Personalising Learning in Teacher Education through the use of Technology

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Abstract: The meaningful integration of technology in teaching and learning is consistently called for in all sectors of education. Recently it has appeared as a key tenet for achieving what has been termed as personalising learning. Personalising learning, a concept that addresses a range of current best-practice approaches with an added emphasis on ICT and the voice of individual learners, is becoming more prevalent in both general discussion, and in some countries, in policy regarding education. If its prevalence continues to grow, teacher educators need to consider how they too can incorporate personalising learning approaches in their courses to ensure graduate teachers are equipped with the necessary skills and knowledge to implement personalising learning approaches in their own classrooms. This paper considers the components of personalising learning and describes one approach to creating a technology-infused learning environment that has been trialled in the tertiary sector. The key focus of this trial was the effective integration of technology as an enabler of personalising learning. Findings indicate that meaningful student learning experiences can be achieved through a personalised approach which also supports the emerging tenets of effective, pedagogical use of ICT for learning. These findings led to a model of Technology for Personalising Learning (TPL) which is presented as a planning framework through which personalising learning with technology can be achieved in higher education.

Introduction

Researchers have debated what personalising learning actually means and discussed whether it is any different to what is already known about good teaching practice (Johnson, 2004; Sebba, Brown, Steward, Galton & James, 2007). The main principles that tend to be agreed on include that it requires the learner to be placed at the centre of teaching, learning and assessment, rather than imposing uniform resolutions on all students (Fullan, Hill & Crevola, 2006; Keamy, Nicholas, Mahar, & Herrrick, 2007; Leadbeater, 2005). Personalising learning recognises the diversity of students' needs, interests and aptitudes and strives to ensure that every learner can achieve at their highest potential (Heller, Steiner, Hockemeyer & Albert, 2005). It aims for quality and equity in education by catering for individual learning styles and motivations (Fullan et al., 2006; Miliband, 2004). Personalising learning also uses diagnostic assessment practices to inform teaching (Heller, et al., 2005). Setting it apart from other generic models of good teaching practice, personalising learning also requires the explicit use of Information Communication Technology (ICT), integrated into the teaching strategy as a key enabler of learning (Keamy et al., 2007; Hargreaves, 2006; Miliband, 2004).

Personalising learning is distinct from personalis*ed* learning and from individualised learning. Firstly, personalising learning is considered to be 'a process not a state or product' (Sebba et al., 2007, p. 15). Milliband (2004) also stresses that personalising learning is not the same as individualised learning where students are potentially more likely to be working alone. Personalising learning emphasises the social aspect of learning by involving co-operative working partnerships with others, including the broader community. Keamy et al. (2007) also highlight community links as one of four components of personalising learning in their model which also includes: students at the centre of learning; ICT as a key enabler; and life-long learning. Sebba et al. (2007) report that personalising learning is often interpreted as individualised learning through references to individual pathways, individual timetables, or individual learning programs made by special arrangement. However, personalising learning does not place this level of emphasis on the individual. Individuals are certainly encouraged to have a voice, but participation in learning is considered more by 'recognis(ing) the "personal" in teaching, learning and schooling so that all pupils are motivated by a sense of belonging and view the learning as relevant to them' (Sebba et al., 2007, p. 66). They state that strategies that personalise the learning include examples such as drawing on prior knowledge and experience, and using a combination of whole class, small group and one-to-one learning. This, they argue, is how the learning becomes personalised without necessarily making it individualised.

Making a similar argument, Johnson (2004) warns educators about the interpretation and application of a number of the tenets of personalising learning. He suggests for example, that students' needs and interests can be categorised in groups rather than viewed as strictly individual, and that this is necessary for achieving the social nature of learning. He also warns against the insinuation that personalising learning might be taken to mean every child has a pathway designed that matches their pedagogical preferences, indicating the importance of teaching 'learnacy' (p. 6), where students learn to learn in a variety of ways, and thus all personalising learning does, is increase awareness of the different styles. He also expresses a concern that in the UK at least, the notion of personalising learning has been introduced and discussed almost exclusively by members of government rather than being generated through academic research and practitioner experience. Sebba et al. (2007) also highlight that the majority of papers on personalising learning are commentaries rather than based on empirical research, thus there is limited evidence of the impact of personalising learning. Furthermore, while the literature, even if mainly in the form of commentary, is growing, there is very little that considers the approach from a higher education perspective. This is a serious oversight if personalising approaches increase in prevalence in schools, as teacher education courses will need to adequately prepare the next generation of teachers and equip them with the skills for designing learning that incorporates such an approach. This paper sets out to address some of these shortcomings by exploring whether the ideas and definitions of personalising learning can be applied in adult education with an emphasis on investigating the use of technology as a key enabler of personalising learning in the higher education context.

Background

The effective use of technology is widely recognised as a crucial component of modern education and is increasingly seen as an enabler of learning. The US Department of Education (2010) describes it as being pivotal in improving student learning opportunities and the Australian National Curriculum, currently under development, highlights successful learners as those who are productive users of technology (National Curriculum Board, 2009). In 2005 Britain's Secretary of State, Ruth Kelly, described technology as the crucial element

for shaping learning opportunities that address the learning needs and preferences of all learners (Department for Education and Skills UK, 2005). Technology is viewed as a generic skill needed for participation in active learning and citizenship (US Department of Education, 2010) and a tool for effectively addressing the diversity of learners through its potential for providing personalising learning (Biggs, 2003; Keamy, et al., 2007; US Department of Education, 2010).

