The Impact of Authentic Learning Exercises On Pre-service Teachers' Motivational Beliefs towards Technology Integration

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ABSTRACT

A quasi-experimental study explored the impact of authentic learning exercises on preservice teachers' motivational beliefs and intentions to integrate technology, as well as the ability of those beliefs to predict intentions. A questionnaire was used to assess 104 preservice teachers' expectancy-value related motivational beliefs, namely intrinsic and extrinsic goal orientations, task value, self-efficacy, and control of learning. Results indicated authentic learning exercises might have enhanced motivational beliefs, particularly self-efficacy and intrinsic goal-orientation. Also, motivational beliefs predicted intentions to integrate, with task value predicting significantly.

Keywords: *Authentic Learning, Motivation, Pre-Service Teachers, Task Value, Technology Integration*

INTRODUCTION

Despite the availability of technology afforded to schools, many teachers ineffectively integrate or do not integrate technology (Harris, Mishra, & Kohler, 2009). In part, lack of integration may be due to deficiencies in professional preparation (Haydn & Barton, 2006; Lawless & Pellegrino, 2007). Most teacher education programs are not constructed to influence preservice teachers' beliefs about technology (Kay, 2006). Programs might only include one designated educational technology course and other professional preparation courses may offer little to no experience with making technology integration decisions (Haydn & Barton, 2006). Consequently, unless a preservice teacher is self-motivated to learn how to integrate technology, he or she is unlikely to do so in a future classroom (Kim & Keller, 2011; Smarkola, 2011).

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Knowing professional preparation plays an important role in whether or not preservice teachers will use technology in future classrooms (Chai, Koh, & Tsai, 2010; Haydn & Barton, 2006; Lawless & Pellegrino, 2007), there is value in uncovering preservice teachers' existing beliefs regarding technology integration, the predictive relationship of those beliefs with technology integration, and the types of learning experiences that influence beliefs and intentions (Kay, 2006). More specifically, understanding preservice teachers' expectancy-value related motivational beliefs towards technology integration and their intentions to integrate could help teacher educators design better professional preparation that hones in on activities that support future technology integration.

This quasi-experimental study sought to uncover preservice teachers' expectancy-value beliefs (specifically intrinsic goal orientation, extrinsic goal orientation, task value, control of learning and self-efficacy) towards technology integration, the impact of authentic learning exercises on those beliefs and intentions, and the predictive relationship between those beliefs and intention. The purpose of the authentic exercises was to provide preservice teachers with the opportunity to practice making technology integration decisions similar to in-service teachers. The driving idea was these types of exercises might positively influence beliefs, and consequently intentions, by way of helping preservice teachers develop an early teaching schema that includes technology.

THEORETICAL BACKGROUND

In this background section, the authors provide an overview of motivation, as defined and assessed in this study. Next, a case for intention as an estimate of future behavior is made. Finally, how authentic learning exercises, as an instructional strategy, are used to influence preservice teachers' motivational beliefs and intentions is explained. The research questions follow this discussion.

MOTIVATION AND TECHNOLOGY INTEGRATION

Without sufficient motivation, it is unlikely preservice teachers will put forth effort to learn and later use technology in their future classroom (Kim & Keller, 2011; Smarkola, 2011). Brophy (1999) stated, "Motivation is a theoretical concept used to explain the initiation, direction, intensity, and persistence of behavior, especially goal-directed behavior" (p. 2). The multi-dimensionality of motivation as expressed in this definition suggests a single variable may not be sufficient to describe one's beliefs about technology integration. In this study, preservice teachers' motivation to integrate technology was assessed via multiple dimensions, specifically intrinsic and extrinsic goal orientation, task value, control of learning beliefs, and self-efficacy. Collectively, these five dimensions are entrenched in McKeachie, Pintrich, Lin, and Smith's (1986) motivation and learning strategies taxonomy. Their taxonomy is rooted in expectancy-value theory, a theory that postulates the primary measureable outcome of motivation is effort, and task value and success expectancy are necessary preconditions (Fishbein & Ajzen, 1975).

The motivation and learning strategies taxonomy suggests motivation is *not* a static trait, but rather a dynamic, contextually-bound construct mediated by value beliefs (i.e., intrinsic goal orientation, extrinsic goal orientation, and task value) and expectancy beliefs (i.e., control of learning and self-efficacy) with each belief contributing to motivation in its own way and varying from one situation to the next (Duncan & McKeachie, 2005). According to Pintrich, Smith, Garcia, and McKeachie (1993), *intrinsic goal orientation* concerns the degree to which one performs a task for reasons such as challenge, curiosity, and mastery. In the realm of technology integration, this implies learning how to integrate technology would be a motivating end all to itself. *Extrinsic goal orientation*, in contrast, is a means to an end. One participates to earn a letter grade, award, promotion, or other external recognition. *Task* *value* relates to how interesting, important, or useful a task is perceived. For example, a pre-service teacher might learn to use technology because he/she believes future students will need technology skills to be successful or that the technology tool renders learning more efficient. *Control of learning* refers to believing that effort leads to an identified outcome. If one inherently believes teaching with technology will improve student learning, one would be more inclined to do so. As Lewis and Litchfield (2011) stated, "if students believe they can achieve in a course, then they are more likely to receive a higher final course grade" (p. 461). Therefore, academic achievement may be impacted by student beliefs about their ability. *Self-efficacy* is a self-appraisal of ability and confidence. One is more likely to perform a task when one believes he/she is capable of doing so. Successful performances, such as those embedded into professional preparation, help to develop this belief (Bandura, 1998).

