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Authentic instruction and technology literacy

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Abstract

Technology integration is an important aspect of student competence in the 21st century. The use of technology in teaching and learning is a valuable practice for supporting student learning and engagement. Modelling the pedagogical practices that integrate authentic, performance-based opportunities for technology integration was the focus of a project designed to support future teachers with acquiring these same pedagogical practices. The project was an opportunity to demonstrate value for a competency-based approach to teacher education that integrates technology literacy as a required component of teaching and learning in the 21st century. It explored the extent to which preservice teachers integrated technology tools in the lesson plans they created. The use of various self-selected technology tools using this approach served as an illustration of the important aspects of sound instructional pedagogy including authentic learning, technology integration and performance-based learning.

Keywords

Authentic learning, competency-based learning, performance-based learning, technology

Introduction

Efforts to reform teaching and learning practices in higher education have been a focus for many American college and university campuses since the 1980s (Lazerson, Wagener & Schumanis, 2000). Technology integration offers opportunities to support students, increase engagement and create an important component of reform in twenty-first century teaching and learning. It is particularly important that educators of future teachers model the integration of technology-based learning experiences and make technology literacy an essential part of the curriculum (Jerald, 2009). Emphasising the important role of technology in the twenty-first century teaching and learning environment offers the opportunity to reform the model we use to foster student competencies and technology literacy in this important era (Diana, 2013).

Instructor practices that include a competency-based approach promote competency within the students enrolled in their courses (Cydis, 2014). As an instructor at the higher education level, recognising the value of an integrated

approach to instruction and employing this philosophy in the higher education classroom has the potential to produce instruction with effectiveness and motivational qualities for students. Focusing on the role of technology as it relates to fostering student competencies serves as an effective model for reforming our current practice in teacher education (Diana, 2013).

Background

Competency-Based Learning

The U.S. Department of Education (2001) defined competencies as the "combination of skills, abilities and knowledge needed to perform a specific task" (p. 1). These tasks require students to demonstrate the skills and abilities necessary to perform in the real world scenario and setting for which they would be applicable (Voorhees, 2001). Competency-based learning models include the use of student learning outcomes, objectives, skills and competencies (Voorhees, 2001). Mansilla (2005) proposes a "focus on broad cognitive abilities embedded in meaningful, holistic complex tasks and its focus on information technologies" as a method for learning assessment. Research proven best practices such as authentic instructional practices, integrated instruction and performance-based assessment have been the topic of conversation in educational journals and have been proven to enhance the quality of student learning (Purcell-Gates, Degener, Jacobson, & Soler, 2002). Capitalising on these important features of research proven best practices contributes to a model for effectively developing technology literacy.

Authentic learning

As technology is integrated in the pedagogical practices in the classroom, students acquire those literacies in an authentic context. Authentic instruction is defined as that which requires students to construct meaning and produce knowledge, inquire to construct meaning, reflect and discuss information, and create or perform tasks that have values of meaning beyond success in school (Newmann & Wehlage, 1993). Shepard (2004) argued that learning should be authentic and connected to the real world. Authentic learning requires students to use knowledge and skills and perform tasks to solve worthy problems resembling "real-world" contexts (Wiggins, 1993). The use of technology as part of the pedagogical practice in teacher education courses serves as an opportunity to integrate authentic opportunities for acquiring technology literacy as a competency. Students develop this competency through integrative learning which fosters students' ability to make connections between new and existing knowledge, skills and experiences, needed to respond to changing needs of society (Carey, 2005). This concept is manifested through the competencies students acquire and demonstrate as they create "real world" lesson plans for their fieldwork experiences that integrate the use of technology. Smith and Greene (2013) found that pre-service teachers reported improved lesson planning and implementation resulting from an e-learning project integrated as part of their coursework. Through this model,

students demonstrate their competencies through performance-based opportunities for learning and assessment.

Performance-Based Learning

Performance-Based Learning is defined as learning systems that seek to document that a learner has attained a given competency or set of competencies (Voorhees, 2001). The lesson plans serve as a performance task assessment, or a set of strategies for the acquisition and application of knowledge, skills, and work habits through the performance of tasks that are meaningful and engaging to students (Hibbard, 1996). Because students engage in the application of the technology literacies they are acquiring, they develop a meaningful connection to the content they are learning and this knowledge is demonstrated in the student created lesson plans. These plans then serve as evidence of student learning outcomes, i.e. the knowledge, skills, and abilities that students have attained as a result of their involvement in a particular set of educational experiences (Mesa College, 2005). These practices combined with a belief in the value of technology are an important way to develop important competencies in students.

