Scaffolding pre-service teachers representing their learning journeys with eportfolios

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Abstract

The term "scaffolding" is often used loosely to describe a broad range of interventions or devices for learners and in many instances the actual nature of the scaffold is unclear. In the true sense, for "scaffolding" to take place the activity needs to be for the learner's own intentions, i.e. a task that he or she sets for themselves. The scaffold must also operate within the learner's Zone of Proximal Development, working at the learner's level of comprehension and drawing the learning into new areas of exploration. A final characteristic of scaffolding is that the scaffold is gradually withdrawn as the learner becomes more competent. The study described in this paper draws on concepts of scaffolding to support beginning pre-service teachers to establish an eportfolio for their course. The students use the eportfolio environment "PebblePad" to store resources and reflect on experiences as they journey through their course. This paper describes and reflects on the processes and artefacts used to scaffold the first year pre-service teachers as they conceptualise and frame their learning journey eportfolios.

Introduction

In the early 2000s, I conducted a research project to investigate the teaching strategies of a primary school teacher who was considered exemplary at using computers to support teaching and learning (Masters, 2005). In particular, I was interested in the mechanisms she used to "scaffold" children as they constructed a digital media product, a stop motion animation of an alien who visited Earth to explain the solar system to earthlings. Since this study, I have strived to incorporate scaffolding strategies into my own teaching in tertiary education, as I believe that learners, whether they are adults or children, learn best when they are supported to pursue their own learning goals and when they encouraged towards autonomy in learning.

 Over the last four years, as part of the leadership team for the first year of teacher education, I have had plenty of opportunity to reflect on my own teaching, my student's learning and strategies for supporting, facilitating and sometimes scaffolding the learning experiences of students in our first year program. An important part of the first semester for new students is the introduction of eportfolios and, in particular, the use of PebblePad as an ongoing environment to record, represent and present their learning journey. We do this via a first semester subject called "ICT for Education". In this subject the students build an embryonic eportfolio that introduces them to the concept of creating and storing "assets" that can be assembled into eportfolios for a specific audience.

The portfolio created in ICT for Education serves several purposes. It enables the students to become familiar with the technical functionality of the PebblePad software and it also introduces the concept of reflective practice, presented through reflective writing. More importantly though, it builds a foundation for a ongoing portfolio that will be maintained across the student's course to create a graduate portfolio for teacher registration in the final year of the course.

Background

The concept of scaffolding as a teaching strategy is grounded in the work of Vygotsky. The term "scaffolding" was coined by Wood, Bruner and Ross (1976) who defined it as "a process that enables a child or a novice to solve a problem, carry out a task or achieve a goal which would be beyond his [or her] unassisted efforts" (p. 90). Over the years some distinct features have been identified to characterise the scaffolding process (Yelland & Masters, 2007). In order to be "scaffolding", an interaction must be collaborative, with the learner's own intentions being the aim of the process. Further, it must operate within the learner's Zone of Proximal Development (ZPD), the arbitrary learning region where a learner can achieve better outcomes with the support of an adult or more capable peer (Vygotsky, 1978). Finally, the scaffolding needs to be gradually withdrawn as the learner becomes competent at the task.

In my earlier research (Masters, 2005), I discovered some interesting features about the scaffolding strategies implemented by the "exemplary computer-using" primary school teacher that I worked with. I found that while she had a good understanding of scaffolding, it wasn't possible for her to use scaffolding strategies all the time. Scaffolding was shown to be an optimum intervention that could only be used when circumstances were right. This happened when the learner or group of learners was highly motivated to explore or create during a task and she could support them to achieve the goals they had set themselves. At times it was more practical to facilitate an activity where the intention of the learner sometimes took second place to the successful completion of a task or product. At other times, the teacher reverted to simply giving instructions. This happened when group dynamics became frayed or the learners had become fatigued. It also occurred when the learners were simply operating beyond their ZPD.

An additional observation from this study was that scaffolding was mostly suitable for problem-based learning and not every activity in the class could be at this level. In order to establish a sustainable classroom, the teacher designed the program with activities of varying intensity, a selection of tasks that required different levels of concentration and engagement. This meant that, at times, groups of children engaged with traditional, low level tasks in order to be able to move into intense learning cycles on other occasions. Further, the amount of scaffolding varied during the life cycle of the project. At the beginning, much of the activity was driven by the teacher as she outlined the project to the students and explained the initial products that would be created. It wasn't until the children had a good grasp on the task and had created some trial animation, that they were motivated to design and develop a creative product. It was almost as if the children didn't take on an ownership of the task until they had actually developed artifacts that they could relate to. As soon as the children had a purpose, then the teacher support could move to scaffolding.

