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Wendy Loewenstein

University of Nebraska, Omaha, wloewenstein@unomaha.edu

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EXPLORING THE EFFECTIVENESS OF THE GRADUAL RELEASE OF RESPONSIBILITY ON GRADUATE TEACHER EDUCATION CANDIDATES' SELF-EFFICACY WITH IPADS

Wendy Loewenstein
University of Nebraska at Omaha

***Abstract:** Many educational institutions struggle to keep up with technological innovations in order to engage students and prepare them to be competitive in the workforce. Those given the charge to prepare future teachers (undergraduate students) and continue the education of current teachers (graduate students) feel this pressure even more, because of the impact teacher colleges has on teacher quality in K-12 schools. Technology integration is an overwhelming task for educational leaders that extends beyond which technological device to purchase. Consideration must be spent on what pedagogical approaches are effective when implementing technology. Due to the increase of popularity of mobile technology, this study examines barriers to iPad integration in higher education and how the gradual release of responsibility method of instruction can be used to increase graduate teacher candidates' self-efficacy with iPads.*

Introduction

Due to the rapid evolution of technology and various systems barriers, classrooms around the country are struggling to reflect the 21st century world, and conceptualizing the potential of future technologies. As a result, schools have struggled to leverage technology in order to engage the digital learners who fill the seats in classrooms. The mission statement for the Partnership for 21st Century Skills (2013) acknowledges that, "There is a profound gap between the knowledge and skills most students learn in school and the knowledge and skills they need in typical 21st century communities and workplaces" (para. 3). Being in the second decade of the 21st century, this gap includes some fundamental disconnects between students and the institutions that teach them. Today's students do not know a world without the Internet. Lecturing does not provide quick access to information to students who have "Googled" their way through childhood. Sheninger (2014) articulates this concern, "The learning styles of these active, digital learners conflict with traditional teaching styles and preferences of educators" (p. 15). By acknowledging this gap and accommodating to students' learning styles, schools can start working towards creating 21st century learning environments that promote critical thinking, communication, collaboration, and creativity. Teacher education colleges are in a position to prepare future and current teachers on how to create such environments. Unfortunately, barriers to technology integration still exist. The awareness of these barriers and efforts to overcome these are imperative, because, even in the mid-twentieth century Dewey (1944) warned, "If we teach today as we did yesterday, we rob our children of tomorrow" (p. 167).

Barriers to Technology Integration

Barriers to technology integration are similar to barriers to any change initiative. These barriers are the extrinsic and intrinsic factors that affect change implementation. Extrinsic barriers to technology integration are considered first-order barriers and include a lack of access, insufficient time, and inadequate support. In contrast, second-order barriers are intrinsic and include beliefs and attitudes about technology, teaching, and classroom practices. While providing access and increased support can eliminate many first-order barriers, second-order barriers involve confronting deeply rooted beliefs and practices. The difficult aspect of second-order barriers are that they are not tangible and difficult to measure. Researchers for the Apple Classrooms of Tomorrow (Sandholtz, Ringstaff, & Dwyer, 1990) noted how the reduction or elimination of first-order barriers allowed second-order barriers or issues to surface: "In many ways, the massive introduction of technology forced teachers back into a first-year-teacher mode, starting all over again with issues of classroom management, discipline, role definition, and

lesson development” (p. xvi). The feeling of discomfort and uneasiness (second-order barrier) that access to technology (first-order barrier) evokes makes it apparent that both barriers need to be addressed simultaneously in order for effective technology integration to occur in classrooms. Unfortunately, most school leaders focus solely on the procurement of devices and expect effective technology integration to follow. This is made evident in the increased access to and money spent on technology in education. More recently, the focus on education has been on mobile technology.

Mobile Technology Access

At one time, access to technology was a major, first-order barrier that educators had to overcome in order to integrate technology in the classroom. In the 21st Century, teachers and students have access to technology more than they ever have before. According to a study released by Nielsen (2013), 70% of teens (ages 13-17) own a smartphone. For a frame of reference on the rapid increase of smartphone adoption amongst this age group, 58% of American teens owned a smartphone in 2012, and 36% in 2011 (Kerr, 2012). Research from the same study indicated that 55% of mobile phone users own a smart phone. Mobile access to the Internet and information is now readily available to users and is in their pockets everyday. In addition to the popularity of smartphones is the increase in sales of tablets.

The New Media Consortium (2013) reported that, “the iPad sold more than 85 million units in 2013; of these 85 million, 4.5 million iPads have been sold to United States educational institutions” (p. 15). The affordability of tablets versus laptops may be why education leaders are deciding on tablets for their districts. According to the J.D. Power & Associates, U.S. Tablet Satisfaction Study (2014), the average purchase price of a tablet has decreased by \$53 (\$337 in 2014 vs. \$390 in 2012). The decrease in cost cannot be ignored by the education sector. Especially when this year alone, schools are projected to spend almost \$10 billion on education technology, a \$240-million increase from 2013 (Barshay, 2014).