The current study expands on expectancy-value theory in two ways. First, while some expectancy-value beliefs have been studied as correlates of technology integration (Davis, 1993; Smarkola, 2011; Taylor & Todd, 1995; Teo, 2011), the five dimensions as they appear together in the motivation and learning strategies taxonomy have not. For example, Davis' (1993) technology acceptance model investigates only two factors (perceived usefulness and perceived ease of use) with intentions. Taylor and Todd's (1995) decomposed theory of planned behavior investigates the relationship of three factors (attitudes, subjective norm, and perceived behavioral control) with intentions. Though one may argue that intrinsic goal orientation, extrinsic goal orientation, and task value could be collapsed into one factor (e.g., value) and control of learning and self-efficacy could be collapsed into another (e.g., expectancy), the authors contend there is value in understanding how each of these beliefs contributes uniquely as well as a whole.

A second way this study expands on expectancy-value theory is the incorporation of the motivation and learning strategies taxonomy's associated measurement tool, the Motivation Strategies for Learning Questionnaire (Pintrich et al., 1993), as a means of predicting intentions to integrate. Previously this tool has been used in studies related to motivation and learning strategies in technology-enhanced environments (Lewis & Litchfield, 2011), but it has not been used to measure motivational beliefs to integrate technology or to predict behavioral intentions (e.g., intentions to integrate technology in one's future classroom). Given the complexity of motivation as depicted in the motivation and learning strategies taxonomy, a multi-dimensional tool such as the Motivation Strategies for Learning Questionnaire seems appropriate for the current study.

INTENTION AND MOTIVATION

While intention does not guarantee future behavior, well-grounded research has established it as a reliable predictor. Most notable among this research is the theory of reasoned action (Fishbein & Ajzen, 1975), the theory of planned behavior (Ajzen, 1985), and the integrative model of behavioral prediction (Fishbein, 2000). Moreover, research related to these theories has found intention to be a predictor of future technology integration (Salleh & Albion, 2004; Venkatesh, Morris, Davis, & Davis, 2003). Knowing which factors best predict preservice teachers' intentions to integrate technology could provide useful information to professional preparation programs seeking to design learning experiences that influence preservice teachers (Lawless & Pellegrino, 2007). In this way, evaluating motivational beliefs and studying their relationship with intention to integrate technology is like conducting a needs assessment to better personalize preservice teachers' professional preparation. In this investigation, the researchers sought to identify those constructs that most greatly predicted intention, and to influence those constructs, as well as intentions, by way of authentic learning.

AUTHENTIC LEARNING

With the exception of clinical observation and student teaching, most preservice teachers' professional preparation lacks the contextual learning experiences afforded to in-service teachers whose technology decisions are situated in actual classroom experiences (Angeli & Valanides, 2009). For professional preparation programs, the goal should be getting preservice teachers to view technology as a pedagogical tool to improve learning or to change how learning occurs (Downes et al., 2001). Per Downes et al. (2001), the key is not viewing technology as a content area, but rather viewing it as a pedagogical tool that improves learning while leaving the content intact. To accomplish this, preservice teachers need regular practice making connections between technological and pedagogical knowledge (Chai et al., 2010; Ertmer, 2005). Authentic learning exercises embedded into pedagogical methods courses can facilitate this connection (Kay, 2007).

There is no singular criterion that makes a learning activity authentic, but rather, it is a collection of characteristics. Via an extensive review of the literature on authentic learning and related concepts, Herrington and Oliver (2000) have established criteria to describe authentic learning.

These characteristics included:

- Have real world significance,
- Be ill-defined and require learners to define tasks and sub-tasks needed to complete the activity,
- Be complex tasks to be investigated over a sustained period of time,
- Provide learners with the opportunity to examine the task from different perspectives, using a variety of resources,
- Provide the opportunity to collaborate,
- Provide the opportunity to reflect,
- Be integrated and applied across different subject areas and beyond domain-specific outcomes,
- Be seamlessly integrated with assessment,
- Create polished products valuable in their own right, and
- Allow for competing solutions and diversity of outcomes.

Summarized, authentic learning is a multidisciplinary, pedagogical approach that allows learners, under the guidance of their instructors, to explore, discuss, and meaningfully construct concepts and relationships in the context of "real" problems and projects (Donavan, Bransford, & Pellegrino, 1999).

