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Pre-Service Teachers Need More Than Online and Flipped Learning

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Abstract: This decade has seen unprecedented pressure on higher education institutions to deliver more instruction using online technologies; to the extent of some courses being entirely online. In this paper I address the question of how instructors of undergraduate teacher education courses in Australia should respond to this pressure? I present a rationale for employing a ‘blended’ approach to learning, which sets limits on purely online instruction by including some face-to-face activities. And I illustrate this approach by describing the planning and implementation of a new final semester undergraduate unit titled, *ICT Enhanced Curriculum*. The main aim for the unit was to develop the TPACK knowledge of students, and the skills to implement associated learning activities that included ICT use. With a focus on pedagogical knowledge and skills the use of face-to-face workshops, which featured the modelling of pedagogy, was crucial. This was supported with a comprehensive set of online materials giving rise to a successful blended learning environment, although an attempt at a ‘flipped’ environment was not successful. As a result, I argue for limits to the use of purely online learning in pre-service teacher education. The unit was successfully implemented, and for most students their assignments showed strong growth in their TPACK knowledge, and greater confidence and awareness in how to implement ICT use with their curriculum. It illustrated my belief that even in ICT-focused units undergraduate teacher education students need a blended approach with the use of both face-to-face and online strategies. As teacher educators we need to strike a balance between online and face-to-face activities, and we need to resist the pressure from our universities to go fully online; that may suit business courses, but not pre-service teacher education courses.

There is increasing pressure on higher education institutions to deliver more instruction using online technologies (Sutherland-Smith & Saltmarsh, 2010). In the extreme there has been the rise of the MOOC (Massive Open Online Course), notorious for massive attrition rates (i.e. Massively Overestimated Online Crowd), and the flipped classroom. To what extent should teacher education courses follow these online trends? Teacher education in Australian universities has also been under pressure to increase the use of online technologies in teaching and learning, with some courses being entirely online (Sutherland-Smith & Saltmarsh, 2010). However, typically it has been more economic and social factors, rather than educational factors, that have supported this pressure. A key driver in higher education has been to save money on facilities and tuition, but equally the argument has been put in terms of fitting the lifestyles and life pressures of students. Although a rationale of increased personalisation of learning has also been espoused, the evidence tends to relegate this as a distant third. For example, when research shows that to achieve this increased personalisation of learning requires a greater investment of time by instructors and students, institutions tend to invest in relatively token attempts. Many, but not all, teacher educators, including myself, share the conviction that there should be a limit to the extent to which online learning environments are relied upon in undergraduate teacher education, with the focus more on ‘blended learning’, that is a combination of face-to-face and online environments (e.g. Chigeza & Halbert, 2014; Collopy & Arnold, 2009; Saltmarsh & Sutherland-Smith, 2010). This is not to say that online technologies cannot be used effectively in teacher education, or that some components of a course could not be fully online. My argument is that there should be limits on the extent to which these are employed.

At the heart of the issue is the fact that in Australia the vast majority of schooling occurs in rooms typically containing 15-30 children within which the bulk of graduating pre-service teachers will find themselves for most of their time teaching face-to-face class groups. The question is whether teacher education courses can adequately prepare teachers with the pedagogical knowledge and skills for these environments with largely online pedagogies. This paper considers this question of the extent to which online pedagogies should be used in undergraduate teacher education courses. A brief literature review is used to provide a rationale for a ‘blended’ approach to learning with limits on purely online instruction. This approach is then illustrated through the planning and implementation of a new final semester undergraduate unit titled, *ICT Enhanced Curriculum*. This was not a research project but some of the standard data generated provided useful insights for illustrative purposes.

Online learning in teacher education

Sutherland-Smith and Saltmarsh (2010) suggest that when deciding the role of online learning within teacher education there is a need to consider “purpose, pedagogy and practicalities” (p. 75). That is what is the purpose of the learning episode, what is the preferred pedagogical approach for that content and those students, and how practical is it for instructors and students to use the technologies?

