DOI: 10.20472/TEC.2016.003.009

BOB FOX

University of New South Wales, Australia

FLEXIBLE FRAMEWORKS FOR BLENDED LEARNING IN HIGHER EDUCATION

Abstract:

Pressures to adopt new technology-based online solutions to enable increased flexibility in delivering higher education have accelerated in pace. The primary reasons for this growth concern ongoing debates about costs of residential on-campus courses and resulting economies of scale; demands for more student-centred and flexible approaches, providing students with more choices in learning; technology ubiquity, portability and their affordances providing solutions to identified student needs; and the impact of MOOC experiences and lessons learnt, rolling back into mainstream open and on-campus teaching. Based on case study analysis, this paper examines experiences in developing open and blended learning solutions for predominantly campus-based education and identifies longer-term impacts on changing core practices. The first case explores the impact of distance and open education courses and course resources and activities re-purposed to replace conventional on-campus teaching; the second a re-engineered continuing professional education course converted to distance and blended learning; the third describes how a conventional course structure, quality assurance and sustainable improvements were made through the introduction of blended and online solutions; and the forth case explores the impact of an institution's use of MOOCs as a catalyst to effect changes in mainstream courses and programs. Arising from the cases described, the paper identifies key concepts that support improved opportunities for success in adopting open and blended learning. The paper concludes by outlining a curriculum design framework, based on recent research and practice that facilitates sustainable and transferable improvements to learning and teaching in universities adopting open and blended learning strategies.

Keywords:

online learning; blended learning, technology affordance, curriculum design

JEL Classification: I29, O33, I23

This paper is adapted and extended from: FOX, R. (2015). The rise of open and blended learning. In K.C. Li, & K.S. Yuen (Eds.), Studies and Practices for Advancement in Open and Distance Education (pp. 93-103). Hong Kong: Open University of Hong Kong Press.

Introduction

Open and blended learning strategies have become the *mot-du-jour* in delivering higher education in recent years. The reasons for this focus are multiple. What this paper illustrates is that quality open and blended learning has been practiced in higher education for several decades. What is more important is not the delivery method itself but underlining sound pedagogy and curriculum design. This paper outlines case studies of good practices in open and blended learning and concludes with an effective curriculum design framework to support future blended courses.

Case Studies In Open and Blended Learning

Case One: Distance Course Re-engineered For Blended On-campus Delivery

A distance course in microbiology was developed to enable practising nurses in rural and regional Western Australia to upgrade their Nursing Diploma to degree status (Fox & Edwards, 1990). Materials developed, included weekly video presentations (laboratory demonstrations and short lectures) broadcast on Golden West Network, a regional television station, activity-led print-based study guides and resources and later, a series of computer problem-based scenarios via augmented learning exercises (Russell, 2014), which enabled students to work through cases and make decisions regarding, for example, different ways of collecting and storing urine samples for laboratory analysis. The decisions students made were logged and individual feedback given on the consequences of the decisions they had made. The distance course was adapted for use with the Open Learning Agency of Australia (OLA) in the mid-1990s OLA, 1993). Feedback on the course from distance students was positive and resources and the teaching methodology used in the distance mode was considered worth adapting to support on-campus teaching (Edwards, Fox & Philips, 1997).

The microbiology course was taught to a large number of students in health sciences, with considerably increased numbers (750) in the early 1990s. The course was a core as well as a service/elective unit of study for various health related degree programs. The distance materials were initially made available to supplement the on-campus course. The print-based study pack, which included resources for the course, activities and simple tests with feedback and answers; links to the videos and additional references, to enable students to self-study as well as self-monitor their progress through the course was placed in the university bookshop and sold to students at cost. The videos and computer-based case scenarios were placed in the AV section of the library, for internal use by on-campus students. The decision to trial using the distance resources to take the place of certain components of on-campus course delivery was made following positive data collected from students using the materials, the number of sales of the print-based study pack, and the number of uses of each of the videos held in the library (Fox & Edwards, 1990). The VHS videotapes needed to be replaced

several times in each semester, due to heavy usage and subsequent wear-and-tear. Students were asked to review the videos for each week and to address activities set in the study packs before attending the large lectures. In the lectures, students were placed in groups to discuss answers to the tasks set prior to class and to raise questions. Areas requiring further clarification, were supplemented, as needed, by a review of sections from the video. The lectures, using this method became more interactive. Students took some time to get used to the changed format, but broadly appreciated the increased opportunities afforded for more activity, interactivity and reflection (A.I.R.) (Fox & Radloff, 1999) in the lectures and the additional support provided out-of-class. The lectures and tutorials were not only more interactive, but enabled more detailed and enriched matters to be discussed. This approach to teaching created new roles for lecturers and tutors and introduced roles for educational developers and designers, who explored and recommended the changing learning environments that took into account affordances of new technologies and new practices and the adoption of re-engineered distance learning courses.