Another way in which the term "scaffolding" is used relates to the construction of devices (either physical or digital) designed to support the learner as they complete a task (Pea, 2004). The teacher from this study had an interesting technique for building scaffolding devices. Rather than hand the children a worksheet with instructions or create a poster to display next to the computer, the teacher had meetings with a group of children where they would work collaboratively to develop a chart of steps required or the agreed plan. In this sense, she provided scaffolding to help the children create the device, which in turn produced a scaffold for on-going work.

Scaffolding in teacher education

While there are some obvious differences between a primary class and a cohort of first year teacher education students, there are similarities in the learning context. It is possible that some of the scaffolding strategies used in the primary education study are useful and valid for the learning processes used to construct eportfolios.

The word "scaffolding" is quite common in tertiary education literature, although more frequently in terms of online teaching and learning, especially in supporting online discussion (e.g., Whipp, 2003). Vrieling, Bastiaens, and Stijnen (2011) identified that scaffolding is an important component of self-regulated learning, as students move from a teacher dominated, knowledge base to an independent inquiry approach. They argue that teacher educators need to be able to structure activity in a way that allows and motivates pre-service teachers to self-regulate their own learning. Biggs and Tang (2007) also are proponents of learner-orientated investigation and reflection. They refer to a shift to "deep learning" and suggest that students need to be intrinsically motivated to investigate and explore.

The use of eportfolios can facilitate reflective learning and practice in teacher education (Hauge, 2006). Pelliccione and Raison (2009) found that students who were provided with a structured electronic portfolio tool managed to write deeper and more cohesive reflections than those who did not have this support. This development in writing was also reported by Fox, White and Kidd (2011) who found that preservice teachers extended reflective capabilities through sustained eportfolio work. Further, Fox et al. identified that an eportfolio provided an authentic way to assess student's progress, as the reflections in the portfolio showed change and development across the course. Chau and Cheng (2010) added that the use of eportfolio could be used to foster more independent learning although they cautioned that it was still important to provide learners with appropriate support to reach learning goals. The ePortfolio is recognised as a mechanism to support authentic reflection and consequently is seen as a tool to underpin self-regulated learning. In order to maximise the potential of eportfolios though, both strategies and devices for scaffolding the use of eportfolios are likely to benefit teacher education students.

Method

The ePortfolio was introduced into our teacher education program as part of the "Connecting with Education" project in 2008. The project design incorporated a common first year for the Bachelor of Education and the Bachelor of Physical and Health Education. The rationale for this project was to strengthen and support first year for the pre-service education students in both of these courses. Further objectives for the project were to:

• Establish a program of integrated teaching strategies and assessment for pre-service teachers that would reflect known effective practices.

• Promote an agreed and tangible set of graduate capabilities that would be embedded into the course by both academics and pre-service teachers.

• Embrace blended learning and eportfolios as an integral part of the teaching and learning program.

The project used an Action Research cycle to reflect on, and then strengthen the program design. This progression was supported with weekly teaching team meetings during the teaching term and then a transition meeting between teaching teams at the end of each semester. Students were surveyed in the first few weeks of the teaching year and then again in Week 10 of the second semester. The final survey, a Likert Scale with approximately 80 questions, was particularly extensive and included components relating to transition into university, curriculum design, structure, blended learning and ICT (including PebblePad), practicum and subject content.

While we explain to students that the survey is an optional research component for publication and that participation is not mandatory, we also make it very explicit that our teaching is based on reflective research and therefore this type of data collection is considered to be core practice. Further, we ensure that the data collection aligns with authentic teaching events – an introductory lecture at the beginning of the semester and an information session about elective choices at the end of the year. As a result of this explicit valuation, we find that the response rate to the survey is usually quite good, with a return of at least 50% each year.

Over the years and through design cycles, we have implemented many changes to the First Year Program including streamlining content and assessment, the strengthening of collaborative teaching practices and the integration of academic skill programs into coursework. In the latest iteration (2011) a cohort of Early Childhood Education students joined the common first year as La Trobe University commenced the Bachelor of Early Childhood Education.