Much of the purpose of learning episodes in undergraduate teacher education is to develop pedagogical content knowledge and therefore the aim is to expose students to a large range of pedagogical strategies and thus develop their skills (Haydn, 2014). Practically there is ample evidence that substantial groups of students find this difficult in a ‘distance learning’ (online) mode, as do many of their instructors. For example, Chigeza and Halbert (2014) found that replacing face-to-face instruction with online materials had a negative impact on pre-service teacher engagement and satisfaction, but that a carefully designed blend of face-to-face and online in small class sizes was much better. They explained that “the capacities, confidence and preparedness of the pre-service teachers in being a technology enabled and independent learner limited some pre-service teachers significantly” (p. 144). They correctly identified that in designing courses the learner needed to be at the “heart”, that assumptions should not be made (Duncan-Howell, 2012) about their capacities “simply because they are ‘gen y’”, and the “diverse needs of learners” should not be marginalised (p. 145). There is plenty of evidence that students entering teacher education courses in Australia are on average less adept at using ICT than their peers across other disciplines at universities; perhaps those attracted to teaching tend to be more conservative and less technologically innovative (Chigeza & Halbert, 2014; Duncan-Howell, 2012; Pagram & Cooper, 2013). Irrespective of capabilities to use ICT, Chigeza and Halbert (2014) argue that “higher order critical reading, organisation and motivation needs to be scaffolded” (p. 145). Implied is the argument that this requires a blended design, not purely online pedagogies.

Collopy and Arnold (2009, p. 99) found that the,

... blended design provided an optimal opportunity for professors and teacher candidates. It offered a flexible option for teacher education by providing opportunities for discussion both in a face-to-face and an online space. The blended design also provided the opportunity to use time in a flexible way inside and outside of class walls.

Therefore, they conclude that instructors “must work to find the right balance of time spent face-to-face and online” and that this balance may “vary depending on the needs of the students and the content”, because such “flexibility can support different learning styles and different speeds of cognitive learning”. Unfortunately, they point to a paucity of research concerning the use of “blended learning course design in traditional pre-service education environments” with research tending to focus on graduate programs and non-traditional students and/or courses. A recent review by Kinash, Knight and McLean (2015) of Bond University investigated four related questions.

1. Does student attendance decrease when online content is made available?
2. Does achievement decrease if, and when, student attendance decreases?
3. Is online content better suited to some pedagogical tasks than others?
4. Do some types of online content work better than others?

Their findings from an analysis of 30 relevant publications included that there tends to be a positive relationship between attendance and the use of digital resources. However, students using online lectures as a complement to face-to-face classes, rather than in place of, achieved higher grades. They surmised that face-to-face and online pedagogy serve different learning and teaching purposes.

Arguably the main purpose for undergraduate teacher education courses is to prepare students to teach in schools where the vast majority of them will spend most of their time teaching face-to-face class groups of 15-30 children. Ideally lecturers should role model appropriate pedagogy through collaborative practices, problem solving, creative thinking, inter-personal communication, and digital technology competencies (Dede, 2008; Department of Education, 2001; Haydn, 2014). If part of that preparation is to model teaching strategies, methods and practices then it could be argued that a reasonable proportion of teacher education should be experienced in face-to-face class groups (Haydn, 2014). If there is an element of modelling required (‘do as I do’ rather than ‘do as I say’) then if all that is experienced is online they will be poorly prepared for the teaching most of them will be required to deliver as they start their careers. Technology should not be the driver for

change in education, rather pedagogical intentions should drive the use of technology. This is even the case for educational technology units (Haydn, 2014; Kale, 2014). Valtonen et al. (2015) found that pre-service teachers were more likely to consider using ICT in their teaching if their experiences of learning with ICT was in “pedagogically meaningful ways” (p. 55). While students need to experience how to use online technologies in teaching and learning, in reality most of their use of online and offline technologies will be in face-to-face teaching of class groups so they need to see modelled how this can be done (Haydn, 2014). Teaching with ICT will not be all ‘sitting in your office responding to online posts’, most of the time it will be working with individuals or groups of students, sitting physically in the room, to use software or online services with learning activities. However, the situation is different for in-service teacher education because participants already ‘know how to teach’ so they can adapt knowledge gained from online discussions and information to their face-to-face teaching practice. The use of online technologies to support Personal Learning Environments (Johnson & Liber, 2008) and learning communities is to be sought, even perhaps the use of MOOCs (Laurillard, 2016). Also this is different from the need for learning how to teach in online modes (e.g. distance education). Few students will initially have a lot of involvement with this.

