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Designing Flexible Learning: Learning With Each Iteration

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Abstract: This paper describes the three iterations of an innovative cross institutional initiative within teacher education. Through an international project pre-service teachers, in-service teachers and teacher educators engaged in a rich exploration of educational topics such as inclusivity and information and communication technology integration. The goal of this learning experience was to promote higher order thinking and collaboration while embedding and fostering authentic dialogue between and among pre-service teachers and experts. Siemens' (2005) five stage learning development cycle has provided a framework for analysis of the three iterations of this online international collaborative project.

Introduction

The provision of blended and distributed learning opportunities have had some success in satisfying learner demand for variable and flexible access as well as achieving improved learning outcomes. Further, successful integration of information communication technologies (ICTs) affords new teaching and learning opportunities. Milton (2003) argues that "[t]echnology is a tool to shift the focus from teaching to learning" (p. 2). These new spaces which embed ICTs blur the boundaries between traditional face-to-face and flexible learning. The ability to provide learning opportunities for anyone, anywhere, anytime enables a broader cross section of the educational community to access and to engage in such learning experiences. As we embrace teaching in a digital age, according to Knezek (2008), the "once isolated classroom has suddenly become a global learning portal for student and teacher" (p. 2).

This paper reports on three iterations of a dynamic online international project that involved a learning community of pre-service teachers, teachers and teacher educators from Queensland, Australia and Alberta, Canada. The project was designed to achieve authentic learning experiences that fostered critical thinking and collaboration. With each iteration, research was conducted using a case study approach which provided data to inform redesign decisions. To add another level of analysis, Siemens' (2005) five stage learning development cycle has been used to examine both the design and re-resign of the iterations to provide further insight into the design process.

Designing Powerful Learning with ICT

"Education must help students learn how to learn in powerful ways" (Darling-Hammond, Barron, Pearson, Schoenfeld, Stage, Zimmerman, Cervertti & Tilson, 2008, p. 2). "When we look at teaching beyond the mere delivery of information, we see a rich picture of learning, one that embraces the social context, resources, background, and history within which information resides" (Brown, 2001, p. 66). To help students learn in meaningful ways requires designing learning that nurtures active and in-depth learning, engages authenticity, fosters collaboration, utilizes prior knowledge and experience, uses formative assessment, organizes knowledge

around key concepts and connections and supports the development of meta-cognitive skills (Darling-Hammond, et al., 2008).

For high quality learning to occur, learners need to move beyond a passive role to one of engagement with content and with others that occurs at behavioural, emotional and/or cognitive levels (Fredricks, Blumenfeld, Friedel, & Paris, 2003). Boud and Prosser (2002) recommend that the "learning experience needs to challenge the learners experiences of the world, the learners present understandings, and help them develop self-critical skills" (p. 243). They advocate that high quality learning is influenced by learner engagement, acknowledgment of the learning and learners context, challenging learners and providing the learner practice.

Merrill (2002) suggests learning experiences require design and pedagogical approaches that: promote learners engagement in solving real-world problems; provide opportunity for existing knowledge to be activated as a foundation for new knowledge; demonstrate new knowledge to the learner; enable the learner to apply new knowledge; and enable new knowledge to be integrated into the learner's world.

In the 21st century classroom, ICTs have a critical role in support of authentic learning and knowledge construction. Meaningful learning with ICTs should primarily be used for generative processing by learners in constructing knowledge, rather than a medium to deliver instruction (Jonassen, Howland, Marra, & Crismond, 2008). Further, Frand (2000) advocates that we "need to think in terms of transforming the educational experience so that it is meaningful to the information-age learner" (p. 24). ICT enabled learning environments foster interactions where learners can reflect, exchange information and ideas, conduct in-depth investigation or analysis, and compare and contrast beyond the superficial level. Any discussion can move beyond serial monologues to reflective thought by invitation for interaction and continued exchange among learners or participants as an element of the learning design. When looking specifically at course design, Mason and Rennie (2008) argue that it is "no longer about transmission and consumption; it is about co-creating, sharing, repurposing, and above all, interacting" (p. 23).

Adaptive and flexible designs are required to "provide a dynamic, emergent teaching and learning environment in which resources or strategies can be developed or modified during the actual delivery state" (Irlbeck, Kays, Jones, & Sims, 2006, p. 179). The life cycle of a course or learning task will differ each time because the different participants bring to the activity differing experiences and knowledge. "[L]earning arises from what students experience, not what teachers do or technology does" (Boud & Prosser, 2002, p. 37). Effective design and planning for these types of learning experiences are required.