Implementing PebblePad

Before the Connecting with Education project, the use of eportfolios was limited. The students participated in an introductory ICT subject where they developed an eportfolio as html, however, the focus was more on the ICT skills for building web pages rather than the content. This portfolio was also a static product. The students were not required to revisit this resource again in their course and for many students it was the last time they were required to create digital content.

The Connecting with Education project aimed to change this approach. Our design team had been following the work with eportfolios at Alverno College in Milwaukee, US for some time and the idea of using an integral eportfolio to showcase the obtainment of outcomes via integrated assessment was a direction that we were prepared to commit to. Our goal was to progressively introduce eportfolio tasks into our curricula in order to move to a portfolio-based program. We choose PebblePad as our platform early in 2008 and the Faculty of Education participated in the software trial for the University. We began the trial by simply replacing the existing eportfolio task with a PebblePad portfolio. In the second semester we replaced two additional tasks in two subjects with PebblePad based activities. The following year we were given permission to use PebblePad as our on-going eportfolio platform and over the last few years we have been working to weave PebblePad based tasks into the common first year and across the undergraduate courses.

Using PebblePad in First Year

A key objective in the "ICT for Education" subject is to introduce the students to PebblePad and support them to build a working knowledge to use across their course. During the four years of implementation we have varied the details of the task, the weighting and the support mechanisms used to scaffold the students. In general though, the task has followed the same structure over the years. The students build a number of reflective resources – such as a lesson plan, an "aha moment" story, a report of ICT use in their school – and then present this material in a digital portfolio, using images and hyperlinks to websites or artifacts to support their writing.

In the Connecting with Education survey conducted at the end of each year, we have four statements that specifically address the use of PebblePad. These are:

- I47: PebblePad was a useful tool for collating my material

- I50: PebblePad provided a useful working environment for (tasks in second semester)

- I53: I would like PebblePad to be available to use for the rest of my course

- I54: I found PebblePad difficult to use

The students also have the opportunity to provide open comments in the survey.

Findings and Discussion

The students were asked to respond to each statement on a 5 point scale, with 1 being "strongly disagree", 3 "neither agree or disagree" and 5 being "strongly agree". Each statement was given a score to represent the average response between 1 and 5. In the case of a reversed question, such as question I54, the score was reversed so if the student strongly disagreed with the statement "I found PebblePad difficult to use" then it scored highly – 5. The scores for the four PebblePad orientated questions in the first year survey between 2008 – 2011 are represented in Table 1.

Table 1

Scores of PebblePad questions in the "Connecting with Education" survey

	Statement	2008	2009	2010	2011
		n=102	*n*=98	*n*=103	*n*=143
I47	PebblePad was a useful tool for collating my material	3.08	2.67	2.83	3.50
150	PebblePad provided a useful working environment for (tasks in second semester)	3.47	2.71	2.91	3.80
153	I would like PebblePad to be available to use for the rest of my course	3.22	2.50	3.35	3.52
154	I found PebblePad difficult to use (reversed)	2.98	2.36	2.54	2.93

As may be deduced from these results, our students' reaction to using PebblePad was initially not as enthusiastic as we might have hoped. In this table, 3.0 represents neither agree nor disagree and so results less than 3.0 indicate a negative response.

In the first iteration of the project (2008), we simply used PebblePad to replace Dreamweaver for creating a hyperlinked document where students were asked to represent themselves, their experiences and their interests. This was a practical solution at the time as the decision to trial PebblePad was made in February for the semester commencing in March. It was one of three tasks weighted at 30% and the students worked on the eportfolio in class time and during their own time. The learning focus was largely technical and the students were given instructions on how to construct pages in PebblePad. While the students were encouraged to explore the PebblePad environment, the task really only required the students to use a small part of the PebblePad functionality.

The student response to the PebblePad statements in the 2008 survey was largely neutral. The students had been told that we were trialing PebblePad and some were somewhat suspicious because of this. A few of the comments were along the lines of "we felt like guinea pigs". Other comments questioned the use of the software in favour of more traditional software that they already knew how to use such as PowerPoint and even Word. Generally though, the students were fairly ambivalent to its use.