Technology Integration

Creating performance-based opportunities for developing competence in students requires the instructor to believe in a value for technology integration and utilise technology as part of instruction. Teacher attitude and beliefs are key to successful technology integration (Mueller & Wood, 2012). In order for students to develop in the area of technology literacy teachers' beliefs about the importance of technology integration is an important phenomenon in fostering this competency in students. Teachers need to view technology as an essential part of a curriculum that integrates a constructivist approach to performance-based learning for students to really benefit from this approach to learning (Handal, n.d.). Developing pedagogical beliefs through professional development in the area of technology integration serves as an important consideration as it relates to fostering technology literacy as a competency in students (Ertmer, 2005). Through the integration of technology, students have opportunities to learn how to use technology tools, while at the same time engage in authentic learning experiences (Skoretz and Cottle, 2011).

Research Design

In this study, students enrolled in a college-level teacher education program participated in a project in which they engaged in learning experiences that integrated the use of technology. The method used to choose the sample participants was criterion-based, non-probability sampling. This type of sampling "requires that one establish the criteria, bases or standards necessary for units to be included in the investigation, one then finds a sample that matches these criteria" (Merriam, 1988, p. 48). Consequently, the researcher selected students enrolled in EDUC 3105 *Literacy Development* as the population of participants.

The rationale for selecting this population was determined due to the nature of the course content. Students enrolled in this course participated in learning experiences that integrated the use of technology and were encouraged to develop a knowledge base for integrating technology as they plan lessons for future use. For this reason, students enrolled in this course meet the criteria necessary to be included in the investigation.

Methodology

The project focused on the design of a pre-service teacher education course in which students acquire the instructional skills and strategies necessary for early literacy in the early childhood setting. The course also focuses on technology literacies a result of the instructional pedagogy that integrates authentic, performance-based opportunities for learning with a focus on guiding future teachers to successfully integrate technology into their lesson plans they create.

During the semester, the instructor engaged students in the use of various technology tools and their instructional uses. These included several technology tools including:

a. web-based programs for creating an electronic portfolio;
b. personal response systems, that is, hand-held interactive devices for enabling students to respond to prompts presented by the instructor during class discussions;
c. a web-based program for creating visual representations of information; and,
d. online discussion forums.

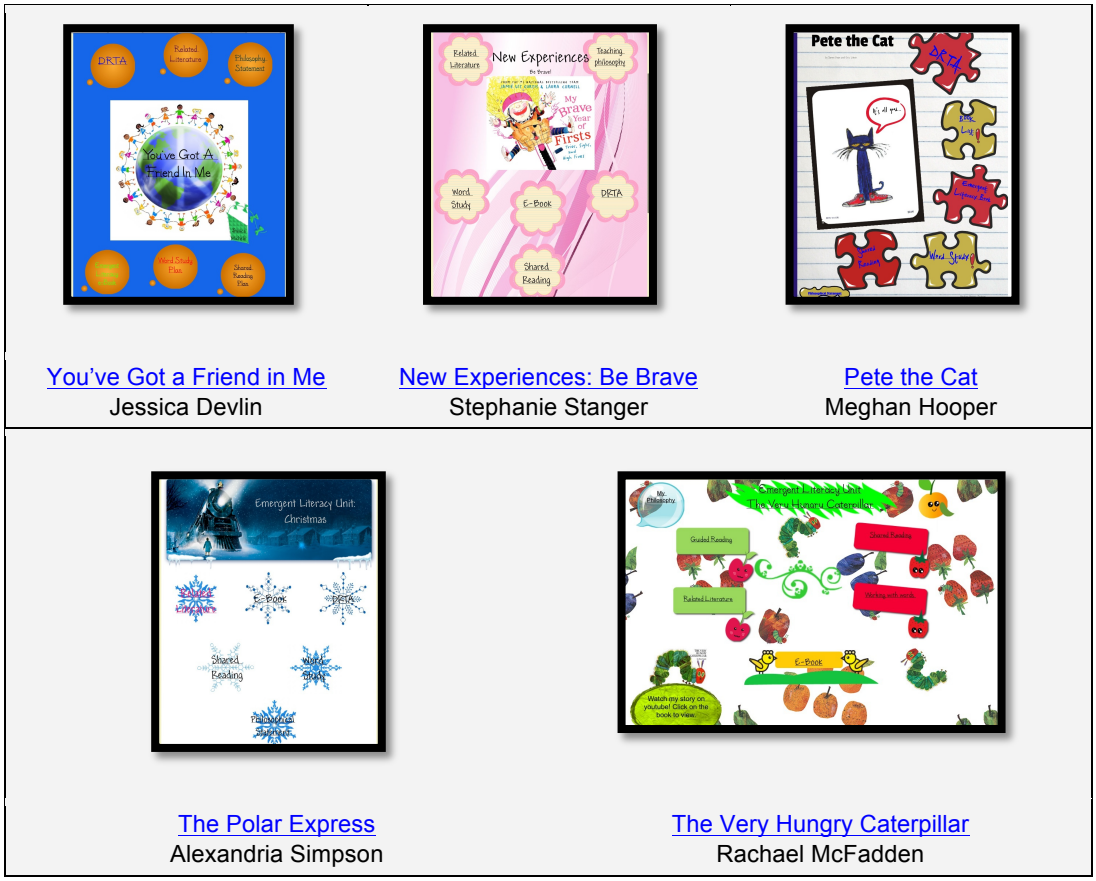
The integration of these tools created opportunities for the instructor to model their use in an authentic, meaningful way. The methods used to integrate these tools are described further in the discussion that follows. In addition to the value of the use of these tools for their own merit, it also created opportunities for modelling the use of these tools as students began to develop their own lesson plans. Students were not required to integrate the use of technology in the lesson plans they created, but the instructor observed and monitored the extent to which students did so using methods such as a survey questionnaire, the analysis of narrative data and observational data.