Authentic learning has been identified as an effective instructional strategy because it requires learners to make connections to existing knowledge and to explore new knowledge deeply in context (Lombardi, 2007). The contextual nature of the authentic learning experiences promotes deeper learning because of their associations with a setting, activities, and people (Lombardi, 2007). Per seminal research conducted by Resnick (1987), these experiences bridge the gap between theoretical learning and real-life application. This could be the same bridge Chai et al. (2010) described as being needed between technology and pedagogy. A few technology-specific, authentic learning studies reveal this may be true. For example, Kurz and Middleton (2006) found providing preservice teachers with opportunities to practice and reflect on the pedagogical uses of a software program not only led to more positive beliefs about the technology, but also more skillful insight into its constraints and affordances. Pope, Hare, and Howard (2002) found exposure to technology integration in the context of learning about pedagogy had a direct impact on preservice teachers' efficacy and use of technology during student teaching. Similarly, Kay (2007) found having preservice teachers replicate technology integration tasks performed by classroom teachers was a significant predictor of preservice teachers' technology use during student teaching. These studies demonstrate that authentic learning exercises may be a means to bridge the contextual gap between technology and pedagogy, and to influence preservice teachers' motivational intentions to integrate.

AUTHENTIC LEARNING AND MOTIVATION

The current study proposed authentic learning exercises would improve preservice teachers' motivation to replicate those efforts in their future classroom. Research shows when preservice teachers are provided with authentic learning tasks (i.e., assuming the role of a teacher designing of instruction), they demonstrate higher levels of motivation (Hill, 2007) and are more likely to integrate technology into student teaching (Kay, 2007). Such would be the case of a preservice teacher assigned learning tasks during professional preparation that he or she would eventually perform in a future classroom. Exercises might include designing a technology-integrated curriculum unit and/or implementing technology-integrated lessons with classmates as practice. During student teaching, authentic learning exercises would include implementing technology-integrated lessons with actual students. These kinds of exercises would require the preservice teacher to prepare for and reflect on the tasks needed to successfully implement the lesson, as well as to evaluate the impact of the lesson on student learning. The underlying intention of these activities would be to foster the potentially relevant motivational beliefs preservice teachers need to become future technology integrators.

RESEARCH QUESTIONS

The purpose of this study was to investigate the impact of authentic learning exercises on preservice teachers' motivational beliefs and intentions, and how motivational beliefs predict intention.

The following research questions were asked:

RQ1: Do authentic learning exercises impact preservice teachers' motivational beliefs (measured as intrinsic goal orientation, extrinsic goal orientation, task value, control of learning, and self-efficacy) and intention to integrate technology to enhance student learning?

RQ2: Do preservice teachers' motivational beliefs predict intentions to integrate technology to enhance student learning?

In this way, motivational beliefs acted as predictor variables; however, they also were studied as dependent variables.

METHODS

Context

The context of this study comprised four sections of the lead researcher's *Health Education in the Middle and High Schools* course during the 2011-2013 academic years at a university in the Midwest region of the United States. The course was a 3-credit, undergraduate level, required methods course for preservice teachers working towards a health education endorsement. While health education was the content matter, development of curriculum and instruction skills was the primary course goal.

Study Design

The study population was a sample of convenience, and randomization did not occur. Pre- and post-online assessments took place during Weeks 4 and 13 of the 15-week long semester. The study design is depicted in Table 1. To maintain anonymity, names of participants were not associated with their responses. Rather, pre- and post-responses were matched via a coded first question, the participant's former elementary school name, and the name of the street they lived on in third grade. Participants were given the option to participate in the study by completing a pre- and post-assessment or to complete an alternative assignment that would take approximately the same length of time. All students (n=104) chose to participate. To avoid potential bias resulting from the researcher also

Table 1. Research design

Week 4	Week 5-12		Week 13
Motivational beliefs and intentions pre-assessment	Authentic learning experiences with technology integration		Motivational beliefs and intentions post-assessment
	Curriculum unit and technology integrated lesson plans	Lesson presentations	

being the course instructor, an Institutional Review Board (IRB) trained colleague read a description of the study and provided students with a link to the online assessment when the researcher was out of the room.

Participants

With IRB approval, participants were 104 preservice teachers working towards an endorsement in either health or physical education. Sixty participants were male and 44 were female. Ages of participants ranged from 20-42 years old, with 84.9% being 20-27 years old. Education levels were as follows: 17.9% high school diploma, 67% associate's degree, 11% bachelor's degree, and 1.8% masters degree. In light of their existing education, and with the exception of one student who indicated some prior training, all participants indicated they were novices in developing curriculum and instruction that integrated technology.

TREATMENT: AUTHENTIC LEARNING EXERCISES

The authentic learning exercises consisted of preservice teachers developing a 3-4 week long curriculum unit and 4 complete lesson plans in teams of 3-4 students. They also delivered one of the lesson plans to classmates as if the classmates were 6^{th}-12^{th} grade students. These exercises were completed in stages over eight weeks of the course. The exercises are described in detail below.