The modern view of technology in education as a generic skill required by all learners raises the agenda for technology integration. This presents a need for teachers to become more expert and technologically literate so they may provide learning through the effective use of technology that prepares future generations for the increasingly technological society in which we live. The subsequent challenge then arises for those involved in teacher education, who are charged with the responsibility of preparing effective teachers with increasingly diverse needs, to be capable of delivering the flexible, personalising learning opportunities that Keamy et al. (2007) and the US Department of Education (2010) assert that technology can provide.

Diversity in Higher Education

Student diversity incorporates a range of ideas: learning abilities and styles; students' interests and motivation; cultural and religious background; and socio-economic background. In Australian higher education, it is students' needs, interests and motivations that appear to have increased diversity as the number of people accessing higher education expands (Biggs, 2003; Teaching and Educational Development Institute, 2003). Biggs attributes this increase to what was a relatively quick expansion, restructuring and refinancing of the tertiary sector in the 1990s. These factors resulted in larger class sizes and a subsequent increase in the range of students' backgrounds, including motivation for learning, cultural background and skills and access to technology. As a result, much of the teaching in higher education tended to be surface in approach (Biggs, 2003), often with poor learning as a result. The Bradley report (Bradley, 2008) is likely to result in even further increases in student diversity if the recommendation stemming from this report for increased student numbers, particularly from low SES and rural and regional backgrounds, is adopted. This is likely to exacerbate both the diversity of students' needs, interests and aptitudes and poor teaching practices as universities struggle with further expansion in student numbers.

Fields (2000) indicates that elements of school teaching experience and pedagogy limit the capacity of teachers to cater for diversity in the classroom. Biggs (2003) and Ramsden (2003) highlight this as an issue in higher education as well. Ramsden (2003) reveals that poor learning is witnessed through the use of 'teaching methods that foster passivity and ignore the individual differences between students' (p. 98) which have been found to be ineffective because they fail to stimulate higher order thinking (Biggs, 2003). These elements are identified through an emphasis on content coverage and exposure to the curriculum, standardised use of time irrespective of individual learning rates, and summative and standardised assessment used for diagnostics and remediation (Fields, 2000). This is in contradiction to a philosophy of personalising learning which embraces diversity as central to learning.

McInerney (2000) describes diversity through the variation from individual to individual on the level of motivation for particular tasks. Fullan et al. (2006) purport that a personalising learning approach requires motivational levels to be continually considered in the teaching and learning program. McInerney notes that variation in motivation tends to reflect differing interests, values, ability and effort. If the diversity of interests, values, ability

and effort of students is recognised then the learner becomes central thus meeting one of the key definitions for personalising learning. Catering for diversity requires consultation and the inclusion of student decision making to promote the learner's interest and hence their level of effort in a particular task (Fullan et al., 2006; Keamy et al., 2007; Lawton, 1999). Lawton (1999) also acknowledges that through involvement students are empowered. This means that as teachers, when we involve students in decision making about what is to be learnt, we can best ensure that the needs and interests which students consider most important are addressed. This is not different to what is required in the higher education context where the quality of students' understanding in higher education is 'intimately related to the quality of their engagement with learning tasks' (Ramsden, 2003, p. 40) and where approach is the most crucial element to effective teaching (Ramsden, 2003; Biggs, 2003).

Views in favour of catering for individual student interests and needs are not new. Papert (1993) describes engagement in meaningful and socially important activities as being significant for student learning and if students lack motivation they will not put in the effort that learning requires (Fullan et al., 2006). Bransford, Brown and Cocking (2000) indicate that student interest contributes to motivation to problem solve and learn complex subjects. In fact, Deci and Ryan (1991) (as cited in McInerney & McInerney, 2006) describe interest and motivation as synonymous. Of particular interest for the effective integration of technology for personalising learning is intrinsic motivation. Ryan and Deci (2000) describe intrinsic motivation as the inherent motive to remain on task which is more conducive for learning than extrinsic motivation (Lashway, 1999; Ryan & Deci, 2000). Through intrinsic motivation persistence with a problem or task is more likely to occur if the task is interesting, fun and relevant to student needs (Covington 2002a, 2002b; Pokey and Blumfield, 1990 as cited in McInerney and McInerney, 2006). Elements of intrinsic motivation are described in terms of engaging students in self-directed activities. This view is further supported by Ryan and Deci (2000) who indicate that intrinsic motivation can be achieved by providing students' choice and opportunity for self-direction which is summarised in the words of Papert (1993) who states 'the best learning takes place when the learner takes charge' (p. 24). Leadbeater (2005) agrees with this but also warns that when working with children the amount of choice needs to be considered carefully as 'too much choice leads to anxiety, bewilderment and confusion' (p. 15), although this may be less the case when dealing with adult education.

A further consideration for engagement and motivation is an authentic learning context. Herrington, Reeves and Oliver (2010) describe authentic learning for students in higher education as being inventive, realistic and collaborative and suggest that the affordances of technology applied to the tertiary context should be considered in a similar way. They describe an authentic context for using technology as providing 'purpose and motivation for learning' (p. 19) over an extended period of time, and integral to any design for authentic learning with technology.

Personalising learning in authentic contexts for using ICT appears to offer an approach that addresses these issues of diversity. However, it also highlights a challenge for equipping future teachers with the necessary skills to deliver such an approach. Skills for catering for student interests, needs, abilities and motivations to learn need to be developed. This calls for a review of learning in higher education to ensure that effective teacher education programs are designed to incorporate a personalised approach.