Tondeur et al. (2013) report that in terms of TPACK knowledge pre-service teachers often feel inadequately prepared to use ICTs for learning and teaching. Kale (2014) suggests that their limited “educational use of emerging web technologies ... despite their digital literacy skills” reflects their “lack of understanding of how content, technology and pedagogy interact” (p. 471). So and Kim (2009) suggest that this is due to a “lack of intimate connection among beliefs, knowledge, and actions, and insufficient repertoires for teaching with technology for problem based learning” (p. 101). They suggest that the solution to this “conflict in content, pedagogical, and technological knowledge” is to expose students to “new and innovative teaching practices with technology throughout their teacher training”. They claim that “most student teachers come to the teacher training programs with little previous exposure to student centred and technology integrated learning experiences” (p. 111). As a result, they implemented an activity to “... design a technology integrated lesson in their subject area of teaching” in which students found they were challenged by “a) generating authentic and ill-structured problems for a chosen content topic, b) finding and integrating ICT tools and resources relevant for the target students and learning activities, and c) designing tasks with a balance between teacher guidance and student independence” (p. 101). These are challenges I recognise in my students.

Finally, to some extent the pressure towards using online technologies has been supported by the fact that in the universities in countries such as Australia, most students have mobile digital devices (e.g. smart-phones, tablets, netbooks), are increasingly using them to support their learning, and are bringing them on campus (e.g. Baran, 2014; Chen & Denoyelles, 2013). Increasingly the tablet such as the iPad is being heralded as the most effective device to support learning (Pegrum, Oakley, & Faulkner, 2013). In their study with teacher education students Pegrum, Howitt, and Striepe (2013) found that the iPad supported their “learning in multiple ways” across “formal and informal contexts” (p.475). Russell et al. (2014) reported on the use of information from 7000 students by three Australian universities to make strategic decisions about the use of digital technologies to support learning. In particular students expected anytime-anywhere access to course materials facilitated through better wireless networking for their smart phones, tablets and laptops. In common with many recent studies (e.g. Kobus, Rietveld, & van Ommeren, 2013) they found that most students already had a digital device but were critical of a lack of use in their classes. However, it should be recognised that providing materials and activities for students that use their digital devices does not imply this needs to occur while being physically isolated. These can, and should, be used in conjunction with both face-to-face and online pedagogical strategies (Baran, 2014). This is the essence of the blended learning environment that provided the model as I approached the planning and implementation of a new ICT-related unit.

Planning and implementing a new ICT unit

The main aim for my new final semester unit was to develop the TPACK knowledge of my students, and the skills to implement associated learning activities that included ICT use, aims that are consistent with the recommendations from Haydn (2014). Ideally, to enhance their TPACK most students needed exposure to a wide range of applications of ICT to teaching and learning, and some experience at planning how to implement some of this in their curriculum area (Haydn, 2014; Kale, 2014). As a result the two assignments were the planning of a learning sequence that incorporated the use of a range of ICTs, and an e-portfolio that included the outputs from a range of applications of ICT to teaching and learning and the student’s reflections on links to their curriculum. With the pressure at our university to teach units online there was probably an expectation that this ‘ICT unit’ would be fully online. However, drawing on my previous experience I knew that I would need to model the use of ICT to support teaching and learning and therefore they would need to experience this in standard class sized groups in a physical room. I also knew that without face-to-face help from myself and their peers, many students

