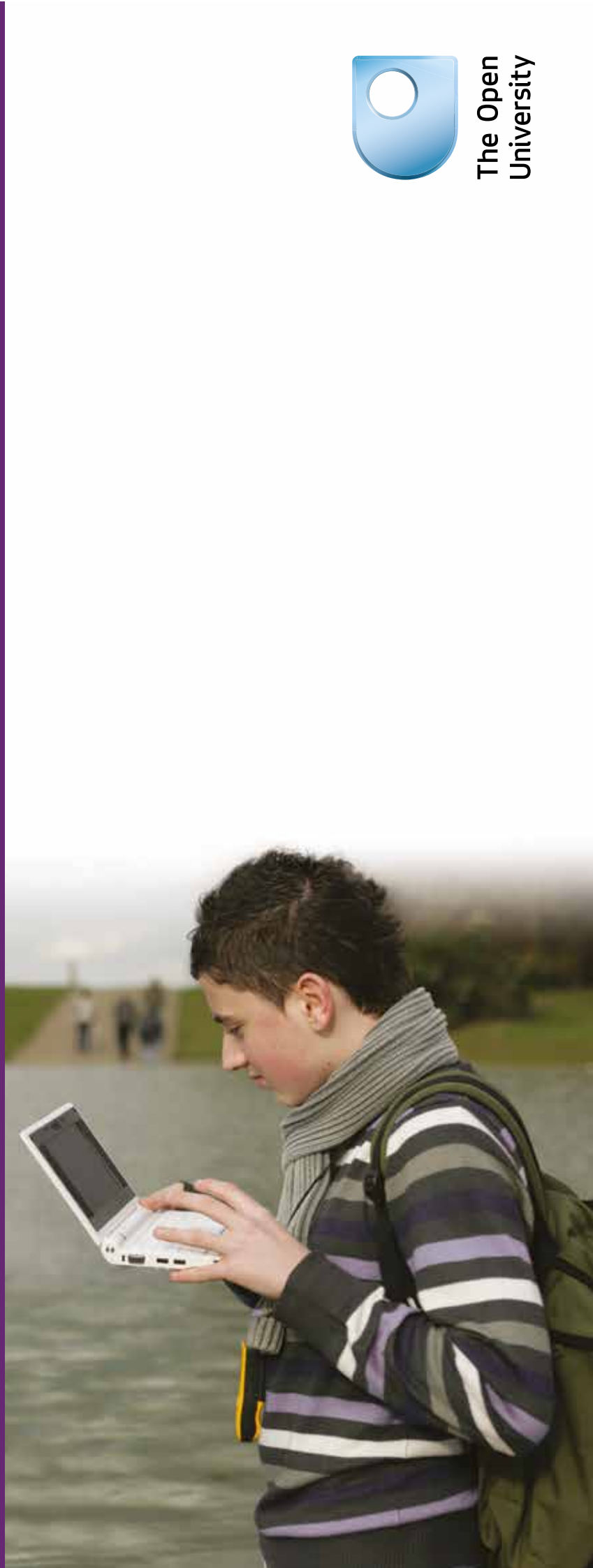The Open University

Innovating Pedagogy 2014

Exploring new forms of teaching, learning and assessment, to guide educators and policy makers

Mike Sharples, Anne Adams, Rebecca Ferguson, Mark Gaved, Patrick McAndrew, Bart Rienties, Martin Weller, Denise Whitelock

Open University Innovation Report 3

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Executive summary

This series of reports explores new forms of teaching, learning and assessment for an interactive world, to guide teachers and policy makers in productive innovation. This third report proposes ten innovations that are already in currency but have not yet had a profound influence on education. To produce it, a group of academics at the Institute of Educational Technology in The Open University proposed a long list of new educational terms, theories, and practices. We then pared these down to ten that have the potential to provoke major shifts in educational practice, particularly in post-school education. Lastly, we drew on published and unpublished writings to compile the ten sketches of new pedagogies that might transform education. These are summarised below, starting with two updates to last year's report, followed by eight new entries, in an approximate order of immediacy and timescale to widespread implementation.