Learning and Assessment in Teacher Education

Deep learning and constructive alignment are the two key constructs that underpin the development of the teaching and learning content intended to help students achieve effective

learning in higher education (Biggs, 2003; Light, Cox & Calkins, 2009; Ramsden, 2003). Deep learning is concerned with the 'what' and 'how' students learn rather than how much they remember (Ramsden, 2003). It is achieved through an effort to make the teaching and learning strategies student-centred where students are active participants, constructing knowledge based on what they already know and which is connected across contexts that hold relevance to learners (Biggs, 2003). Deep learning links to the progressive curriculum tradition which also 'places the learner at the centre' (Neary, 2002, p. 58) where the learning 'process is as important as the outcome' (Neary, p. 58). This learning process focuses on active roles for teacher and learner, learning skills, and life-long learning where 'everything is directed at improving the process of learning' (Neary, p. 64). The types of activities that promote deep learning are those targeting active involvement and learner interaction (Biggs, 2003). Light et al. (2009) promote the use of group work, problem solving and reflection, among a number of others to achieve this. Deep learning aligns with the tenets of personalising learning where student-centred approaches are also critical.

Constructive alignment, a notion proposed by Biggs (2003), occurs when the curriculum, teaching methods, assessment processes, learning environment and the institutional climate mutually support one another (Biggs, 2003). It is seen as essential for the achievement of deep learning and student engagement (Biggs, 2003; Light et al., 2009; Neary, 2002; Ramsden, 2003). The emphasis on constructive alignment, rather than alignment on its own, is linked to the extent of high-level depth of learning 'in which students construct their own deeper meanings from the course content' (Light et al., 2009, p. 81). In addition to this, Ramsden (2003) purports that from a learner's point of view, 'assessment always defines the actual curriculum' (p. 182). This is because 'students learn what they think they will be tested on' (Biggs, 2003, p. 140). This makes it critical that assessment methods are constructively aligned with teaching and learning strategies (Biggs, 2003; Light et al., 2009; Ramsden, 2003).

The diversity of the students accessing higher education makes it difficult to ensure that deep learning is achieved for all students. Even when teaching, learning and assessment are constructively aligned, ensuring that all students find relevance in the learning topic and that their differing skills and needs are met is a constant challenge. Furthermore, the increasingly large numbers faced in the tertiary sector make it more difficult to utilise active involvement and learner interaction. It is argued that the use of ICT can cater for this greater diversity and also promote interactivity between individual students and individual teachers (Keamy et al., 2007).

Effective learning through technology can begin to address the diversity issue. However, simply including technologies in teaching does not guarantee effective learning. In fact 'inappropriate uses of technology can hinder learning' (Bransford, Brown and Cocking, 2000, p. 206). Wang (2000) indicates that while developing technological skills is important, on its own it does not encourage the integration of technology into classroom practice. In recent years these considerations have collectively been recognised through the notion of personalising learning, which has its focus not on what is taught, but rather on the pedagogical practices that define how teaching occurs (Miliband, 2004).

When considering assessment, assessment *for* learning is one of the best developed components in a personalising learning context, mainly because the evidence to support it has been well established (Sebba, Brown, Steward, Galton and James, 2007). Assessment *for* learning 'serves the purpose of promoting students' learning' (Black, Harrison, Lee, Marshall & Wiliam, 2003). It becomes formative assessment when it moves from the informal (e.g. observations) to the formal through the use of particular tasks or activities to inform, adapt or modify the planning of learning activities. The notion of formative assessment is particularly important in the context of diversity as adult learners coming from a variety of backgrounds,

tend to have had wide-ranging prior experiences with and access to technology. This increases the diversity issue if technology is to be a fundamental part of the learning.

Another key assessment issue lies in the constant challenge in educational research to find ways to evaluate changes in student achievement (Briggs, Weeks & Wiley, 2008; Anderman, Anderman, Yough and Gimbert, 2010). Growth models and value-added models are two related models that have been said to achieve effective measurement of change in student learning (Briggs, Weeks and Wiley, 2008). Anderman, et al. (2010) report that value-added models, based on goal orientation theory, have the potential to increase academic motivation; particularly when they affect instruction; thus promoting the combined use of value-added and formative assessment. It also closely links to the motivation of students and thus ties in with the argument for constructive alignment of assessment processes with teaching and learning practices in higher education. A number of higher education researchers espouse the need for constructive alignment in order to achieve deep learning (e.g. Biggs, 2003; Ramsden, 2003; Light et al., 2009). Hence it would appear that the idea of value-added assessment aligns with a personalised approach.

One of the most troubling aspects of more traditional performance-based assessment is that many students never experience success, regardless of the amount of learning and progress they make, because they are only ever measured against standards and through comparison to their peers (Orfield & Lee as cited in Anderman et al., 2010). Value-added assessment acknowledges the learning and progress made by an individual and tends to better represent achievement that is the result of the instruction they have received (Anderman et al., 2010). Some argue that it is not a robust form of assessment and does not allow teacher or school effectiveness to be measured and compared (Anderman et al., 2010). However, Anderman et al. also highlight the risk associated with comparing schools and their teachers where significant cultural and socio-economic diversity exists. There is certainly some controversy around using value-added assessment, but overall, its focus on the learner makes it fit better with the principles underpinning a personalised approach.

Personalising learning incorporates the ideas of effective teaching, learning and assessment, which aligns with deep learning and constructive alignment principles associated with effective teaching in higher education. In the research presented below the integration of ICT is explored through personalising learning and catering for diversity in a teacher education program. In using personalised learning in this way evidence of the impact of this pedagogical approach on the student experience is evaluated in the teacher education context. Teacher education re-focused with a personalised approach could promote a change in pedagogy that sees a move away from skills driven and 'add on' approaches to technology in the classroom (Durrant and Green, 2000) toward a culture that enables involvement and achievement for all students through learner autonomy and development of learner capability (NCSL, 2005). This then has the potential for producing teachers equipped with the necessary skills to use technology in their own classrooms to personalise the learning of their own students. It also offers a pathway for creating the deep learning and constructively aligned learning environments that many higher education authors purport as important for effective learning (e.g. Biggs, 2003; Light et al., 2009; Neary, 2002; Ramsden, 2003).