Technology Integrated Curriculum Units

In the fourth week of the course, preservice teachers formed teams to develop a curriculum unit for a selected health education content area (e.g., substance use and abuse, nutrition, mental health, reproductive health). This curriculum unit was rooted in the Backwards Design curriculum and instruction model (Wiggins & McTighe, 2005). The Backwards Design model is a 3-stage, conceptual framework that has been demonstrated to lead to higher levels of student performance (Kelting-Gibson, 2005). In Stage 1, the developer identifies the overall goal of the unit, desired student learning outcomes (i.e., objectives), and state and/or national learning standards with which the learning outcomes align. In Stage 2, the instructor determines how they would assess student achievement of the objectives and develops appropriate assessment tools. In Stage 3, the instructor identifies learning activities that will ensure student achievement of the objectives and organizes these learning activities sequentially into a planning calendar.

The preservice teachers completed all three stages of the Backwards Design model to develop a 3-4 weeklong curriculum unit in which objectives, assessments, and learning activities could be implemented in future classroom setting. Due to the brevity of the course, only brief descriptions of proposed daily learning activities, versus 3-4 weeks' worth of complete lesson plans, were required in the Stage 3 planning calendar. It was after completion of the Stage 3 planning calendar that the researcher interrupted the unit project to implement the lesson plan authentic learning exercises. After completing the lesson plan authentic learning exercises, the preservice teachers were asked to return to Stage 3 of their curriculum unit and identify which of their proposed daily learning activities could be enhanced with technology and to indicate this in the learning activity descriptions. The last step of the unit project required the preservice teachers to construct a cover page and a summary describing their unit. In this summary, they were required to describe how technology was used strategically to enhance student learning and cite specific examples.

Technology-Integrated Lesson Plans

Over a 2-week period, preservice teachers practiced using four different types of technology tools and designed four technology-integrated lessons that could be included into their curriculum unit for the purpose of helping students to achieve the unit's learning objectives. Specifically, these four lessons were intended to expand on selected learning activities described in Stage 3 of their curriculum unit.

The four different types of technology tools included:

- Idea/concept mapping and other information visualization tools
- Audiovisual tools
- Online surveys and other information gathering tools
- Blogging, wikis, websites, and other information sharing tools

To guide development of the assignments, each preservice teacher was provided a lesson plan template which required him or her to provide the following items: (1) a summary of the learning activity; (2) a description of how the technology tool was integrated; (3) desired student learning outcomes; (4) step-by-step directions for both the teacher and student, with particular attention to ensuring students would be able to successfully and independently use the technology tool; and (5) grading criteria for student performance. preservice teachers were also asked to develop a prototype of completed student work. The purpose behind requiring the prototype was to get preservice teachers thinking about the directions future students would need to successfully complete the assigned task and what difficulties those students might encounter.

Delivery and Reflection on Technology-Integrated Lessons

After receiving feedback from the researcher on the four technology-integrated lessons, preservice teachers selected and delivered one of the lessons to their classmates as if classmates were 6^{th}-12^{th} grade students. (Note: The classroom in which these lessons were implemented was a computer lab, thus affording each student a computer. Also a projector and screen was available to the preservice teachers acting as instructors). After implementation, both the presenters and the audience discussed the strengths and weaknesses of the presentation. Finally, preservice teachers were required to submit a reflection about what aspects of the lesson *they* felt went well and what changes they would make for future implementation. The purpose of this latter activity was to engage preservice teachers in the thought process of carefully considering factors that make for a successful technology-integrated learning activity.

Overall, the intention of these authentic learning exercises was to provide preservice teachers with ill-defined situations to practice making the types of instructional decisions made by a classroom teacher who regards technology as a tool to enhance learning and/or to help students achieve the desired learning outcomes. Moreover, preservice teachers were able to perform these activities in collaboration with others, utilizing assistance from peers and the instructor, and with opportunities for reflective practice. Each of these characteristics aligns with the description of authentic learning as depicted by Herrington and Oliver (2000).

INSTRUMENTATION

To study the research questions, a pre- and post-assessment was administered online to course sections prior to the first authentic learning experience (approximately the beginning of week 4) and after the last learning experience (approximately week 13). The pre- and post-assessments were identical and were divided into three parts. In part 1, participants rated their agreement with statements about their motivational beliefs. In part 2, they rated their intention to integrate technology in their future classroom. In part 3, participants provided demographic data including age, gender, and major. Parts 1 and 2 are described next.

Part 1: Motivational Beliefs

Motivational beliefs about integrating technology were measured using a modified version of Pintrich et al. (1993) Motivated Strategies for Learning Questionnaire (MSLQ). To reflect the object of interest, a common phrase in the MSLQ needed rewording. Specifically, the phrase "*to learn the material in the course*" was replaced with "*to use technology as a tool to enhance student learning.*" For example, the question, "It is important for me *to learn the material in the course*" was replaced with, "It is important for me *to use technology as a tool to enhance student learning*."