would find the range of applications of ICT to teaching and learning daunting. Finally, I knew that many students would not adequately engage with online materials without some face-to-face engagement (synchronous communication sessions). Therefore a 'blended' learning environment was necessary so I organised the unit to be delivered to workshop classes of around 25 students supported by a tutor, computers (either their own devices or those provided by the university) and an extensive Blackboard site for 12 'modules' (weeks). The structure of the modules and workshops as presented in Blackboard is shown in Figure 1. It was important to have an increasing focus on the use of online technologies because one of the aims of the unit was to introduce students to using a Personal Learning Environment within learning communities to support their self-regulated learning as graduate teachers (Johnson & Liber, 2008). Each module included:

- video recordings and slideshows of 'lectures'
- pre-readings and supplementary 'content' resources (files and links)
- workshop activities instruction 'sheets' with associated links and files
- homework
- assessment information referenced to the content and activities of each 'module' or week

The screenshot displays two side-by-side Blackboard course pages. The left page is titled 'Module 1: Computers and Learning' and contains a navigation menu with 'Build Content', 'Assessments', 'Tools', and 'Partner Content'. Below the menu, there are several content items: 'Pre-Readings 1' with a link to a Gardner (2011) article; 'Presentation 1' with an attached PDF file 'CUR4212_P1_14S2.pdf' (18.937 MB) and several links to related media; 'Workshop 1 Folder' containing educational problems, research questions, and literature; 'Homework 1' with instructions to explore the Blackboard site and complete workshop activities; and 'Video recordings of presentations' which is currently unavailable. The right page is titled 'Workshop 1 Folder' and contains: 'Workshop 1 Instructions File'; 'Workshop 1 Support Materials' with a link to a Word document; 'Workshop 1 Discussion' with three tasks (a, b, c) related to reading and discussion; 'CUR4212 Initial Survey' designed to collect student background information; 'Workshop 1 Assessment' with tasks A1 (educational problems) and A2 (workshop outputs); and 'Prepare for Next Week' with instructions to read readings and find case studies.

Figure 1: Typical structure in Blackboard for each module and workshop.

The focus was on the workshop activities that included the use of a range of local and online technologies to support a range of individual, paired and group-based activities. All outputs from the workshops contributed to at least one of the assignments, in particular the e-portfolio. Many of the workshop activities were facilitated as examples of modelling the use of ICT to support learning. For example, in one workshop the implementation of a group-based role-play simulation was modelled using the Sim School online simulation system

(<http://www.simschool.org/>). Students in each ‘class’ were randomly assigned to groups of four, the tutor gave a brief demonstration of the operation of the system, the required outcomes were explained, and then the tutor ‘managed’ the groups as they followed some simple instructions in an online document. The tutor moved around the room interacting with the groups, pointing out how they would do this in a similar situation. In other workshops different purposes and allocation methods for grouping were modelled; for example, to implement a skills task (i.e. novice with an expert), and to discuss education problems and analyse case-studies (managing individuals and pairs). In a workshop managing the distribution of iPads from a trolley was modelled. In one workshop implementing an online video-conference or webinar was modelled by having the tutor’s screen projected as the students interacted through their workstations. Each workshop involved modelling the management of activities using ICT (including online materials), using whole-class projection, individual and group work, and how a teacher may combine these and respond to requests (e.g. not sure what to do, software not working, meaning of information etc.). Co-incidentally the aims, structures and practices embodied in the workshops matched well with Haydn’s (2014) recommendations that teacher education should include “modelling effective use of ICT” (p. 462), use “peer tuition and collaborative working” (p. 463), focus on the “potential of Web 2.0 applications” (p. 464), and centre on developing TPACK (p. 466).