Personalising Learning in Teacher Education – The Research Design

A personalised, authentic learning pedagogy formed the approach to this study. Both authentic learning and personalised learning pedagogies have been described in the previous sections. The desire to create meaningful, effective learning experiences for all students inspired the researchers to re-think their own delivery of technology in a pre-service teacher

education unit. In designing the research project, a qualitative approach was taken. Qualitative research is concerned with describing, understanding and interpreting phenomena rather than measuring it for cause and effect (Lichtman, 2006). The qualitative researcher is inherently involved in the situation under study rather than being an objective observer in a detached role (Lichtman, 2006; Denzin & Lincoln, 2005). This approach fits the context in the present study where the researchers were also the lecturers in the unit under consideration.

The researchers drew on the literature about deep learning, diversity, authentic learning with information technology; and their relationship with personalising learning to inform the 'on campus' delivery of the unit in lecture and tutorial mode. The teaching and learning was then designed to approach unit content in a manner that best aligned with their reflections on this literature. The unit was a core 'Education Foundation' unit focused on contexts for learning and development which also had a compulsory ICT component. The main content focus was on human development and risk and protective factors individuals might face in their environment which subsequently impact on their learning. Specific topics included Piaget's human development theory (McInerney & McInenrney, 2006) and social ecology frameworks such as those developed by Bronfenbrenner (1976) and Hawkins and Catalano (1992). In an effort to better personalise the learning and cater for the diversity of students' learning needs these frameworks were examined through a personal lens of 'transition to university' where students analysed their own social ecology using the frameworks to build an understanding of how they applied to their own and others' lives. Further, a personalised authentic learning task, incorporating technology (Herrington et al, 2010), was designed to address the complexity of the real world setting. The students chose their technology platform to communicate their learning.

In order to address the potential diversity of needs, interests and ICT abilities, a technology skills inventory was conducted early in the semester through the online platform 'Blackboard'. Students were asked to give an overall assessment on how they rated their own ability in using a range of technologies. They were also asked to identify examples of programs and applications they had used before, and how confident they felt in using each of them. Applications such as Microsoft Word, Microsoft Publisher, Microsoft FrontPage, Windows Movie Maker, Digital Photography and Electronic whiteboards were among those listed. Finally, students were asked to identify which applications they were interested in learning more about. This enabled the researchers to incorporate the important 'assessment for learning' feature of personalising learning.

The pedagogical approach employed incorporated elements of authentic learning described by Herrington et al. (2010). The lecturers collated the information from this formative assessment and grouped students who had similar self-assessed abilities and interest areas for their assessment task. The assessment task then required students to produce a multi-media presentation for the rest of their class that described similarities and differences in their social ecology frameworks and how these supported or hindered their transition to university. This design element aimed at providing students with multiple perspectives on the issue to enhance understanding in an authentic learning context (Herrington et al, 2010). Each student received an individually addressed letter indicating how they had assessed themselves in regard to technology, the names of others in their group who had assessed themselves at a similar level, and the interest area(s) the different group members identified. Group ability levels ranged from very low to low skills, through to medium high to high skills. Meetings between group members were facilitated where they were encouraged to plan which technologies they would like to focus on for their multi-media presentation. Groups were encouraged to select something to work on that would extend their current skill level and confidence. If they were in a lower end skilled group, they were encouraged to keep their selection simple, for example, PowerPoint with some digital photography. Higher skilled

groups were also encouraged to challenge themselves, mostly by incorporating a number of technologies into one presentation. One group in particular did this by developing a web page that linked to their own PowerPoint show of digital photographs as well as a movie they made, and they presented the entire presentation through the Electronic whiteboard, a clean sweep so to speak. This design element was an important pedagogical consideration which highlighted the provision of an authentic context that maintains complexity through providing access to a range of options for novice to advance users (Herrington et al, 2010).

In lieu of tutorials, a three-week period was provided where technology workshops were conducted. In these workshops students were provided access to demonstrations and examples specific to their chosen multimedia. These demonstrations and examples aimed at providing an authentic opportunity to observe and reflect on the processes required (Herrington et al, 2010). Group members were expected to plan who was going to become the 'expert' in each technology that would be used in their presentation. This person (or in some cases, pairs) attended the appropriate workshop and then took charge of that part of the group's presentation. They also had to help skill the other group members in the use of the technology, tapping into valuable peer teaching approaches to learning and encouraging a collaborative learning community. Support for the collaborative construction of knowledge (Herrington et al, 2010) was also developed in this project. Some of the technologies selected were challenging for the researchers too, and help was enlisted by more capable staff to assist with some of the technology workshops. Potential exists here for students to see teachers as fellow learners, and the notion of collaborative learning teams can be developed. This view was supported in the literature where new roles for the teacher in authentic e-learning contexts are collaborative and employ scaffolding approaches and the use of more able partners when required (Herrington et al, 2000).The final products were presented at a forum open to the campus community where each group articulated their shared learning to an audience. The presentations, the final element of the design, enabled the articulation of implicit knowledge in an explicit way (Herrington et al, 2010).

The resulting products were varied in level of technology expertise that was evident. To accommodate this foreseeable eventuality, a value-added assessment strategy was adopted for the ICT component of the assessment task, while the reaming content, associated with the application of social ecology theory, was subject to performance-based assessment. This meant that for the ICT component, students were assessed not on who had the most sophisticated multi-media presentation, but rather on the demonstration of growth in technology skill, knowledge and understanding. This assessment was conducted through viewing the students' presentations and though a reflection on ICT learning that they individually submitted as a part of the assignment.