In 2009, we were given permission to use PebblePad on an ongoing basis and consequently we redesigned EDU1ICT to incorporate a more significant portfolio task. The new task incorporated more features of PebblePad and had connections to the other subjects in Semester 1. It also required the students to write reflectively about being a teacher and made explicit links to the Victorian Institute of Teaching's "Standards for Graduating Teachers". To reflect the additional dimensions of this task, the weighting was changed from 30% to 50%. The task incorporated aspects of practicum and so was spread over a longer period, either side of the mid-semester school experience.

The students were introduced to the technical aspects of the task in Week 4. They were given two weeks of computer lab time to work on learning about PebblePad and were directed to the significant online support provided in PebblePad and also paper-based material with information about the task. While further technical sessions were not planned in the semester, an "emergency" session was incorporated the week before the task was due in Week 11 because it was obvious that many students had not made the required connections between their experiences in other subjects and on practicum with the eportfolio task. It seemed, even at this late stage, that many hadn't even started construction of the resource.

As illustrated by the scores in Table 1, most students found this task challenging and consequently their reactions to PebblePad were negative and much worse than the previous year. A further complication was that although the university had opened up the use of PebblePad to a wider user group, the installation of the software was still on the server used for the trial. This meant that in the days before the task was due, the server struggled under the load and at times dropped out causing a great deal of angst for students with approaching deadlines, particularly because by that stage they realised that a 50% weighting meant it was important to complete the task successfully.

The comments relating to PebblePad reflected this struggle. They ranged from "PebblePad sucked" to "PebblePad was the most confusing thing. Why was it weighted so highly when no one knew how to use it?" There was some evidence, however, that students who used the material available to them actually benefitted. One student wrote:

> At the start of this course I found PebblePad to be extremely overwhelming although like most things once you've got the hang of it I found it to be very easy to use and felt pride that I was able to learn how to use it effectively.

After the difficult implementation in 2009, we worked on tightening the process. Our installation of PebblePad stabilised with support from PebblePad, UK and we had all learnt more about the process. We also streamlined the task and reduced the percentage to 40% rather than 50%. The implementation in 2010 was smoother although it was still evident that quite a few students really didn't "get" how a PebblePad portfolio went together. The score given to the PebblePad statements in the survey improved slightly (Table 1) and the feedback we obtained was a little better. We found that some comments actually considered the functionality of the software, eg. "PebblePad was good, though a bit restrictive for group collaboration and design". There was still plenty of negativity too – "Death to PebblePad!" It was interesting to note that the score for the repeated use of PebblePad in second semester improved to a positive 3.65 (almost "agree"). This was encouraging because our goal is for students to continue to use it across the course.

In July, 2010 several PebblePad users from La Trobe University attended the PebblePad Bash at Shifnal in the UK. It was a good opportunity to meet academics and students using the environment and this "think tank" was a great catalyst for further work with PebblePad at La Trobe University. For the 2011 implementation, we slightly adjusted the content of the portfolio again, with one of the components being a "future perspective" response that the students will revisit in second year. We left the percentage at 40% but streamlined the content of the whole subject so we had more time to work with PebblePad. The most significant change that was made though, was the interactions with and around PebblePad.

The students began to make PebblePad assets right from Week 2 of semester, even before they had visited their PebblePad desktop. We provided a link to a PebblePad form from the subject's Moodle shell and so the when the students completed their first online task, a metaphor for their learning journey, they opened it directly from Moodle and it was automatically published to the PebblePad gateway. When they started exploring the PebblePad environment the following week, they already had assets that they had created in their asset store. They also prepared and uploaded images over the next week and so by the time we were ready to look at the ePortfolio assessment they already had their own resources that they could use.