A Framework for Analysis

Agostinho, Oliver, Harper, Hedberg, and Wills (2002) describe learning design as the "variety of ways of designing student learning experiences, that is, the sequence of activities and interactions." Siemens (2005) argues that learning design is concerned with creating an environment or ecology for learning. Learning design is a system, beyond the product or process as the design itself "serves only a small part of the entire learning experience" (Siemens, 2005, p. 3). The design of learning experiences should service the learners. The learning experience should result in better outcomes for learners.

The design of learning should make room for multiple perspectives, to enable the learner to move from where they started by having access to ideas and beliefs beyond what they already know. Siemens (2005) proposes that "[d]esigners no longer create only instruction sequences. They must create environments, networks, access to resources, and increase the capacity of learners to function and forage for their own knowledge" (p. 8).

Siemens' (2005) five stage learning development cycle (LDC) is used to discuss design and redesign of three iterations of an online collaborative project. The goal of the cycle is to inform on-going design and implementation of learning experiences. This cycle suggests that feedback and evaluation from multiple sources is actively incorporated into design and development of activities for the future implementation. The following are the five stages of LDC:

1. "Scope and object of learning design
2. Creation of learning resources

3. User experience
4. Meta-evaluation to determine effectiveness and accuracy of design process and assumptions
5. Formative and summative evaluation of project and learner experience" (Siemens, 2005, p. 23).

Context

Working within a constructivist and technology-enhanced environment, pre-service teachers from Australia and Canada actively participated in an international online collaborative learning experience. The project was designed and implemented to advance educational thought and practice and give pre-service teachers an opportunity to live the experience of being online collaborators investigating real-world teaching issues. This experience created the opportunity for authentic discussion between pre-service teachers, teacher educators and experts and also became authentic assessment tasks for the pre-service teachers.

The project occurred over a six-week period in early 2006, 2007 and 2008, using the following three-phase process.

Phase one: Introduction and bookrap

A key component of this phase was to develop a sustainable learning community through the development of a social presence using videoconference and asynchronous online discussions. Social presence, as defined by Garrison, Anderson and Archer (2000) is "the ability of participants in a community of inquiry to project themselves socially and emotionally, as 'real people' though the medium of communication being used" (p. 94). Social presence does not just happen, rather it requires intentional design and facilitation. Activities designed to develop social presence included posting introductions, sharing stories and images about themselves and communicating with others with similar interests or differing locations.

Within a community of learners, it is the teacher's role to "set the tone and draw reluctant participants into the discussion" (Garrison & Anderson, 2003, p. 54). Teaching presence is required to nurture a community of learners, to move from non-content discussion, where learners are free to exchange social and other information, to cognitive relationships. For robust discussion to occur, there is a need to nurture an environment where all participants feel free to share ideas and also be critical of the ideas of others as part of the learning process. This "intellectually challenging yet respectful" (Garrison & Anderson, 2003, p. 50) tone is a pre-condition for purposeful and worthwhile learning experiences.

Another component in helping build community occurred through a shared experience as a stimulus for ongoing learning. The shared experience was for the pre-service teachers to participate in a bookrap. This required them to read one of three or four selected novels. Within novel groups, they were to share their reviews of the books within an online discussion forum among their peers from both universities. Inquiry questions drafted by pre-service teachers through this activity were used to spark initial online discussions related to the novel and to the major topics of diversity and inclusivity in K – 12 classrooms.

Phase two: Online Discussions with pre-service teachers and experts

Experts (teacher educators and teachers) from both countries were invited into Blackboard™ to participate in dialogue with the pre-service teachers. Online discussion forums were created so that pre-service teachers and experts could share prior experiences and knowledge, and integrate information from multiple sources in the co-construction of possible solutions to complex problems of teaching in today's classrooms.

At this stage, the design and the nature of the teaching presence was driven by the needs of learners. Here learners explored problems in-depth and presented information for exploration as they collectively searched for solutions, explanations or links to their prior knowledge and experiences. During this stage, multiple perspectives were shared and while learners were questioning others, texts and themselves they were beginning to build knowledge. A critical component of the design was to foster critical discourse. Learners moved to a deeper level of

thinking where they integrated and analyzed information from multiple sources and moved learning from an isolated experience to a community learning experience.