To evaluate the approach, data collection took the form of students' written responses to open-ended questions. Students were asked to comment on both the positive aspects of their experience in the unit and what made it positive, and the difficulties or issues they experienced and what caused these. These questions align with the qualitative approach undertaken in the study where the use of open questions ensures that participants are free to describe each of their own experiences, providing a rich data set that is characterized by words rather than numbers: a marker of qualitative data (Lichtamn, 2006). Students' responses were then analysed using a process of analytical induction (Burns, 2000; Bernard & Ryan, 2010). Analytical induction is a form of analysing qualitative data for categories or themes. It involves multiple passes of data as they are sorted into themes and a review of these themes for separating or collapsing as more data are revealed. Emerging categories helped the researchers identify whether any of the comments identified features that aligned with those of personalising learning; and whether they felt that their personal needs and

interests had been addressed. This enabled the research question, 'Can ICT be used as an Enabler of Personalising Learning in a Higher Education Context to be addressed?'

Results:

From the 52 students involved in the project, 32 (62%) provided at least one response to the evaluation questions. Some students provided a number of responses, giving a total of 69 comments for analysis. The responses were coded into themes individually by each researcher. This individual analysis was then compared and contrasted and similar themes were brought together under a common name. For example, one researcher identified a theme of 'Individualised Learning' and the other 'Student-centred Learning'. Upon comparison, these contained mostly the same types of comments and thinking so were brought together under the title 'Student-centred Learning'. This process was continued until the following themes were established: Student-centred Learning, Transferable Skill Development, Unit Organisation and Improvements. Each theme had a number of sub themes as shown in Table 1.

Theme	Sub Theme	Frequency
Student-centred Learning	Catering for individual student abilities and interests	17 (25%)
	Allowing for student autonomy	10 (15%)
	Student Enjoyment	10 (15%)
Transferable skill development	Group Work/Team work	5 (7%)
	Organisation	2 (3%)
	Independent Learning	2 (3%)
Unit Organisation	Unit Structure	7 (10%)
	Unit Content	2 (3%)
	Assessment	2 (3%)
	Flexible learning arrangement	3 (4%)
Improvements	Assessment	1 (1%)
	Unit Content	3 (4%)
	Unit Organisation	2 (3%)
Other	Other	3 (4%)
Total		**69 (100%)**

Table 1: Themes from Student Feedback on Experiencing a Personalised Approach

The three main response types to the open questions all dealt with the student-centred learning approaches that students felt they had experienced in the unit. This is shown in the Student-centred Learning theme which accounted for an overall 37 (55%) of the comments made by the students. Three sub-themes were identified within this focus area. The sub-theme 'Catering for individual student abilities and interests' was characterised by comments such as '*The multimedia presentation assessment task was a worthwhile experience. Not only did we learn new ICT skills that we wanted to learn, but we did not have to repeat ICT mediums we were familiar with*' (Student 25) and '*I enjoyed the way the ICT skills part of this unit was structured. It allowed me and other students to engage in the ICT skill where we had never engaged in before. This meant my opportunities were great and increased my level of knowledge and skill*' (Student 18). The sub-theme 'Allowing for Student Autonomy' was identified through student comments such as '*It* [the unit] *not only encouraged individual learning but also enabled the development of the ICT of my own choice*' (Student 4) and '*I*

thought that the structure of choosing our own ICT area with our skills in mind was really good as each person could expand on their own learning and no one was bored or way over their own skill level' (Student 33). The final sub-theme in this category was identified through student comments such as *'The multi media component of this unit was fantastic. It provided me with a lot of NEW knowledge about ICTs and I thoroughly enjoyed learning in the workshops'* (Student 13) and was termed Student Enjoyment. It accounted for 15% of the comments made.

The theme of Unit Organisation was selected through comments made about the unit content, the structure of the classes, the nature of the assessment and the flexible learning arrangement. The flexible learning arrangement included time for ICT workshops, group meetings and group appointments with tutors in lieu of scheduled lectures and tutorials. This theme accounted for 20% of all comments made. Students expressed a positive attitude towards each of the sub-themes through comments such as *'The lectures have been very informative and the tutorials enabled me to feel valued and empowered me with a feeling that I can make a difference to my students'* (Student 13), *'I liked the second half-ICLT structure of unit as people were more driven to learn and produce a more in depth assignment'* (Student 21) and *'Through not having structured lectures and tutorial, the onus was put on us to take responsibility for our own learning'* (Student 25).

A number of comments (13%) were linked to generic skills and attributes that are transferable across different contexts. Group work/team work skills, Organisational skills and Independent learning skills formed the three sub themes for the overarching theme of Transferable Skill Development. These areas were identified through the following types of student comments: *'The group activity on the ICT learning was a good way to not only develop ICT skills, but organisation and cooperation skills'* (Student 34) and *'The multimedia assessment task gave us an opportunity to become independent learners'* (Student 11).

Of the 69 comments made only 5 (7%) had suggestions for improvement in the unit. The remaining 64 (93%) were all focused on the positive experiences students had as described by the themes and sub-themes already discussed. Two comments were made about improving the unit organisation where one student wanted less group work and the other felt that *'organising meeting of groups was hard so time for that could have been better planned'* (Student 33). Students often report on group work as an issue in assessment tasks, mainly due to the challenge of finding coinciding time, as identified here by Student 33. Another problem we have encountered with group work arises when group members do not share the work load equally. We believe that in a teacher education course some group work is essential to ensure the skills of team work and cooperation, which are so much a part of the teaching profession, are developed. The findings with regards to group work support the employment of the social construction of knowledge through group work that is a tenet of personalising learning. However, we recognise the tension that this can create, particularly when linked to assessment.