Five subscales from the MSLQ were used in this study:

1. A 3-item *intrinsic goal orientation* scale measured the degree to which using technology to enhance student learning is due to challenge, curiosity, and mastery (α = .78)
2. A 3-item *extrinsic goal orientation* scale measured the degree to which using technology to enhance student learning is to obtain a job, get a good grade in the course, or demonstrate ability to family, friends, and potential employers (α = .74).
3. A 4-item *task value* scale measured the degree to which using technology to enhance student learning is interesting, valuable, and useful (α = .89).
4. A 4-item *control of learning beliefs* scale measured the degree to which being able to use technology to enhance student learning is based on effort (α = .79)
5. A 4-item *self-efficacy* scale measured expectancy for success and confidence in using technology to enhance student learning (α = .87).

All 18 questions were based on a 7-point scale. Cronbach's α values are noted above with each item's description.

Part 2: Intention to Use Technology

Intention to integrate technology was measured using three items that reflected the intention subscale of Fishbein (2000) integrative model of predictive behavior. This model, an extension of the theory of reasoned behavior (Ajzen, 1985) and social cognitive theory (Bandura, 1997), assesses the influence of attitudes, norms, and self-efficacy on intention to perform a behavior. The model purports that skills/ability work with intention to influence behavior. Because intention to integrate technology was perceived to be a behavior that could be influenced by motivation and skills (such as those needed to integrate technology) this subscale was ideal.

The 3 items used to measure intention to integrate technology were: (1) I plan to use technology as a tool to enhance student learning, (2) I will use technology as a tool to enhance student learning, and (3) I intend to put effort into using technology as a tool to enhance student learning. Questions were based on a 7-point scale. A single intention variable was created by computing a mean score for all three items. Cronbach's α was determined to be .83.

RESULTS

The Statistical Package for Social Science (SPSS) Version 20 was used to analyze the data. To analyze research question one, a paired samples t-test, also referred to as a repeated-measures test, was used to calculate differences between pre-test and post-test scores. Means and standard deviations were also calculated. To identify the size of the treatment effect, eta squared was calculated for the five motivational beliefs variables and single intention to integrate (IIT) variable. To analyze research question two, pre- and post-test scores were averaged to develop composite intrinsic goal orientation (IGO), extrinsic goal orientation (EGO), task value (TV), control of learning (COL), self-efficacy (SE), and intention to integrate (IIT) scores. Standard multiple regression, using the enter method, was used to assess the ability of these motivational beliefs variables to predict intentions to use technology to improve student learning. Tests for multicollinearity were performed and are reported with the research question two results.

Research Question 1

Do authentic learning exercises influence preservice teachers' motivational beliefs [measured as intrinsic goal orientation (IGO), extrinsic goal orientation (EGO), task value (TV), control of learning (COL), and self-efficacy (SE)] and intentions to integrate technology (IIT) to enhance student learning?

When analyzing research question one, paired-samples t-tests showed a statistically significant increase in all motivational beliefs *except* task value (TV). Based on Cohen's (1988) convention, a .14 eta-squared value indicates a large effect, .06 indicates a medium effect, and .01 indicates a small effect. This means the effect of the authentic learning exercises was large for intrinsic goal orientation (IGO) and self-efficacy (SE), moderate for extrinsic goal orientation and control of learning (COL), and small for task value (TV) and intention to integrate (IIT). In other words, of all the motivational beliefs, the authentic learning seemed to make the greatest impact on intrinsic goal orientation and self-efficacy.

It was possible that the authentic learning exercises did not impact task value because the preservice teachers already held a high regard for integrating technology. A scan of mean scores in Table 2 confirms this idea; task value was rated higher than other motivational beliefs. Also, intentions were next highest. With task value and intentions already high, increasing them more might require some other factor or modification to the authentic learning exercises. Also, the small effect on intentions could be related to the modest change in task value. Results of research question two (discussed later in this section) indicated a potential predictive relationship between motivational beliefs and intention to integrate technology. Particularly, task value predicted the change in intention. So if task value scores were modest, so, too, would be the intentions to integrate.

Research Question 2

Do preservice teachers' motivational beliefs [measured as intrinsic goal orientation (IGO), extrinsic goal orientation (EGO), task value (TV), control of learning (COL), and self-efficacy (SE)] predict intentions to integrate technology (IIT) to enhance student learning?

To answer research question two, average intrinsic goal orientation, extrinsic goal orientation, task-value, self-efficacy, control of learning, and intention variables were calculated by averaging pre- and post-scores. Next, standard multiple regression, via the enter method, was used to assess the ability of motivational beliefs (measured as IGO, EGO, TV, COL, and SE) to predict preservice teachers' intentions to integrate technology (IIT). Multiple regression analysis assumes lack of multicollinearity. Multicollinearity exists when more than two predictors correlate very strongly. When this happens, it creates biased estimates between variables (Pallant, 2010). Collinearity diagnostics were performed and did not reveal violations. In accordance with Pallant (2010), tolerance values were high (above .10) and variance inflation factor (VIF) values were low (below 10), both suggesting the likelihood of multicollinearity was low. Moreover, bivariate correlation values were below .70, therefore