Case Two: Civil Engineering First Year Course Converted Using Personalized System of Instruction (PSI)

The civil engineering course in this case study was a service/elective and a core course for a number of different programs in Engineering, taught in the mid-1980s. First year second semester students from multiple degrees, with varied interests, understandings, capabilities and motivations to study were all enrolled together in the same class. The number of students in the course varied from year to year, but generally ranged between 120 and 250. To complete the course, students were required to evidence their understanding of core components of the course by addressing tasks and problems set, questions in the form of multiple choice and short open ended questions, all set in authentic contexts related to civil engineering.

The course was taught using traditional methods of lectures, focussing on delivering and contextualising content, followed by tutorials, clarifying content introduced in the lectures and providing students with opportunities to raise questions and seek help for tasks and problems set. While this traditional method worked well when classes were composed of students from similar backgrounds and interests and when the number of students taking the course was around 20-30, the shift to much larger classes of students from different degrees and capabilities created major difficulties for both students and staff teaching the course. Student feedback highlighted a number of issues in the course, that could mostly be related to the broad student demographic and different student needs, experiences and understandings. For example in the tutorials, some students required detailed help in working through tasks set, while other students needed little help, but just needed to know how well they had done in addressing the tasks set, enabling them to move onto the next stage of the course.

The course delivery was ‘flipped’, following the Keller Plan, also called Personalized System of Instruction (PSI) (Pear, Schnerch, Silva, Syenningsen, 2011). The Keller Plan, developed in the mid-1960s provided a systematic framework for self-paced personalised distanced instruction, well suited to STEM subjects (science, technology, engineering and maths) and others subjects, based on structured hierarchical knowledge development and standard stepped testing procedures (Maciea & Usher, 2012).

Core tasks and problems in the civil engineering course, were given to students prior to the start of semester, along with a self-paced study pack about the course and the way the course was delivered. In the first ‘lecture’ students were informed that there would be no lectures in the traditional sense, but that learners would be required to work through the various exercises in the course manual, answering the tasks and questions set. Student were told that the lecturer would still attend the lectures or at least be in the lecture hall to assist individuals and small groups that needed particular help with the staged activities. Those students who could successfully complete tasks set on their own, could submit their work for early feedback, and then move through other parts of the course at their own place. The study pack, produced by the lecturer provided an interactive, self-paced text, including course content broken down into small units with examples, short stories to illustrate issues and accompanying questions, diagrams and figures to help students work through all the tasks. The lecturer noted that time was needed in the first few sessions to explain and re-explain to students about the format of this course and to assure students that despite having no content driven lectures, they could very successfully work their way through the course to successful completion. Overall, the new flipped method worked well and student completion rates as well as grades were improved. Students who needed help in getting through the course, appreciated the opportunity given to talk to the lecturer, while those students who found the course and the PSI materials easy to work through by themselves were happy to complete the course at their own pace, often well before the end of semester, enabling them to focus on other courses they were taking, that they found more demanding and needed increased effort. The greater flexibility of this course catering for different student interests and capabilities was much appreciated by students, who then put pressure on other courses to adopt a similar method of delivery. Though the term ‘flipped’ was not used, the practice was certainly similar to recent descriptions of changed teaching. Today, with advancement in technology enhanced learning and teaching, the Keller Plan methods have become popular again, especially in the STEM disciplines.

The success of this flipped civil engineering course led to very mixed responses from academics around the campus. Some very positive, adopted similar strategies themselves, while others expressed concern that this would lead to non attendance in lectures and querying whether students could genuinely learn effectively through this method. In the years that have passed since this PSI approach was adopted in civil

engineering, the same criticism is heard, concerning students missing face-to-face classes.

Case Three: Main Roads Engineering Courses

In the 1990s, engineers working for the government's main roads department required staff to complete continuing professional education (CPE) courses to update their skills and knowledge and to keep up with changes in state and federal policy and procedures. The courses run were conducted in conjunction with a local university. Course delivery adopted a conventional face-to-face method, requiring staff to attend classes in person. A difficulty arose when increased information was included in the course and the course itself expanded to accommodate this change. However, the engineers required to take these courses were increasingly finding it difficult to attend classes at particular times, due to increased business at work. The course coordinators were becoming more frustrated as they could not identify a time and date that would be suitable for the engineers needing to take the required courses.