1 **Massive open social learning:** Massive open social learning brings the benefits of social networks to the people taking massive open online courses (MOOCs). It aims to exploit the 'network effect', which means the value of a networked experience increases as more people make use of it. The aim is to engage thousands of people in productive discussions and the creation of shared projects, so together they share experience and build on their previous knowledge. A challenge to this approach is that these learners typically only meet online and for short periods of time. Possible solutions include linking conversations with learning content, creating short-duration discussion groups made up of learners who are currently online, and enabling learners to review each other's assignments. Other techniques, drawn from social media and gaming, include building links by following other learners, rating discussion comments, and competing with others to answer quizzes and take on learning challenges.

2 **Learning design informed by analytics:** Learning design is used in the development of courses or series of lessons to help educators plan a coherent sequence of media, technologies and pedagogies. The use of learning design tools and templates shifts attention away from content, towards learner activities and the learning journey. A learning design specifies intended learning outcomes, identifies the ways in which these are to be achieved, and sets out how they will be assessed. Data from tracking and management of learning activities can inform learning design by providing evidence to support the choice of media and sequence of activities. When analysis of learning data is also used to evaluate and improve

learning design, the circle is complete, so design and analytics work together to support the development of successful learning and teaching.

3 **Flipped classroom:** Flipped learning reverses the traditional classroom approach to teaching and learning. It moves direct instruction into the learner's own space. At home, or in individual study time, students watch video lectures that offer them opportunities to work at their own pace, pausing to make notes where necessary. This allows time in class to be spent on activities that exercise critical thinking, with the teacher guiding students in creative exploration of the topics they are studying. Flipped learning is sometimes seen simply as a different approach to delivering content. It also offers opportunities for the classroom to become a more flexible environment, where the physical layout can be shifted to enable group work, where students can make use of their own devices, and where new approaches to learning and assessment are put into practice.

4 **Bring your own devices:** When students bring their own smartphones and tablet computers into the classroom, this action changes their relationship with the school and with their teachers. They arrive equipped not only with individual technologies that they maintain and improve, but also with their own personal learning environments and social networks. This means that teachers become managers of technology-enabled networked learners, rather than providers of resources and knowledge. This shift opens opportunities for connecting learning inside and outside the classroom. Computer-based activities that are set in the classroom can be continued elsewhere and then shared at school. Students' personal collections and networks, gathered inside and outside school, can become resources for learning. Bring-your-own-device (BYOD) approaches have the potential to reduce the cost of ICT provision and introduce new possibilities for learners, but they also offer new challenges.

Schools need to be willing to support a wide range of technologies and to open their educational networks to new devices. They must also avoid disadvantaging learners who cannot afford suitable devices, and develop ways for individuals to keep their social and learner identities apart if they prefer to do so.

5 **Learning to learn:** We are always learning. Throughout our lifetime we take on board new ideas and develop new skills. What we find difficult are learning what others want to teach us, and managing our learning in order to achieve particular goals and outcomes. Self-determined learning involves learning how to be an effective learner, and having the confidence to manage our own learning processes. 'Double-loop learning' is central to this process, for double-loop learners not only work out how to solve a problem or reach a goal, but also reflect on that process as a whole, questioning assumptions and considering how to become more effective. This helps them to become self-determined learners with the ability to seek out sources of knowledge and make use of online networks for advice and support. Web tools and activities such as reflective journals and concept mapping have been designed to support learning to learn, but these are rarely well integrated into a learner's social world. There may be more value in adapting for wider use social research environments such as ResearchGate, or question-answering communities such as StackExchange and Quora.

6 **Dynamic assessment:** Dynamic assessment focuses on the progress of the student. The assessor interacts with students during the testing phase of the process, identifying ways to overcome each person's current learning difficulties. In the dynamic assessment process, assessment and intervention are inseparable. This approach has been used with university students, with school children learning physics, and with children who have particular learning difficulties. Although labour intensive, it has the potential to be used as part of a range of assessment tools.