As part of a course that prepares future teachers for supporting literacy development in early childhood students, the goal was to develop lesson plan design and technology integration abilities in future teachers. In an effort to make the learning meaningful and authentic, students were required to apply knowledge of course objectives by developing a unit of instruction using Glogster[1], a web-based program that served as a forum for students to showcase the lesson plans they created in the form of an electronic portfolio. This electronic portfolio created an authentic purpose for designing lesson plans as a resource and an artifact that demonstrates competence in lesson plan design as well as technology

[1] <http://edu.glogster.com>

integration. Ultimately students were supported in developing a philosophy for instruction that integrated the use of authentic, performance-based opportunities for developing competence with the course objectives as well as technology integration. This portfolio could then be shared with a potential future employer and serve as evidence of competence in lesson plan design and a sound philosophical perspective. Doing so created a setting in which these important components of instruction were modelled by the instructor as a means of demonstrating instructional practices for the future teachers enrolled in this course.

In the electronic unit, competency was demonstrated by students enrolled in a section of this course in the 2013 Fall semester which included required elements of this task such as the development of a thematic home page with links to specific lesson plans to support the theme, an annotated book list to support the theme, a children's book authored by the student as well as a personal statement that communicates the author's teaching philosophy. Many of the students integrated additional components to further enhance the final product including audio, animated components and enhanced backgrounds. Figure 1 presents a selection of hyperlinked examples (included with the express permission of the named students).



[You've Got a Friend in Me](#) Jessica Devlin

[New Experiences: Be Brave](#) Stephanie Stanger

[Pete the Cat](#) Meghan Hooper

[The Polar Express](#) Alexandria Simpson

[The Very Hungry Caterpillar](#) Rachael McFadden

Figure 1. Samples of student Glogs, built with the web-based program Glogster

Another opportunity for technology integration included the use of personal response systems, hand-held interactive devices enabling students to respond to prompts presented by the instructor during class discussions. One such program requires the purchase of hardware which includes the hand-held devices themselves in addition to the transmitting device which is inserted into a USB drive on the computer. The software is downloaded for free from Turning Technologies[2]. Using this technology created opportunities for the instructor to model their use in an authentic, meaningful way. As daily lectures were delivered, students engaged in discussion of prompts provided by the instructor and "clicked in" to record a response. This data could then be collectively revealed through a PowerPoint presentation and could be retrieved by the instructor to reveal individual responses by students as a means of formative feedback in the teaching-learning process (Cydis, 2011). Other options for this technique included the use of free web-based programs such as *Socrative*[3] and *Poll Everywhere*[4] which allowed students to respond using, personal computers, laptops, i-pads and even smartphones.