An examination of the course content by instructional designers identified that new information was being added to courses but older information/content was not being removed. In addition, the specified objectives of each course had become unclear and unconnected to course objectives as each course had increased the content. Further, the links within course components and between the courses also had become tenuous.

The solution developed by the instructional designers was to complete a curriculum mapping exercise, identifying the core business of each course, interrelationships between course and assessment components and how the courses related and built on each other. Older content of the courses was removed and clear links made between the courses (Fox & Radloff, 1999). Delivery of all courses was blended, enabling the engineers to complete the bulk of the coursework at a distance, at home or in the office. Face-to-face classes were reduced to two times two-hour sessions. Evaluations conducted identified improvements in grades as well as better retention and pass rates. Again, this case made use of instructional designers and educational developers, as members of the teaching and support team, ensuring that the revised courses achieved the outcomes set, as well as ensuring teaching staff were provided with training and support in the changed delivery practices, which incorporated distance learning strategies.

Case Four: Piloting New Practices through MOOCs

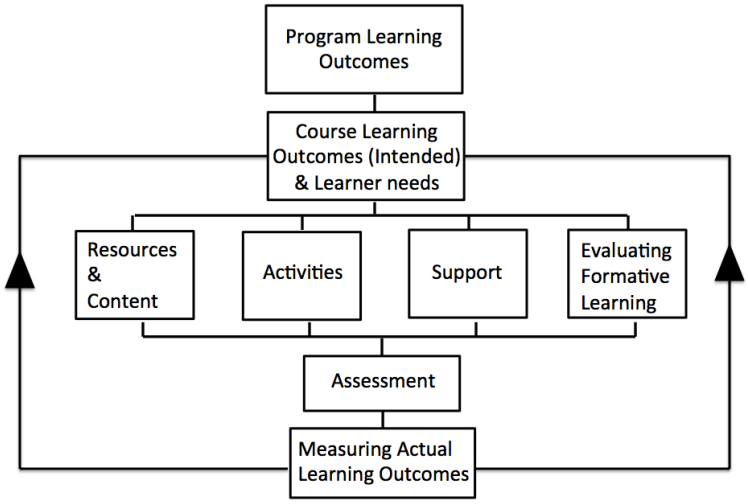
In 2012, the university decided to strategically fund a selection of Massively Open Online Courses or MOOCs. Reasons for developing the MOOCs was varied, though one core purpose was to trial new approaches, practices, and innovations to developing and delivering higher education, that could later be shared and in part

adopted into mainstream on campus residential and blended learning. In the first year of trials, the RASE (Resources, Activities, Support and Evaluation) design model (Churchill, King & Fox, 2013) was adopted, along with a standard-based assessment model, based on Blooms' objectives and Biggs' SOLO taxonomies (Krathwohl, 2002; Biggs & Collis, 1982) and a 7-point grade scale. Amongst the lessons learnt from these trials, the university was able to evidence the value of adopting a single curriculum design model for the MOOCs that could also translate well into more conventional on campus teaching and the adoption of open learning strategies to residential courses. The final section of this paper outlines the design framework and the values such a model offers to higher education programs and courses.

RASE Model For Developing Courses

One core benefit of trialling MOOCs as well as other cases in open and blended learning is the opportunity to trial and evaluate new approaches to higher education learning and teaching. Over the last decades, different design models have been tried and tested in the above cases of this paper and the RASE model builds of this previous work (Churchill, King & Fox, 2013), within an outcomes-based curriculum. An advantage of this model is that it takes into account changing technologies and their evolving affordances, while maintaining core principles that support quality learning and teaching. Fundamental to this model is that quality content and accompanying resources are not sufficient for achievement of the learning outcomes, but that four interrelated core components should include: 1. Resources, for example, crafted content to engage students through experiments, demonstrations, mini-lectures, or readings, etc., enabling students to learn *with*, not just learn *from* resources; 2. Activities for students to engage in using resources and working on tasks such as experiments and problem solving leading through experience towards achieving learning outcomes; 3. Support, including peer, course teacher and technology-platform support to help students solve emerging difficulties as they work through the course; and 4. Evaluation, to provide structured information to guide and enable student' self-progress and to serve as a tool for teachers for understanding what else is needed to ensure that learning outcomes are being achieved. This four-step model supports a range of summative assessment activities to assess and provide a basis for the certification of learning. The RASE model, used in conjunction with an outcomes-based curriculum, has been trialed with blended on campus courses as well as in the MOOC courses and has to date, enabled quality assurance and improvement within and across courses. In line with Biggs (2014) paper on the importance of institutional constructive alignment between programs and courses, the RASE model is now being used in the design and development of programs and courses across the university. The framework with notes in its components is provided in Figure 1 below.