7 **Event-based learning:** Event-based learning runs over a few hours or days and creates a memorable sense of occasion. Examples are the 'maker fairs' that gather together enthusiasts who are keen on do-it-yourself science, engineering and crafts projects, and the 'Raspberry jams' where fans of the Raspberry Pi computer meet up and share ideas. Local events spark national gatherings and these build into international festivals. Many, like the UK's annual Springwatch week or the worldwide Scratch Day for computer programming, are initiated at national or international level, but all depend upon local enthusiasm and initiative. The time-bounded nature of an event encourages people to learn together, its local setting supports face-to-face encounters between amateurs and experts, and the scale of an event can provide access to resources that would otherwise prove inaccessible. Having such an event as a focus gives learners something concrete to work towards and to reflect upon afterwards, together with a sense of personal engagement and excitement.

8 **Learning through storytelling:** Learning requires a structure that helps learners to embed and revisit their understanding. Stories provide one way of creating this structure. Developing a narrative is part of a process of meaning making in which the narrator structures a series of events from a particular point of view in order to create a meaningful whole. Writing up an experiment, reporting on an inquiry, analysing a period of history – these are all examples of narrative supporting learning. Indeed, much of our education involves combining different things we know in order to create an understanding of what has happened and, as a consequence, what can be expected to happen in the future. These accounts can be used to link memories of events, binding them together to form larger, more coherent chunks. In a narrative approach to learning, the creation of stories is emphasised, allowing learners to navigate resources and to add coherence to different experiences.

Narrative encourages the combination of historical overview and modern practice. It can provide emotional engagement and relevance for learners, together with personal involvement and immersion.

9 **Threshold concepts:** A threshold concept is something that, when learnt, opens up a new way of thinking about a problem, a subject or the world. An example is the physics concept of 'heat transfer' that can inform everyday activities such as cooking or home energy use. These concepts help to define subjects, they shift learners' perceptions of a topic area, and they usually prove difficult to unlearn. Teachers are increasingly using threshold concepts as starting points for the design of effective lessons. They can also be used as a focus for dialogue between students, teachers and educational designers. A challenging aspect of threshold concepts is that they often seem strange and unintuitive. Students who appear to have understood these troublesome concepts may be unable to put them into practice, instead falling back on common-sense, but inaccurate, beliefs. Momentum for using threshold concepts to help teaching is growing across disciplines. One approach is to develop standard sets of threshold concepts for different subject areas; another is to embed them in teaching and learning processes and practices.

10 **Bricolage:** Bricolage is a practical process of learning through tinkering with materials. It involves continual transformation, with earlier products or materials that are ready to hand becoming resources for new constructions. It is a fundamental process of children's learning through play, as they create castles out of boxes and tell stories from remembered events. It also forms a basis for creative innovation, allowing inventors to combine and adapt tools and theories to generate new insights, while also engaging with relevant communities to ensure that the innovation works in practice and in context.

Introduction

This is the third in a series of annual reports on innovations in teaching, learning and assessment. The Innovating Pedagogy reports are intended for teachers, policy makers, academics and anyone interested in how education may change over the next ten years.

As in previous years, this report has been written by a small group of academics in the Institute of Educational Technology at The Open University. It is based on our knowledge acquired from leading research projects, reading and writing educational research papers and blogs, holding conversations with colleagues worldwide, and surveying published and unpublished literature. We compiled the report by first producing a long list of new educational terms, theories, and practices, then reducing these to ten that have the potential to provoke major shifts in educational practice. For this 2014 report, we take different perspectives on two topics that were covered in the previous reports and introduce eight further pedagogies that are already being introduced into educational practice or offer opportunities for the future.

Massive open online courses (MOOCs) are still making headlines. The focus now is not on the phenomenon of free courses, but on how they are starting to transform education by offering 'nano-degrees' that teach the minimum skills needed to enter a new career, or by providing complete degree courses constructed from open access materials. MOOCs are also a giant laboratory for testing new methods of teaching, learning and assessment. Analyses of the ways in which many thousands of people are learning online are already starting to influence the design of courses in universities and workplaces.