Three students voiced a concern regarding unit content. Two of these indicated that more activities would be beneficial with one quite specific: *'I think there should be further teaching in the distinguishing of protective and risk factors and interventions'* (Student 29). Organising the unit in the way we did, with a six week explicit teaching period followed by a five week student-directed application of content period, always runs a risk of having too much new information in a short period of time. However, we believe that the application period in the second half of the unit should have enabled students enough meaningful time with the unit content to assist their learning. The multimedia presentations produced by the students certainly demonstrated a sound level of understanding of the unit content. The other comment regarding unit content improvement was associated with the movie-maker workshop. Student 34 expressed that there was too much time spent on how to film and

download the video file rather than on the editing the footage. This indicates that a follow up workshop or an extended workshop on the editing features would be beneficial to include next time.

The only other comment made for improvement in the unit was associated with the weighting of the multimedia assessment task. The student suggested that '*For the period of time we spent working on our final presentation task I think the project itself should have more weighting rather than the essay*' (Student 4). This is one of the drawbacks in using ICT in a significant way in assessment. It can take a lot of time to acquire skills to use a new ICT efficiently. However, skill acquisition tends to have a limited weighting in terms of assessable outcomes in academic coursework. This is particularly the case because ICT skills are often assumed to be either generic skills that students have obtained before entering teacher education courses, or left for them to develop outside of teacher education units whose 'core business' is generally more associated with teaching and learning principles that ICT skill development. This creates a tension for students who often believe that it is their time that needs to be rewarded rather than the application and thinking skills of a higher order that are associated with other components of assessment. It s also a tension for teacher educators who need to strike a balance between important teaching and learning concept development and the development of ICT skills that are also needed for effective teaching practice. As educators we consider the weighting of the task to be commensurate with the level of thinking it required and the outcomes it assessed, and it is balanced between teacher knowledge and ICTL skills development. We recognise that not all students, or perhaps even academics, will have the same view, but the time spent developing ICT skills is valuable, both for the provision of a personalised approach as well as for the transferrable skills it provides students as they prepare for the teaching profession. Furthermore, given the emphasis of ICTL in teaching and learning in all sectors of education, some focus on how to use and teach and learn with ICTL is a part of teacher education 'core business'.

The final student feedback we received, categorised as 'Other' in the theme and sub-theme, demonstrated some of the spin-offs a task such as this one can provide. The task was set in the first semester of a first year Bachelor of Education program. Three students commented on how the group work associated with the multimedia assessment task, and the way in which the groups were formed, enabled them to extend their friendships and get to know more people. This can be a significant issue for students beginning a new course, sometimes in a new city or town.

The feedback we obtained demonstrates strong links to the literature regarding personalising learning. The strong emphasis on student-centred learning aligns with their description of making students central to the learning through the catering for the diversity of their needs and interests, providing 'choice and voice' (Keamy et al., 2007, p. 8) and providing meaningful assessment (Hargreaves, 2006; Sebba et al., 2007). Making ICT a key enabler for learning was clearly evident through the multimedia assessment task that was used in this context. Students themselves recognised the diversity of learning opportunities they had through the selection of ICTs relevant to their own level of skill and confidence, the interactivity the task design gave them with staff and other students and the flexible learning environment that was created in lieu of formal lectures and tutorials, thus creating important curriculum choice and flexible organisation of learning in line with one of Hargreaves' (2006) gateways to personalising learning.

Reflection on the experiences of using ICT as a key enabler for student-centred learning in authentic contexts demonstrated that not only are content-related outcomes effectively achieved, but a number of life skills such as team work, communication, co-operation and organisation are also developed- all important characteristics of good teachers. This was demonstrated through the tertiary setting of a pre-service teacher education program.

It suggests that a personalised approach can be achieved when technology is used in authentic and meaningful contexts and student autonomy is encouraged. It demonstrated that this approach can enhance student learning outcomes as well as develop the professional learning of teachers and in our case, pre-service teacher educators.

Discussion and Reflection
Technology as an Enabler or a Driver

The use of technology to present learning for a specific topic of inquiry was important in the study. While the technology was important for conveying the information, and the necessary skills for using the technology had to be developed, it was the content of the presentations that provided the stimulus for the technology learning to take place. Thus the introduction of the topic of inquiry is an important first step for providing an authentic context that gives purpose and meaning to the ICT learning undertaken. It provides relevance for the learning and links to assessment in a meaningful and achievable way, regardless of initial technology competence. These factors contribute to both deep learning opportunities where students find relevance and purpose to their learning and are actively engaged in the construction of knowledge (Biggs, 2003; Ramsden, 2003). It also demonstrates a constructively aligned approach where the teaching, learning and assessment, and the flexible learning environment were all mutually supportive. It also provided an intrinsic motivation for the learning.

Students were also encouraged to brainstorm possible ICT applications to present through and how different types of presentations could be used to convey their learning about the content area. This further ensured that their individual selections were authentic to their learning interests and abilities. By having a clear idea of the content that needed to be discussed and presented, the types of technologies that appropriately supported the presentation needs naturally emerged. Collectively, these factors help to address the deep learning and constructive alignment identified as commensurate with personalising learning. They also appear to present themselves as an important first step when planning the use of ICT as an enabler of personalising learning. That is, the learning outcomes of the unit should provide the context and drive for the teaching and learning content, the use of ICT then becomes the vehicle or enabler that students use to demonstrate and personalise their learning. This is in contrast to using the incorporation of ICT as the driver of context or content. The technology should fit seamlessly and authentically with the teaching and learning that would otherwise be covered.