Phase three: Exploration of pedagogical practice and classroom applications

Pre-service teachers were invited to participate in a videoconference where they joined their overseas colleagues and experts in discussion that explored pedagogical practice and classroom applications through the use of scenarios and discussion. Drawing on their prior experiences and knowledge gained from phases one and two, pre-service teachers were to develop a professional growth plan in which they identified elements of personal pedagogical theory and practice. Further, they reflected on the project processes and their own learning as a result of the project which was posted in Blackboard™.

Methodology

Each year of implementation, a qualitative research study was conducted. Data from each iteration of the project has been collected, analysed and used to inform the redesign for the following year. A case study approach has provided a means to report on the authentic online collaborative learning experience of pre-service teachers in the project and to examine the complexity of the online collaborative experience. Data sources included: asynchronous online communication; focus-group interviews at the end of the project; project reflection completed by pre-services teachers; and reflections from the researchers who were also the designers, developers and facilitators of the project.

With each iteration of the project, two data analysis methods have been used. First, the online discussion transcripts were analyzed using Henri's (1992) content analysis model for asynchronous computer-mediated communication which allowed for the analysis of online dialogue both in terms of quality and quantity of messages. Henri's (1992) framework include the following five dimensions:

- Participative –the number of postings;
- Social – postings not related to formal content;
- Interactive – connected postings;
- Cognitive – postings which indicate higher order thinking; and
- Metacognitive – postings which make personal learning visible.

The unit of analysis for the coding was individual postings. If a posting included more than one dimension the post was coded at the highest level. The researchers independently coded the data using the dimensions and indicators provided by Henri's (1992) framework. Further, this process was followed by check-coding (Miles & Huberman, 1994) to address the reliability of the analysis. Second, the constant comparative method of data analysis has been used to construct themes by capturing patterns and inconsistencies from the reflective activity and from focus group interviews.

Findings and Discussion

The analysis of data using Henri's (1992) five dimensions are provided for the 2006, 2007 and 2008 implementations of the project. Data from the reflective task and the focus groups are discussed within this section in relation to learning design. The process and findings from this project are presented using Siemens' (2005) five stage learning development cycle (LDC). The LDC is used to discuss design and redesign of the three iterations of the international collaborative project.

LDC Stage One: Scope

This stage of the learning development cycle includes the initial planning and needs analysis. The planning element includes items such as exploring stakeholders' perspectives and investigating the availability of delivery

methods and resources. The analysis element involves access to ICT tools, learners' motivation, and participant support required.

The aims of the online collaborative international project which was originally launched in 2006 were to achieve the following:

- "model the use of ICTs within teaching and learning;
- advance educational thought and practice;
- develop global relationships; and
- develop an increased understanding of diversity and inclusivity in today's classrooms" (Lock & Redmond, 2009, p. 178).

It was at this stage that the two teacher educators sought to find common teaching time between the two university semesters to enable an online collaborative learning experience to occur between pre-service teachers in two different countries. With a variance in professional experience placements and holidays only six common weeks were found in any one semester.

Modes of delivery were investigated and it was decided that the learning experience would utilize a blend of online asynchronous discussion and face-to-face teaching and learning. The common online area for all pre-service teachers would be within the University of Calgary's Blackboard™ environment, which would be augmented with video conferencing. At this stage, it was also decided that the pre-service teachers and teacher educators should be joined by practicing educators who had experience and expertise dealing with the key concepts under discussion.

LDC Stage Two: Creation

Creation within this stage includes design, development and delivery. This stage requires the identification and development of learning outcomes, content, timelines, interactions and learning activities, media/tool selection, learning format, learners' contexts, assessment and evaluation, and learning facilitation.

As previously discussed the learning activities were designed in the three phases. Within these phases the structured learning tasks for the project were designed to support and provide opportunities for authentic learning; authentic dialogue; social constructivist pedagogies; collaboration; higher order thinking; deep knowledge and understanding; and modelling of ICT to enhance and extend learning.

The formal assessment was designed into the learning as part of the learning tasks. The pre-service teachers interactions during the learning tasks were mined for quality posts to submit for their assessment. Hence the pre-service teachers had a post and response obligation at both the personal and group level. Modelling and criteria for effective online posts were explored during the learning experience. Sample criteria for online postings included: effective social presence; timeliness of postings; sustained professional dialogue; promotion of deep discussion; efforts to make personal and group meaning; and integration of ideas from a variety of sources. In addition pre-service teachers were required to formally reflect on the content, learning process, and their personal contributions to the online learning experience.