The outputs from the workshops were collated into the main component of a reflective e-portfolio presented as a website using the Google Sites environment (<https://sites.google.com/>). Typical outputs included screen-grabs (e.g. online databases), downloaded reports, audio-visual files created by the students (e.g. a slowmotion), links to content created by the students (e.g. an Edmodo site), and evidence documents (e.g. planning documents, records of data from spreadsheets). These outputs could be pasted into webpages, attached as files, or embedded from an associated Google Drive account. For each workshop students included reflective comments on what they had achieved and learned, and how they believed they could use the activities to inform their own teaching. Because they came from a range of teaching major and minor curriculum areas the latter type of reflection was critical to their learning. The e-portfolio also included a component on personal research presented as a professional learning site that would be suitable for other teachers in their curriculum areas. Students were also encouraged to explore the features available in Google Sites to improve the navigation and presentation.

In order to minimise ‘lecturing’ there was no common lecture hour for all classes; further I could not be the tutor for all classes and did not want to repeat the same information six times. Therefore, it was decided to record instructional material that was considered critical to completing the ‘integrated learning activity’ assignment. Because these would be available through Blackboard the ‘flipped classroom’ approach was considered (i.e. students are required to view the content prior to attending class at which it is discussed in greater depth) (Baran, 2014). The idea is that students view the ‘lecture content’, often edited video-recordings of lectures, prior to attending a small face-to-face tutorial at which the content can then be discussed in greater depth. The concept is not new in that it has been traditional to have pre-readings for tutorials. However, from previous experience I was concerned that students were unlikely to view the content prior to the workshop. Therefore, the first seven weeks prior to submission of the assignment the video-recordings were played ‘cinema’ style at the beginning of the workshop and after this for four modules a flipped classroom approach was trialled. This ensured all students saw the same material and heard the same explanations from the person who was marking their assignment.

For the four ‘flipped’ modules students were reminded to view the instructional videos (and pre-reading) prior to the workshop so that we could conduct a short discussion of the content. Unfortunately, overall the response confirmed my suspicions. For example, for the first module in my three workshop classes of the 38 students present only 7 claimed to have viewed the instructional video. Tutors for the other three workshop classes reported similar numbers. In fact, Blackboard statistics showed that up to the end of that week 56 of 134 students (42%) had not even accessed the item with the videos (also included a PDF of the slideshow), let alone viewed the videos (27 mins total split into two separate topics). As a result, it was not possible to conduct the planned whole-class discussion based on open-ended questions; rather we just raised a few of the main issues the video would have raised. The following three weeks were similar. In Week 9 there were 65 students (49%) who had not accessed the item through the week (16 mins). In Week 10 there were 67 students (50%) who had not accessed the item through the week (10 mins). In Week 11 there were 59 students (44%) who had not accessed the item through the week (17 mins). Some may suggest breaking the content into more, shorter videos; and I would agree; however, this would not solve the problem with about half the students not even going to the item on Blackboard.

Conclusion

This paper has provided a rationale for employing a blended approach to the use of online technologies in undergraduate teacher training, rather than a fully online approach. I believe that this has substantial support in

the relevant literature although I recognize that there are many other teacher educators who would argue the opposite case. I provided a description of one of my units to illustrate one attempt to use such a blended approach to the use of online technologies. Although this was not a research project some of the data generated in running the unit provided some interesting insight into some of the outcomes. I believe that the unit was successfully implemented, and for most students their assignments showed strong growth in their TPACK knowledge, and greater confidence and awareness in how to implement ICT use with their curriculum. This meets Haydn's (2014) recommendation that they are able to "assess the potential of various new technology applications to improve teaching and learning and then being able to use them to best effect" (p. 458). Further, it supported the contention that pre-service teachers need "modeling activities in teacher education" (p. 485). It confirmed my belief that even in ICT-focused units undergraduate teacher education students need a blended approach with the use of both face-to-face and online strategies. In preparing them to start teaching in Australian schools where the vast majority of them will be in rooms with 20-30 students they need to see this modeled within their courses. There is no value in them being expert at using social media systems for teaching from the office or home if they can't facilitate the learning activities in a physical classroom with their students. As teacher educators we need to strike a balance between online and face-to-face activities, and we need to resist the pressure from our universities to go fully online, that may suit business courses, but not pre-service teacher education courses.

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