Another useful technology tool used, *Popplet Lite*[5], is a web-based program that enabled students to organise thoughts and concepts in the form of a graphic organiser. Students considered the topic for discussion and responded individually or in groups by creating a "popplet" that represented their perception of how the main ideas and details of the topic related to each other. Figure 2 shows how concepts relating to the topic of word recognition can be illustrated using Popplet Lite.

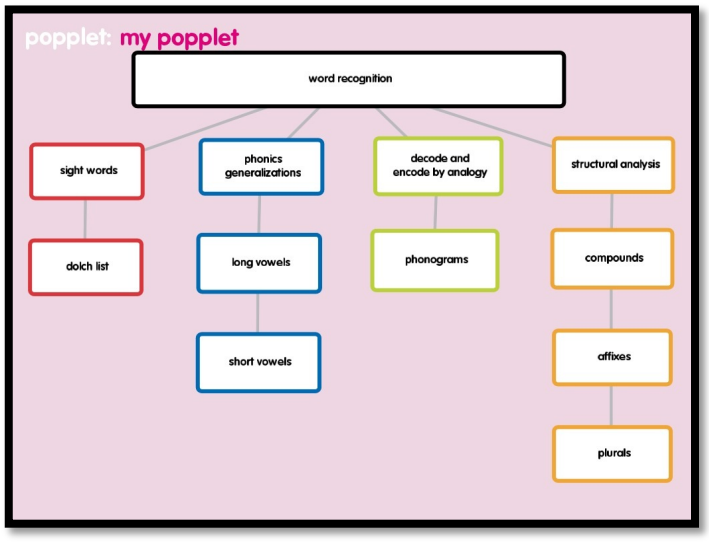


Figure 2. Word recognition Popplet (Screen shot from *Popplet Lite*)

[2] <www.TurningTechnologies.com>
[3] <www.socrative.com>
[4] <www.polleverywhere.com>
[5] <www.popplet.com>

In addition to the value of the use of these tools for their own merit, they created opportunities for modelling the use of these tools as students began to develop their own lesson plans. Student were not required to integrate the use of technology in the lesson plans they created but, as part of the reflection on this practice, the instructor observed and noted the extent to which students did so as a means of further reflecting on the learning experiences from the perspective of the teacher.

The data collection process included the use of three measures:

1. Survey: students were surveyed at the end of the semester to ascertain whether students integrated technology into the lesson plans they created during the semester. The survey also provided space for participants to include narrative information relating to their responses.
2. Content analysis: a content analysis of student comments was conducted and emerging themes within this data were identified with regard to technology literacy acquired, the extent to which these tools were integrated into the lesson plans created by students and participant perceptions of the technology used.
3. Observations: unstructured classroom observations made by the instructor were recorded as field notes and used to document the experiences from the perspective of the author as researcher/instructor.

Results

The survey was administered at the end of the semester. A summary of these results is presented in Table 1.

Table 1
Technology included in student lesson plans

	(*N*=43)	%	Total %
Did NOT include Technology in lesson plans	3	7	7
Included Technology taught in class in ≥ 1 plan	22	51	93
Included Technology NOT taught in class in ≥ 1 plan	9	21	
Included Technology in ALL lesson plans	9	21	

The results of the survey indicated that the majority of the students (93%) included technology tools in the lesson plans they created (see Table 1). This was particularly encouraging given the fact that this was not a required component of the course assignments. The results of the survey also showed that 21% of

students enrolled in the class who responded to the survey, included technology in all lesson plans created, while 72% included technology in at least one lesson plan. Most students (51%) chose to integrate technology tools demonstrated and used in class, while another 21% integrated a tool other than one of those introduced in the course.

In terms of the content analysis, four themes were identified within the narrative responses provided by students at the conclusion of the semester. As it relates to the role that technology should play in instruction, student responses reflected a common theme relating to the authentic need for technology in the global economy of the twenty-first century.

With regard to *Glogster*, student responses reflected two common themes. One related to the lack of "user-friendliness" of the tool itself while, at the same time, another theme related to the useful nature of the tool for authentic or professional purposes.

Finally, the analysis of narrative data revealed a common theme in terms of students' identifying specific technologies for integration. Specific tools were mentioned 17 times and of those, 15 different tools were identified. Of the 15 different tools identified, 11 responses related to tools/strategies that were integrated or modelled in the course as part of the instructional methodology. The remaining 4 tools were self-selected by students.