A central theme of massive-scale courses is 'personalization'. The idea is that each learner can be given the power to choose when, where and how to study, and that the teaching adapts to the learner, either by providing instruction that is matched to a person's approach to learning, or by offering supplementary teaching if the learner makes a mistake in an online test.

Ninety years ago, Sidney Pressey developed the first adaptive teaching machine – a mechanical testing device that presented a question with a choice of multiple answers. If the student got an answer wrong, the machine removed that answer until the student selected the correct response: the first demonstration of automated 'mastery learning'. In his 1933 book, Psychology and the New Education, Pressey wrote,

❝ There must be an 'industrial revolution' in education, in which educational science and the ingenuity of educational technology combine to modernize the grossly inefficient and clumsy procedures of conventional education. Work in the schools of the future will be marvelously though simply organized, so as to adjust almost automatically to individual differences and the characteristics of the learning process. There will be many laborsaving schemes and devices, and even machines – not at all for the mechanizing of education, but for the freeing of teacher and pupil from educational drudgery and incompetence. ❞

Pressey's prediction of an industrial revolution in education by automating the teaching process never happened. Over the years, many projects have developed personalized methods of tutoring that adapt to a student's knowledge, skills, strategies and preferences. Some, such as the Cognitive Tutors® from Carnegie Learning, track each response from the learner, infer the current state of the learner's knowledge, and adapt the teaching accordingly. Each Cognitive Tutor has taken many years to develop, for a specific area of mathematics. These are promising developments, with successful outcomes, but they will not address the worldwide need for education in practical skills, arts, sciences, and humanities. In a post-industrial world of interconnecting networks of people and technologies, there is a growing realisation that social learning alongside personalized instruction may be the key to mass online education.

Pressey's Automatic Teacher, circa 1929

One new development brings the power of social networks to massive online courses, so that learners create personal profiles, engage in conversations, follow people they find interesting, seek 'study buddies' for learning together, form study groups, and build communities of shared interest. New directions in social networks are already starting to influence education. These include live feeds of current activity (such as news items relating to the course, or the learning activities of a group of study friends) and location-based activity, with people contributing video, images or sounds related to their local environment. Social learning is not just a means of sharing learning resources, but a valuable activity in itself. Learning together creates a 'shared mind' that combines different perspectives and alternative ways to solve problems.

Another major trend is towards blending learning within and outside the classroom. This is shown in flipped classrooms, where students watch video lectures at home and discuss them in class. It is also appearing with students bringing their own devices into the classroom along with their personal software and social networks. Initially seen as an unwelcome disruption, or even a threat to school discipline and a danger to children, there is now a drive to educate young people in how to use their own technologies to be inquiring and collaborative online learners. In this way the personal and the social combine, to create a new form of learning based on networked collaboration through personal technologies. Pupils are saved, in the words of Pressey, from educational drudgery and incompetence by joining online communities, asking questions, seeking answers, creating and sharing resources. But this is no online utopia. We also realize the limitations and dangers of mass networked learning, from the spreading of hate literature, to the invasion of online forums by bullies and demagogues. Teachers and leaders have an important role in helping young people learn how to learn online, and in shaping safe and engaging communities.

"Learning together creates a 'shared mind' that combines different perspectives and alternative ways to solve problems."

Resources

Nanodegrees from Udacity:

http://blog.udacity.com/2014/06/announcing-nanodegrees-new-type-of.html

Cognitive Tutor® software from Carnegie Learning:

http://www.carnegielearning.com/

Review of Sidney Pressey's contributions to learning and technology:
Petrina, S. (2004). Sidney Pressey and the automation of education, 1924-1934. *Technology and Culture*, 45 (2), 305-330.

Quotation from pages 582-583 of:
Pressey, S. L. (1933). *Psychology and the New Education*. New York: Harper & Brothers.