Figure1: RASE within an outcomes-based curriculum



Source: Fox, 2015

In Figure 1:

Program Learning Outcomes (PLOs) prescribe the knowledge, skills and applications that students are expected to demonstrate in completing a program of study.

Course Learning Outcomes (CLOs) prescribe the knowledge, skills and applications that students are expected to demonstrate in completing a specific course. CLOs articulate with PLOs.

Learner Needs are the individual students' needs catered for to ensure their greatest possible engagement in learning.

Course Components are the combination of resources, activities, support and feedback/evaluation (formative assessments) required for full achievement of course learning outcomes.

Assessments measure actual learning outcomes. Assessment methods can be formative or summative.

Measuring Actual Learning Outcomes ensures that the student can demonstrate they have achieved the intended learning outcomes of the course and program.

Strategic Intent and **Graduate Capabilities**. Strategic intent establishes university-wide aspirations for all programs, and broadly defines what students may expect to experience when undertaking a program at a particular university. Graduate capabilities are the broad knowledge, skills, practices and dispositions that students are required to develop during their time at university. Strategic intent and graduate capabilities are integrated within PLOs.

Conclusion

There is ongoing demand for adopting open learning strategies in all forms of higher education and much has been learned by researching and re-developing distance courses to open and blended learning in residential courses. Though is no one-fits-all model for the design of curriculum, programs and courses, the RASE model, outlined in this paper, in conjunction with Biggs' constructive alignment (2014) is assisting in improving the quality of higher education provision in a growing number of institutions that have adopted open and blended learning strategies.

References

BIGGS, J. B. & COLLIS, K. F. (1982). Evaluating the quality of learning: The SOLO taxonomy (Structure of the Observed Learning Outcome). New York: Academic Press.

BIGGS, J. (2014). Constructive alignment in university teaching. *HERDSA Review of Higher Education*, Vol. 1, 5-22.

CHURCHILL, D.; KING, M, & FOX, B. (2013). Learning design for science education in the 21st century. *Journal of the Institute for Educational Research* 45 (2), 404-421.

EDWARDS, P.; FOX, R. & PHILLIPS, R. (1997). Microbiology project case study. In R. Phillips (Ed.), *Developer's handbook to interactive multimedia*, (pp. 157-175). London: Kogan Page.

FOX, R. & EDWARDS, P. (1990). Microbes and the media: a telecourse for nurses. In R. Atkinson & C. McBeath (Eds.), *Open Learning and New Technology: Conference Proceedings*, 147-153. Perth: Australian Society for Educational Technology.

FOX, R. & RADLOFF, A. (1999). Unstuffing the curriculum to make room for lifelong learning skills. In E. Dunne (Ed.), *The Learning Society: International Perspectives on core skills in higher education*. (pp. 130-139). London: Kogan Page.

FOX, R. (2015). The rise of open and blended learning. In K.C. Li, & K.S. Yuen (Eds.), *Studies and Practices for Advancement in Open and Distance Education* (pp. 93-103). Hong Kong: Open University of Hong Kong Press.

KRATHWOL, D. R. (2002). "A revision of Bloom's taxonomy: An overview". *Theory Into Practice,* 41 (4): 212–218.

MACKIEA, A. & USHER, B. (2012) A New Implementation of Keller Plan Teaching for an Undergraduate Electronic Engineering Course. Proceedings of the 2012 Australasian Association for Engineering Education (AAEE) Conference, Melbourne, Victoria. Available from: http://www.aaee.com.au/conferences/2012/documents/abstracts/aaee2012-submission-90.pdf [Accessed: 16th December 2015].

OPEN LEARNING AGENCY OF AUSTRALIA PTY LTD (1993). '*Who are we?*'. Available from: http://www.open.edu.au/about-us/who-we-are/ [Accessed: 16th December 2015].

PEAR, J. J.; SCHNERCH, G. J.; SILVA, K. M.; SVENNINGSEN, L. & LAMBERT, J. (2011), Web-based computer-aided personalized system of instruction. *New Directions for Teaching and Learning,* 2011, 85–94.

RUSSELL, D. (2014). Learning, Problem Solving, and Mindtools: Essays in Honor of David H. Jonassen. *Interdisciplinary Journal of Problem-Based Learning, 8*(1). Available from: http://dx.doi.org/10.7771/1541-5015.1492. [Accessed: 16th December 2015].