Table 1 indicates an analysis of the data within the introductory forum. Given the activities were based around building social presence it was expected that the bulk of the postings would be social or interactive in nature as indicated. The volume of postings per pre-service teacher increased from 2.68 in 2006 to 4.47 in 2007 and then dropped in 2008 to 3.64. This may have been a result of minor redesign and changes in teaching between 2006 and 2007 to encourage increased participation.

Table 1: Frequency of Pre-service Teachers Online Postings in the Introduction Discussion Forum

Year	Number of Participants	Participative	Social		Interactive		Cognitive	Meta-cognitive
			No.	%	No.	%		
2006	22	59	18	31	41	69	0	0
2007	57	255	51	20	203	79	1	0
2008	17	62	57	92	5	8	0	0

With each iteration, the teacher educators worked to find ways to continue to foster the development of a learning community and to facilitate rich, deep online discussions that involved critical thinking and reflection.

LDC Stage Three: User experience/Pilot

After engaging in community building activities, pre-service teachers began the intellectual work by engaging in a bookrap activity within Phase One of the learning design. Pre-service teachers selected, read and participated in dialogue around one of the following novels: *The Silent Boy* (Lowery, 2003), *Group of One* (Gilmore, 2005), *Pavana's Journey* (Ellis, 2005), *The Curious Incident of the Dog in the Night-time* (Hadden, 2002) or *Destroying Avalon* (McCaffrey, 2006). These novels all dealt with issues of relevance in today's diverse K – 12 classrooms. The selection of the novels was reviewed each iteration and modified, if necessary, following feedback from participants. The key inquiry questions guiding the online discussion within the bookrap were developed by the pre-service teachers and they reflected the learners' interests and needs.

Table 2 provides an analysis of the data from the novel study and inquiry forums. There was an increase in the quantity of postings per pre-service teacher from 4.72 in 2006 to 6.14 and 5.52 in 2007 and 2008 respectively. After looking at the data from 2006, it was decided that the teacher educators needed to lead a discussion with participants which emphasised that sustained professional dialogue requires ongoing access and participation in a post-and-response cycle rather than accessing and/or posting once per week. This minor change may have resulted in the increase in the volume of postings.

Table 2: Frequency of Pre-service Teachers Online Responses in the Novel Study and Inquiry Questions Forums

Year	Number of Participants	Participative	Social	Interactive		Cognitive		Meta-cognitive	
				No.	%	No.	%	No.	%
2006	22	104	0	71	68	27	26	6	6
2007	57	350	1	215	61	131	37	3	1
2008	17	94	0	50	53	39	42	5	5

After 2006 the teacher educators also decided to refine the effective posting criteria and to provide modelling of cognitive and meta-cognitive postings. This may have resulted in the increase in the percentage of cognitive postings and the subsequence decrease in interactive postings. This was seen as a positive outcome of the redesign of the learning activity.

During Phase Two, the pre-service teachers were joined by practicing teachers and teacher educators who acted as experts. These experts were identified through professional networks and not all experts and topics were the same for each iteration. Separate expert discussion forums were set up for each key concept, (e.g., ICT integration, bullying and cyberbullying, teaching in an inclusive classroom, autism, and cultural diversity, internationalization and second language learners). Each discussion topic included participation by experts and pre-service teachers from both countries. The discussions were driven by pre-service teachers' professional needs and questions. The dialogue was much deeper, with the pre-service teachers' questions to experts grounded in praxis. The level of sophistication of the discussion increased as the project progressed. This was evident in that the pre-service teachers' contributions were more informed than those during the bookrap discussion. Table 3 indicates that both the average number of postings and the quality of postings improved over the three years.

Table 3: Frequency of Pre-service Teachers' Online Responses in Expert Discussion Forums

Year	Number of Participants	Participative	Social		Interactive		Cognitive		Meta-cognitive
			No.	%	No.	%	No.	%	
2006	22	30	0	0	20	67	10	30	0
2007	57	318	7	2	212	67	97	31	2
2008	17	92	0	0	49	53	43	47	0

As part of the redesign during 2007, the experts provided biographies which were included in the online space in Blackboard™. This allowed pre-service teachers to gain some knowledge of the experts prior to joining them in discussion. It also assisted in developing social presence for the experts.