Catering for Diversity

Personalising learning as a concept values the diversity of individuals' needs. It supports higher levels of student engagement and attainment by addressing students' personal needs and interests (Fullan et al., 2006; Keamy, et al., 2007; Hargreaves, 2006; Miliband, 2004). This places the learner at the centre of teaching, learning and assessment. In order to do this, Fullan et al. (2006) suggest that teachers need to know the strengths and weaknesses of students in a 'precise way' (p. 33). In addition, Keamy et al. (2007) argue that the provision of flexible learning environments and a range of educational pathways that meet the needs of all students promote a lifelong approach to learning. Such provision requires programs that give the student a voice to negotiate their learning pathway, placing them in a self-directed learning role, something also purported by Leadbeater (2005), Hargreaves (2006) and Miliband (2004).

The inventory of ICT skills and subsequent grouping according to abilities and interests helped to achieve these ideas. Students were given a voice as to what they felt they could already do and what they were interested in learning. This was evidenced through the range of sub-themes that emerged under the theme of Student-centred Learning: Catering for individual student abilities and interests; Allowing for student autonomy; student enjoyment. Assessment focus on the value-added outcome provided students with the flexibility to select something both challenging and achievable. Flexibility was built in not only through this choice, but through the flexible use of class time where students selected relevant workshops and group appointment times in lieu of timetabled whole group lectures and tutorials. This ensured that the time spent with the teacher facilitators were targeted towards their needs. This time was also made in lieu of scheduled classes to ensure that lecturers and tutors did not overload their teaching time.

In doing this, Fullan et al.'s (2006) three points of focussed teaching to achieve a personalised approach were recognised. Firstly, students' strengths and weaknesses were identified; secondly, appropriate instructional strategies and resources were selected; and finally, differentiated instruction was implemented to meet the needs of individuals. This catering for diversity in interests, abilities and needs of both students and the teachers contributed to a meaningful experience through the personalisation of learning. The social groups that were established meant that students had to take their individual interests and abilities and negotiate with others within a similar interest and ability range, how to further their learning together. This important component of discussion and negotiation moved the individualised emphasis of the formative inventory for learning to one of personalising learning.

Assessment and Recognition

Sebba et al. (2007) report that the development of 'agency' was one of the outcomes of case study schools adopting personalising learning approaches in that 'they valued pupils, staff and all those concerned with schools, facilitated their involvement and recognised their contributions' (p. 72). The sense of being valued for what one can offer is important in building confidence and self-esteem in learners (Jones, 2009). Recognition of learning through value-added assessment approaches, and through presentation of achievement, acknowledges learning and contributes to this sense of building value and self-esteem in learners. It also provides an opportunity to constructively align assessment with the teaching and learning that has occurred and thus better support deep approaches. This sense of achievement and esteem was implicit in students' comments about their learning and the value they sensed in the acknowledgement of their individual interests and needs as well as the transferable skills they identified. This was particularly characterised through comments associated with the theme regarding the organisation of the unit where, as reported above, one student asserted that they felt '*valued and empowered*' and believed '*that I can make a difference to my students*' (Student 13).
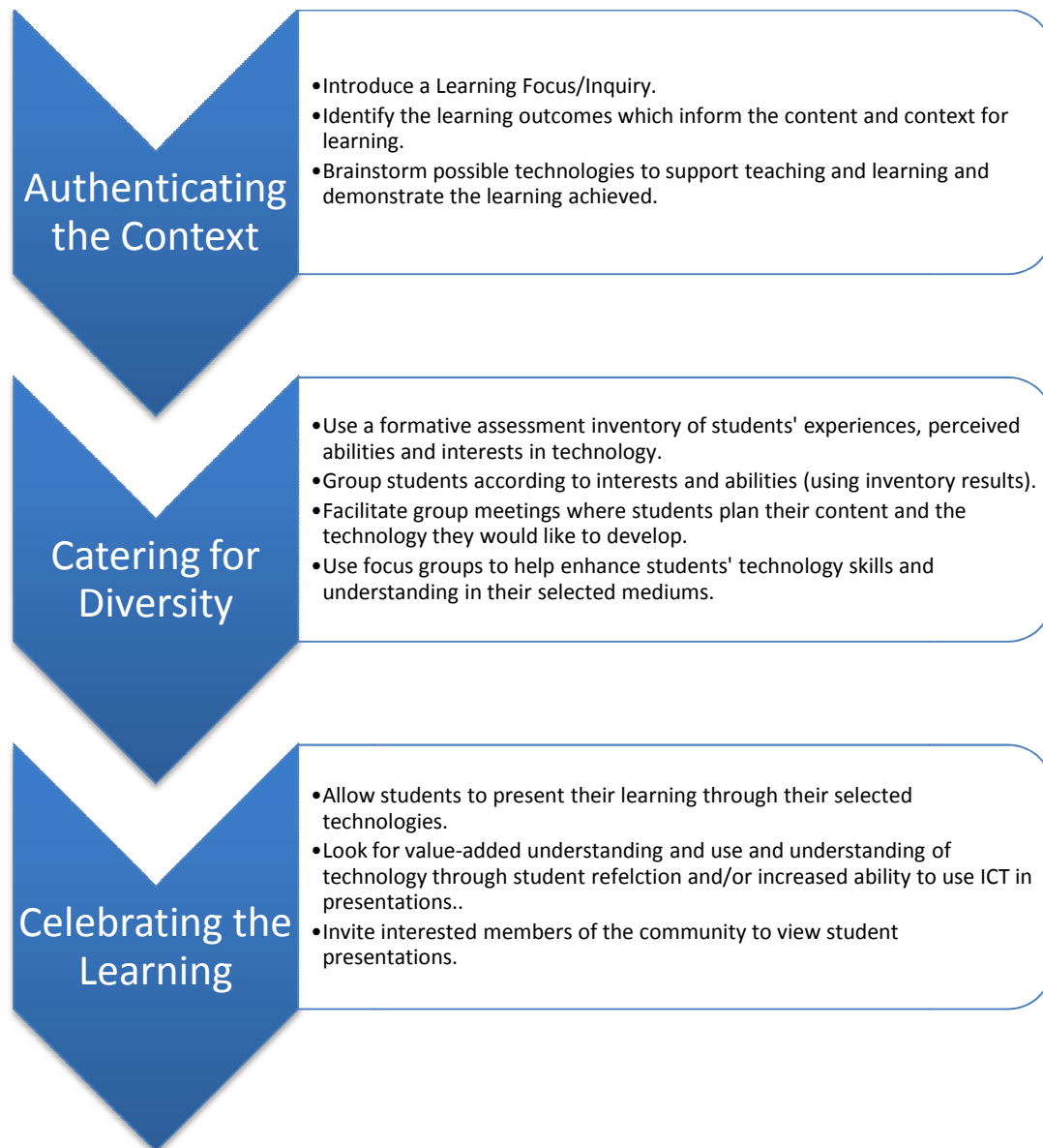
Deep approaches are addressed through the use of students' multi-media presentations as a form of assessment where they also practice their oral presentation skills, an important component of teacher education. Inviting people from beyond the classroom, such as other school students, staff and parents or even members of the broader community could emphasise this component further. We found that the student pastoral care officer and first year experience coordinator were particularly interested in the presentations our students completed. This was due to the content focus on risk and protective factors they faced in their