In PebblePad, the students create an eportfolio by adding pages and/or existing assets to a "webfolio". In previous iterations, we practised creating webfolios in PebblePad during workshop time but the actual construction of eportfolio assessment item was left to the student. This year we decided to take a different approach. In the Week Five workshop we did an activity called "Building the eportfolio: From go to whoa". In this session we systematically stepped through the process of building the webfolio structure with the whole class. As they constructed pages, they left indicative statements, "This is where I write a few paragraphs to introduce myself as a teacher", and by the end of the session a shell for the assessment was intact (see Figure 1). The final instruction was for the students to send the webfolio to the EDU1ICT gateway. This was effectively the submission process and so when the gateway closed on the due date, the most recent version of the eportfolio was available for marking.
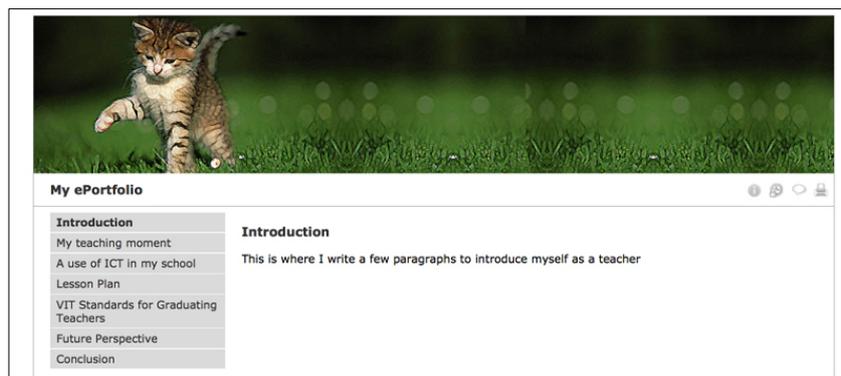

Figure 1. An ePortfolio shell created in PebblePad

The morale around PebblePad and the ePortfolio this semester was significantly different this year. There certainly wasn't the panic to submit work as the deadline approached and students were far more relaxed about the process. There was even evidence that some students were enjoying the task and spent significant time crafting and adjusting their eportfolio. When the work was marked there were considerably fewer students who failed to submit an established eportfolio, with only two students (from 278) receiving less than 10/40 for the eportfolio task compared to eight students (from 254) in 2010.

The "Connecting with Education" survey conducted in October 2011, some comments from the evaluation of the subject were encouraging. In response to the question "Which two or three specific aspects of this subject have contributed most to your learning?" The following statements were made about PebblePad:

Using PebblePad has contributed to my learning

Using PebblePad has helped me improve my knowledge of ICT.

PebblePad: Using this new form of software has opened my eyes to another form of technology. I have never used software like this before and learning to use it has made me feel more confident within the subject.

Doing PebblePad is a major contribution to my learning. It has been fantastic to learn how to use and to set up my own portfolio. I would definitely use it further in my studies and when I have finished university, as it is great to have to show your individual accomplishments.

Reassuringly, PebblePad didn't rate highly in the section in the evaluation relating to "What should be changed?" Better still, there were no "kill PebblePad" statements at all!

Conclusion

In reflecting on our learning journey with the implementation of PebblePad, it seems that the theory relating to scaffolding is highly relevant. In the first implementation (2008), the students' use of PebblePad was not overly demanding and the task allowed students to work in familiar learning zones. Because a huge shift in perception generally wasn't required, scaffolding wasn't mandatory for the students to complete the task successfully. In 2009, the task became significantly more complex and many students were in need of extensive scaffolding in order to meet the requirements of the task. Unfortunately though, the attempts to scaffold the students via devices such as practice webfolios and digital and printed support were largely ineffectual. It was possible that this strategy failed because most students didn't fall in with the minimum requirements for scaffolding. Firstly, they struggled to take on an ownership of the task but more importantly, the requirements were simply beyond their Zone of Proximal Development.

In 2011, the implementation of the task was far more successful and some important parallels can be made between this activity and the scaffolding strategies used with the primary school students. The initial interactions with PebblePad did not require students to engage directly with the assessment task. Instead they were encouraged to complete small challenges that helped them become comfortable with the PebblePad environment. Then, when the students started work on the task, they were facilitated, rather than scaffolded to develop the shell for the eportfolio. Once the students had a product that was tangible and something that they could take ownership of, then the potential for scaffolding via teaching strategies and devices was far greater.

It is important to remember that this subject is an investment for the rest of the course. Some of the students in this subject made huge progress with PebblePad and quite likely crossed their ZPD to the extent where scaffolding can be withdrawn and they will be able to use the eportfolio genre confidently for their own purposes. Other students may have found that this first eportfolio task required them to work beyond their ZPD and perhaps they might not have completed that task successfully if it wasn't for the facilitation provided at the shell stage. For these students, they will have regular opportunities to use PebblePad and it is important that scaffolding is always available to support them to make the connections when they need to.

An eportfolio is by nature, a representation of self-directed learning and reflection. If we can empower our students to build a construct of their learning journey as they progress through their course, then it is likely that they will be able to extend these skills beyond our classes. Ultimately our goal is for them to become life-long learners and reflective practitioners who can, in turn, empower their own students.

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