Instructor field notes were examined and analysed to explore importance of observations made by the instructor (as researcher) over the course of the project. The instructor reported that all students demonstrated a commitment to accomplishing the objectives relating to integrating the technology and many students demonstrated creative methods for accomplishing their goals. In some cases, the students were able to share innovative strategies for technology integration such as using *Google Docs* to facilitate the use of *Glogster*. In other cases, students took the initiative to use web-based applications to download additional resources to integrate with the use of *Glogster*. In another example, students took the initiative to learn to use additional features of the web-based programs in class that were not included as part of the course activities. The instructor reported that students shared examples relating to how they were able to successfully integrate the use of technology in their fieldwork experiences as well as in other courses in their studies.

Conversely, the instructor reported some technical difficulty students and the instructor had with some of the features of *Glogster* and developing glogs. For example, the instructor reported that at times students had difficulty using the feature of the program that enabled the users to link web pages together and/or successfully make text visible. Despite this, the classroom environment was collegiate and cooperative and based on shared discovery.

Discussion

The results of this project indicated that participants recognised the importance of technology integration and included technology in the lesson plans they created as part of the course requirements. Because almost all of the students integrated the use of technology in the lesson plans they created, the findings could suggest that students had developed a level of confidence and competency with the integration of technology. This finding was confirmed by: (a) one of the themes that emerged from students' narrative comments relating to the authentic need for technology in the global economy; (b) the instructor's observations of students integrating novel uses of various tools to facilitate the use of the technology in their lesson plans; and (c) the variety and frequency of tools students chose to integrate into their lesson plans. The latter is a critical observation - of the 15 different tools students chose to use, 11 of those were demonstrated during the course of the study which appears to have supported students' competencies with these tools. That an additional 4 tools were used which students had self selected is an indication of a growing confidence and a more sophisticated understanding of how technology could support learning.

Conclusion

The use of technology in education is ever increasingly important in this era of global, competency-based learning of the twenty-first century (Cognetta, 2012). Authentic opportunities for technology integration in education seem to have considerable value when used to foster competencies in students and make learning meaningful. This project demonstrated that integrating technology meaningfully increased student competency with specific technology tools. It is particularly important that educators of future teachers model the integration of technology-based learning experiences and make technology literacy an essential part of the curriculum (Jerald, 2009). Students learned to successfully use tools integrated as part of the instructor's pedagogical and methodological practices, which served as a valuable model for future teachers. Students demonstrated increased competency with the tools that were modelled by the instructor. Research has shown that students develop this competency through integrative learning which fosters students' ability to make connections between new and existing knowledge, skills and experiences, needed to respond to changing needs of society (Carey, 2005). Through the integration of methods that integrate the use of technology, students recognised the role that technology plays in education and ultimately chose to integrate technology in the lesson plans they created as part of the course requirements. The use of technology in education serves as a great model for pedagogical practices of educators at any level of instruction in addition to creating a value for methods of instruction that integrate technology as an authentic approach to building competence in students.

Recognising the importance of the features of an authentic, performance-based approach to instruction that fosters competencies in future teachers in the area of technology integration, the author sought to design this pre-service teacher education course in such a way that met the needs of future teachers in the 21st

century. The focus of this course was to prepare future teachers to support literacy development in early childhood students. The goal of this project was to assist students in the course with developing competence in the area of lesson plan design and technology integration. In an effort to make the learning meaningful and authentic, the instructor required students to apply knowledge of course objectives by developing a unit of instruction using Glogster. The program provided students with the opportunity to showcase the lesson plans they created in the form of an electronic portfolio using a web-based program. Ultimately students were supported in developing a philosophy for instruction that integrated the use of authentic, performance-based opportunities for developing competence with the course objectives as well as technology integration. Doing so created a setting in which these important components of instruction were modelled by the instructor as a means of demonstrating instructional practices for the future teachers enrolled in this course.

This project was an important opportunity to promote technology literacy and the instructional practices students acquire in teacher education through pedagogical practices that seek to integrate authentic, performance-based opportunities for fostering technology literacy in future teachers. Using this model, technology literacy was fostered in future teachers as well as important pedagogical practice that included the use of technology in the teaching and learning process. This was accomplished through the integration of technology tools in the lesson plans created by future teachers. This paper discussed a project in which the design of a pre-service teacher education course focused on the development of technology literacy and the instructional practices students acquired in teacher education through pedagogical practices that integrated authentic, performance-based opportunities for fostering technology literacy in future teachers. Using this model, the instructor successfully supported technology literacy in students and impacted future teachers' pedagogical practice to include the integration of these practices in lesson plan development.

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