transition to university more than any other reason, but emphasised to the students that they offered something of importance and value to the wider community.

Finally, the diversity in ICT beginning points among the student body must be acknowledged if the task is to provide the same level of relevance and motivation for all students. The key to achieving this was in assessing not the standard of the multimedia presentation given, but rather, the level of evidence of growth in ICT knowledge and ability that individual students demonstrated. This can be achieved by writing assessment criteria based on presentations incorporating key ideas covered in workshops, and individual reflections where examples of previous and acquired knowledge and the processes that supported knowledge acquisition are given to demonstrate a value-added approach to learning. Focusing a value-added approach on the ICT component still leaves room for the more traditional performance-based approaches to assessment with regard to the unit content, in this study, social ecology theory. This means that all growth in ICT skill is recognised and celebrated, ensuring that students do not feel that any past privileged exposure or opportunities to develop ICT skills was going to influence them in how they presented their understanding of the 'core business' of the unit.

Conclusion: Technology for Personalising Learning

The results of this study suggested that technology can act as a key enabler of personalising learning in a higher education context. Both the student feedback and our reflections on the design and implementation of the unit suggest that this occurs best when three fundamental steps are followed: the learning outcomes drive the context and the ICT becomes the enabler of learning in this context, which we have termed *Authenticating the Context*; strategies are implemented for *Catering for Diversity* of abilities and interests based on the use of formative assessment; and that learning is assessed and recognised in a manner that best recognises student achievement and builds esteem which is considered under the umbrella term of *Celebrating the Learning*. From this we suggest a model *Technology for Personalising Learning* (TPL) which is represented in Figure 1. This model is intended for use by educators to assist the planning and design of learning experiences where technology is used as the enabler of a personalised approach.

Authenticating the Context

- Introduce a Learning Focus/Inquiry.
- Identify the learning outcomes which inform the content and context for learning.
- Brainstorm possible technologies to support teaching and learning and demonstrate the learning achieved.

Catering for Diversity

- Use a formative assessment inventory of students' experiences, perceived abilities and interests in technology.
- Group students according to interests and abilities (using inventory results).
- Facilitate group meetings where students plan their content and the technology they would like to develop.
- Use focus groups to help enhance students' technology skills and understanding in their selected mediums.

Celebrating the Learning

- Allow students to present their learning through their selected technologies.
- Look for value-added understanding and use and understanding of technology through student refelction and/or increased ability to use ICT in presentations..
- Invite interested members of the community to view student presentations.

Figure 1: Technology for Personalising learning: The TPL Model

The TPL model offers an approach to integrating technology for personalising learning that should be adaptable to any context where ICT can be adopted for the presentation of acquired learning in a given context. The approach adopted in this study indicated how it emerged from an effort to personalise learning in a higher education setting within an under-graduate teacher education course. The study showed that once the learning needs of students are identified the use of technology becomes a natural component of meeting those needs. In this way the model provides an authentic context for learning about technologies as information and communication resource tools.   The model caters for individual differences, diversity in the learning group and students' individual interests through the use of formative assessment. It places students at the centre of the learning experience and allows them to direct their learning in collaborative social groups through discussion and negotiation with others. It promotes curriculum choice and life long learning through the provision of opportunity for flexible learning and through the range of pathways that can be created for that learning to take place. The opportunity to involve members of the wider community also exists through the stage of *Celebrating the Learning*. In this manner it

ties in with the tenets of personalising learning that many others have identified (eg. Fullan et al., 2006; Heller et al., 2005; Keamy et al., 2007; Miliband,2004; Sebba et al., 2007), demonstrating that these same tenets can be achieved in a higher education context. The TPL model also provides an effective means of teaching and learning that interweaves a number of curriculum areas and takes a value added approach to personalise student learning through the use of technology with deep learning and constructive alignment as key outcomes.

The TPL model was developed through research based on classroom practice in a higher education setting. It is the product of feedback from students, reflection on practice and research into effective pedagogy. It now awaits trialling and evaluation by other educators to investigate its transferability to wider settings of higher education as a tool for planning integrated and personalised uses of technology that meet the learning needs of the diverse students in our classrooms and for achieving deep learning and constructive alignment in courses. This study strengthens the research-based evidence of the success personalising learning can have on students' learning experiences in the higher education context.

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