The experts themselves and the key concepts under discussion were reviewed each iteration with all participants having input. For example, in 2008 from pre-service teacher and expert focus group interviews, a recommendation was made to include in the project participants from another country or countries so to gain their perspectives.

LDC Stage Four: Meta-evaluation

"Is the design useful, usable, desirable, findable, accessible, credible, and valuable?" (Siemens, 2005, p. 28). Exploring elements of the design which enhanced or inhibited personal learning is a key to informing the modifications required for the next iteration. Gaining feedback from the learners was 'designed in' to the learning experience. For example, pre-service teachers' project reflections were a critical source of data that assisted in informing and refining the project. As Siemens (2005) states "[m]eta evaluation is critical to continually improving the model and learning design" (p. 29).

Phase Three of the design required pre-service teachers to explore their personal pedagogical practice in light of what they had learned during the experience. In addition, the final element of the experience required pre-service teachers to share their reflections with regard to the learning experience and their personal learning from the experience. "Learning occurs not only through context, exposure, but also through interaction, reflection and cognition" (Siemens, 2005).

For the implementation of the second and third year of the project, three key changes were made based on feedback. First, pre-service teachers appreciated the videoconference opportunity that occurred at the end of the project. They recommended a videoconference at the beginning of the learning experience to assist with the development of a cohesive learning community. This was implemented in the second iteration and was well received. Second, based on the nature of the online discussions and the need to foster more critical discourse and higher order thinking, the teacher educators started the project in the second year with an activity to help pre-service teachers to develop greater awareness of elements of quality online postings. At the start of the second year, this occurred during the first videoconference and in the third year, this occurred face-to-face during the classroom time with the pre-service teachers. Third, an additional section was added to the Blackboard™ navigation bar for the purpose of introducing experts. Pictures and biographies were available for participants to read before posting questions and engaging in discourse within the asynchronous discussion forums in Blackboard™. Sharing such information helped people gain an awareness of the experts with whom they were going to dialogue with in the forums (Lock & Redmond, 2009).

LDC Stage Five: Evaluation across all stages

The lived experience, practice and evidence were used to inform the redesign for each iteration of the project. The evaluation was not limited to formal assessment of learners and invited all participants to "provide feedback on the quality of the learning resource, instruction, relevance, and format" (Siemens, 2005).

Evaluative data has been collected from the different classes located in two different universities in each of the three years. Participation in the learning experience was formally assessed in all courses. Data, as part of the case study research initiative associated with the project, have also been collected through the archives of the online discussions, pre-service teacher reflective artefacts and interviews or focus group interviews. The transcripts from the online discussions were analysed using Henri's (1992) content analysis model and the constant comparative method of data analysis was used in the construction of themes from the reflective activity and from individual or focus group interviews. Evidence from the analysis of the various data sources has informed the redesign decisions for the project.

Participants seemed interested in giving feedback knowing that it would inform the design of the activity for the following year. The designers found this feedback useful when planning modifications. The redesign of the experience overtime remains faithful to the original design. Customisation and changes came out of the experiences of all participants.

The following pre-service teacher quotes indicate that the design and redesign has been successful in achieving the learning outcomes desired:

- "It was valuable to have authentic conversations with other pre-service teachers and experts";
- "The discussion was informative, and it was personally enriching to hear real-life experiences on particular issues. It was great to have an opportunity to learn through other people's experiences with topics surrounding inclusion, instead of just learning everything from a text book";
- "It forces those in the discussion to consider ideas and beliefs beyond what they already hold";
- "The information I have learned from here will impact my pedagogical practices because the topics covered affect today's society significantly"; and
- "Exposure to new ways to implement technology is fantastic as an aspiring teacher because it helps to develop confidence within us. I definitely found a new confidence in regards to the implementation of technology in a classroom".

Conclusion

As designers of learning, we strive to create rich learning experiences, as well as model best practices. We are very aware that the challenge for education both today and tomorrow involves "maximizing the impact of technology to develop proficiency in 21st century skills, support innovative teaching and learning, and create robust education support systems" (The State Educational Technology Directors Association (SETDA), The International Society for Technology in Education (ISTE), & The Partnership for 21st Century Skills, 2007, p. 18). In order for pre-service teachers and educators to create and facilitate the development of 21st century skills with ICT, they need to be given the opportunity to experience and develop the capacity and proficiency to support robust teaching and learning. Models of authentic learning experiences which utilize digital tools, promote complex and innovative thinking, collaboration, and knowledge creation are significant to today's educators and must be shared to a wider audience.

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