Table 2. Results of paired-samples t-tests for motivational beliefs

	N	Mean	SD	SE	t	Sig.	ES
Pre-IGO	104	4.92	1.35	.12	5.47	.00**	.22
Post-IGO	104	5.70	1.15	.11			
Pre-EGO	104	4.45	1.57	.15	2.90	.00**	.07
Post-EGO	104	4.89	1.36	.13			
Pre-TV	104	6.16	1.08	.11	1.49	.14	.02
Post-TV	104	6.32	.94	.09			
Pre-COL	104	5.44	1.12	.11	2.50	.01**	.06
Post-COL	104	5.72	1.06	.10			
Pre-SE	104	5.49	1.02	.09	3.91	.00**	.13
Post-SE	104	5.83	1.05	.10			
Pre-IIT	104	6.06	1.18	.12	2.01	.05*	.04
Post-IIT	104	6.32	1.05	.10			

Notes:
* Significant at the .05 level
** Significant at the .01 level
IGO = intrinsic goal orientation
EGO = extrinsic goal orientation
TV = task value
COL = control of learning
SE = self-efficacy
IIT = intentions to integrate

omission of variables was not considered (Pallant, 2010). Correlations appear in Table 3; tolerance and VIF values appear in Table 4.

The total variance explained by the model was 73.7%, $F = (5, 98) = 58.59$, $p < .001$. One of the measures was statistically significant, with task value (TV) recording a beta value (beta = .790, $p < .001$). See Figure 1 and Table 4. These results suggest there is a fairly significant relationship between motivational beliefs and intentions to integrate technology into one's future classroom. Moreover, task value plays a key role in the strength of that relationship. Given the relationship between task value and intentions to integrate, this could be why the effect of the authentic learning exercises was modest. In other words, the moderate impact of the authentic learning exercises on task value lead to the modest impact on intentions to integrate.

DISCUSSION

This research expands on expectancy-value theory work in three ways. First, it contributes to the body of literature that looks at expectancy-value beliefs as potential correlates of technology integration (e.g. Davis, 1993; Smarkola, 2011; Taylor & Todd, 1995; Teo, 2011). Second, it demonstrates that the motivation and learning strategies taxonomy (McKeachie et al., 1986) is a way to study these relationships. And third, the Motivated Strategies for Learning Questionnaire (Pintrich et al., 1993) is a tool to measure these relationships. Using the motivation and learning strategies taxonomy and associated measurement tool, the researchers found authentic learning exercises have the potential to positively influence preservice teachers' motivational beliefs towards technology integration and a predictive relationship

Table 3. Correlations between motivational beliefs and intentions

	IIT	IGO	EGO	TV	COL	SE
IIT	—	.537**	.010	.858**	.404**	.587**
IGO	.537**	—	.286**	.528**	.318**	.655**
EGO	.010	.286**	—	.079	.071	.211*
TV	.858**	.528**	.079	—	.407**	.617**
COL	.404**	.318**	.071	.407**	—	.517**
SE	.587**	.655**	.211*	.617**	.517**	—

Notes:
** $p < 0.01$ level.
* $p < 0.05$ level.
IIT = intentions to integrate
IGO = intrinsic goal orientation
EGO = extrinsic goal orientation
TV = task value
COL = control of learning
SE = self-efficacy

might exist between motivational beliefs and intentions to integrate.

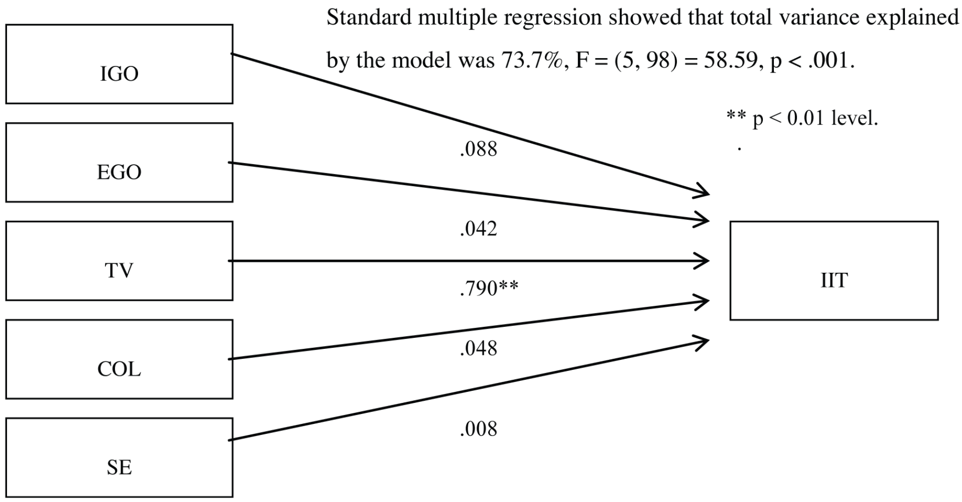
Regarding the impact of authentic learning exercises on the preservice teachers' motivational beliefs, there was a significant improvement in intrinsic goal orientation, extrinsic goal orientation, control of learning, and self-efficacy, as well as intentions. The impact was greatest for intrinsic goal orientation and self-efficacy. Although results from research question two indicate that self-efficacy was not a significant predictor of intention, the positive change from pre- to post-assessment is still valuable. According to Bandura (1997, 1998), self-efficacy has to be positively related to persistence even in the face of difficulties. Such persistence could be deemed beneficial to a future or practicing teacher who is learning to navigate new technologies and ways to integrate them. Similarly, although intrinsic goal orienta-

Table 4. Linear regression results and collinearity diagnostics

	Unstandardized					Collinearity	
	B	SE(*B*)	β	*t*	*p*	Tolerance	VIF
IGO	.08	.06	.09	1.23	.220	.82	1.22
EGO	.03	.04	.04	.76	.449	.52	1.93
TV	.84	.07	.79	11.26	.000	.72	1.39
COL	.05	.06	.05	.80	.425	.40	2.50
SE	.01	.08	.01	.10	.924	.82	1.22

Notes:
IGO = intrinsic goal orientation
EGO = extrinsic goal orientation
TV = task value
COL = control of learning
SE = self-efficacy

Figure 1. Results of standard regression: ability of motivational beliefs to predict intention



tion did not emerge in research question two as a significant predictor of intention to integrate, there is value in its improvement. According to Pintrich et al. (1993), intrinsic goal orientation is the degree to which one performs a task for reasons such as challenge, curiosity, and mastery. Like self-efficacy, such a trait could also be deemed an asset for a future or practicing teacher. As new technologies emerge daily, one must continually work to keep abreast of such developments and to dedicate times towards uncovering their potential. Possessing an intrinsic goal orientation towards technology integration would support such an act.

So, how did the authentic learning exercises come to positively impact self-efficacy and intrinsic goal orientation? According to Linnenbrink and Pintrich (2002), self-efficacy is facilitated by providing opportunities for learners to experience success within their range of capabilities and then by gradually developing new skills and capabilities. Pope, Hare, and Howard's (2002) research validate this finding. They found exposure to technology, in the context of pedagogical practice, had a direct impact on preservice teachers' efficacy. Also, Lombardi (2007) indicates that authentic learning awakens in learners the confidence to act. In the current study, preservice teachers were provided with the opportunity to practice technology-integrated decision-making in both small and large contexts (i.e., whole curriculum units or individual lesson plans) with support and feedback from peers and their instructor. Also, the preservice teachers worked in teams to develop technology-integrated curriculum units and/or individual lesson plans that could be implemented in a real classroom setting. Next, they delivered a technology-integrated lesson to their classmates as a practice audience and reflected on best ways to implement the lesson again in the future. Prior to these lesson implementations, the preservice teachers were given the time to practice using different technologies while also considering how those technologies could help future students achieve learning objectives. The underlying intention of such exercises was for the preservice teachers to connect new experiences to existing knowledge, to understand how technology can support teaching and learning, and to foster the ability to do so. These activities allowed preservice teachers to work towards mastery of new skills, a precursor to self-efficacy as found by Bandura (1997, 1998), and in an environment that encouraged exploring technologies affordances with the support and encouragement of their peers and instructor.

Regarding the improvement in intrinsic goal orientation, the preservice teachers may have found the authentic learning exercises pleasurable. According to Deci and Ryan (1985), intrinsic motivation is highest when performing tasks that are personally meaningful (e.g., such as attainment value) and enjoyable. Moreover, they indicated this kind of motivation could sustain passion, creativity, and sustained effort towards completing a task. In this study, the intrinsic goal orientation assessment items related to challenge, curiosity, and mastery. This means that the authentic learning exercises positively stimulated preservice teachers to learn more about technology integration for reasons external to their intended use, the improvement of future student learning. Even though intrinsic goal orientation (or intrinsic motivation as written in some literature) is a self-centered reason for integrating technology, there is implicit value in its stimulation. Research shows that intrinsic motivation is a positive force in sustained learner engagement (Eccles & Wigfield, 2002). Given the sometimes complex design of instructional and learning technologies, sustained learner engagement could be considered vital in motivating a preservice teacher or teacher to persist in learning new technologies as they emerge. In this regard, providing preservice teachers a supportive, well-structured, rewarding environment to learn and apply new technologies could be deemed imperative.

As for the ability of motivational beliefs to predict preservice teachers' intentions to integrate technology, the model significantly predicted those intentions. To an extent, this finding is consistent with Davis (1993), Smarkola, (2011), and Taylor and Todd (1995) who found expectancy-value related factors to be precursors to intentions to integrate technology. However, this study, compared to the previous research, differed in that only one of the motivational beliefs, task value, predicted significantly. According to Eccles and Wigfield (2002) task value is the extent to which learners find a task interesting, important, and/or useful. This means the degree to which preservice teachers in this study found integrating technology to be interesting, important, or useful predicted the degree to which preservice teachers intended to become future technology integrators. Said differently, task value plays a largely significant role in whether or not a preservice teacher plans to put effort into using technology to improve student learning in his or her future classroom.

According to Eccles and Wigfield (2002), task value in academic settings is influenced by the following factors: (1) the enjoyment one expects to experience while engaging in the task—intrinsic interest; (2) the extent to which engaging in the task is consistent with one's self-image or identity—attainment value; (3) the value of the task for facilitating one's long range goals or in helping one obtain immediate or long range external rewards—utility value; and (4) the perceived cost of engaging in the activity. It should be noted, however, that that factor #1, intrinsic interest, and factor #3, utility value, could be likened to intrinsic and extrinsic goal orientations, which were *not* strong predictors of intention to integrate in the current study. In general, this list of factors coupled with the results from the current study implies teacher educators must keep abreast not only of the utilitarian value of integrating technology, but they must also take steps to identify what makes a given preservice teacher value technology. From an efficiency standpoint, it would be difficult to assess and tailor instruction to meet the needs of each preservice teacher, but definitely plausible to host classroom or online discussions to uncover the larger reasons why integrating technology to improve student learning is valued.

Ironically, the authentic learning exercises in this study *did not* significantly impact task value. As mentioned in the results, this could be because preservice teachers already held high regard for technology integration. Haydn and Barton (2006) found the majority of teachers *did* have positive views about integrating technology; they just did not have the time to learn how to do it. If time is a barrier, teacher educators could help preservice teachers develop a protocol that facilitates quick learning of new technologies and how best to integrate them. Activities fostering such a repertoire might look like the technology-integrated student assignments in this study. The preservice teachers were given time to "play" with a variety of technology tools and to consider how the tools could make teaching more effective and engaging. In this context, the preservice teachers build the confidence and savvy to navigate new technologies and develop the speed required to integrate them efficiently into instruction. Kurz and Middleton (2006) found these types of activities lead to more skillful insight about technologies' affordances. If one does not witness the potential that technology integration has for improved student learning, then one might not hold technology at the esteemed level required to become a regular user.

LIMITATIONS

There are at least three limitations of this study. First, it did not include a control group. Use of a control group would strengthen the experimental design and provide more insight into the influence of the learning activities. Second, the study group was a sample of convenience, thus increasing the potential for bias. To reduce bias, the researcher had a colleague administer the assessment. Also, the researcher did not look at results until after the study was completed to reduce the potential for changing the instructional techniques mid-study. Third, the study analyzed the relationship between motivational beliefs and intentions. While intentions can be a strong predictor of behavior, they do not guarantee it. Future studies should include a longitudinal investigation into preservice teachers' future technology integration practices. Despite these limitations, this study offers valuable insight into preservice teachers' motivational beliefs about technology integration and the types of experiences that might influence them. Assessments that include open-ended questions, interviews, and focus groups could help to reveal such details.

CONCLUSION

Teo (2011) reminded us that historically "developers and procurers of technological resources could rely on authority to ensure that technology was used" (p. 1). Such is not the case anymore. The decision to integrate technology ultimately depends on one's beliefs about technology (Ertmer, 2005) and it would be wise for professional preparation programs to pay heed to those beliefs. According to Fishbein and Cappella (2006), "The more one knows about the factors that underlie the performance (or nonperformance) of any given behavior, the more likely it is that one can design a successful intervention to change or reinforce that behavior" (p. 216).

Expectancy-value theory indicates value and expectancy are associated with willingness to take on challenging tasks (Bandura, 1997). If a preservice teacher values technology integration, then his or her intentions should be more likely to take on the potential challenges associated with integration. Therefore, there is value in future research that identifies methods by which to augment or support existing preservice teachers' task value beliefs. This study affirms this contention in revealing that preservice teachers' task value plays a fairly significant role in whether or not a preservice teacher intends to integrate technology in his or her future classroom. Even though intentions do not guarantee behavior, past research shows a strong predictive relationship (Ajzen, 1985; Salleh & Albion, 2004; Venkatesh et al., 2003).

This study also affirms that authentic learning exercises had a significant, positive influence on some motivational beliefs, of which most notable were intrinsic motivation and self-efficacy. Though the impact on task value was not significant, the researchers contend it is important to continue researching ways authentic learning exercises could positively influence task value. This belief is supported by the motivation and learning strategies taxonomy that suggests motivation is *not* a static trait, but rather a dynamic, contextually-bound construct mediated by value and expectancy beliefs which vary from one situation to the next (Duncan & McKeachie, 2005).

By understanding preservice teachers' beliefs about technology integration and the kinds of learning activities that positively support those beliefs, professional programs can better train and motivate preservice teachers to deliver instruction that builds the 21st century skills K-12 students will need to be successful. Ultimately, the goal is for preservice teachers to enter prospective classrooms with positive expectancy-value beliefs so they are motivated to use technology to enhance student learning. Further research into this domain will not only benefit preservice teachers, but also their future students.

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