However, it is important to note that just because students have access to technology doesn’t necessarily mean that they know how to utilize it for learning. Sheninger (2014) asserts that this is the responsibility of schools. Educators must model and facilitate the proper use of technology as a learning tool. It is apparent that the first-order barrier of access to technology is becoming less of a barrier. As with any other technological advances, McCombs and Liu (2011) state that the impact of tablets on education is dependent upon teachers’ comfort level and confidence (second-order barriers) with the device, which will influence their pedagogical decisions and integration of this technology in classrooms.

Teacher Self-efficacy

Self-efficacy is the second-order barrier that must be confronted for technology integration to occur. Bandura (1997) defines self-efficacy as the belief about one’s capability to learn or perform actions at certain levels. Richardson-Kemp & Yan (2003) expand on this definition and urged that attitudes and beliefs drive a person’s actions. Thus making one’s self-efficacy a predictor of future actions. Pajares (1992) believes that capitalizing on this connection will gain an understanding of teachers’ attitudes and beliefs that could lead to a better understanding of their instructional decisions, classroom practices, and ways of interacting with students. In exploring this construct further, numerous researchers have analyzed teachers’ technology usage and found that their attitudes and beliefs toward technology played a key role (Abbott & Faris, 2000; Ertmer, 1999; Palak, 2005; Richardson-Kemp & Yan, 2003).

Teacher beliefs influence professional practice, which is why confronting these beliefs, is a crucial step for integrating new technologies in the classroom. Bandura (1997) emphasizes that self-efficacy is not based solely on an individual’s skill-level, but on the belief that one can complete a task. Integrating technology requires more than believing one can complete a task. It also requires technological skills and knowledge. This makes self-efficacy a predicament for technology integration, in that if a teacher believes he/she can accomplish technology integration then he/she will attempt it. However, if the teacher does not have the skills to do so, then he/she is not likely to even try it. Based on what is known about self-efficacy and its impact on decision-making, it is clear that effective technology integration professional learning must focus on increasing teachers’ self-efficacy with technology integration. In order to do so, there must be an understanding of how self-efficacy is developed.

Bandura (1986) attributed the development of self-efficacy to four primary sources: vicarious experiences, mastery experiences, social persuasion, and physiological factors. Vicarious experiences occur when an individual observes another individual achieve success in a similar environment, or scenario in which the observer will experience. Putman (2012) emphasizes that a behavior modeling approach can enhance self-efficacy perceptions and performance during teacher training. Therefore, modeling the use of technology using the content and context in which a teacher will utilize the technology would lead to an increase in teacher self-efficacy with technology. Mastery experiences develop self-efficacy by giving a learner the experience of achieving success with a new task or skill. Numerous researchers have proven that the more successful interactions individuals have with a new experience, the more likely they are to develop high self-efficacy (Compeau & Higgins, 1995; Putman, 2012; Tschannen-Moran & Woolfolk Hoy, 2007). Hands-on, guided practice with technology during professional learning is likely to provide a mastery experience with technology during the training, thus a higher likelihood that the teacher would apply technology after training. The next source of self-efficacy is social persuasion. There are many ways to incorporate social persuasion in technology training, the most important being the creation of a learning community. This community should consist of a group of peers who are experiencing the same training who can collaborate and support one another. The last source of self-efficacy is physiological factors. Feelings of anxiety, can affect teachers' levels of self-efficacy with technology. Bandura (1986) argues that individuals sometime interpret their feelings of anxiety to a lack of ability. If a teacher feels anxious when using technology he or she may decide that the reason for the feelings of anxiety is a lack of ability, which lowers the individual's self-efficacy and the likelihood of integration. These four factors need to be considered when delivering mobile technology integration professional learning for teachers.

Teaching Strategies to Increase Teacher Mobile Technology Self-efficacy

While N-Geners assimilate technology because they grew up with it, adults have had to adapt to it, which elicits a much different type of learning process. Tapscott (2009) captures this difference well when he stated: "The assimilation of technology for kids is like breathing-- it's natural, this is not the same for adult learners" (p. 18). This is why technology integration professional learning should meet and challenge teachers at their current level of skill and comfort, so not to intimidate or frustrate them. A scaffolded method of instruction during technology professional development is a method that may accomplish this type of learning environment for adult learners. Scaffolding provides support that changes to match teachers' increasing ability in the skills being taught. An effective method of scaffolded instruction is Pearson and Gallagher's (1983) gradual release of responsibility (GRR). Fisher & Frey (2008) describes the GRR as a method of instruction in which an instructor models a skill, provides guided practice, and gives an opportunity to independently practice and apply the skill. This method of instruction gradually releases new learning from the teacher to the students and is often described as the "*I do, we do, you do*" process. The model, which has been applied to students' literacy learning for over 30 years, (Clark and Graves, 2005; Dole, Brown, & Trathen, 1996; Duffy et al., 1986) has potential for adult learning as well, specifically teacher instruction and professional learning (Carrier, 1980; Sweeney, 2003). It is important to note that the four components of the GRR method of scaffolding embody the four primary sources of self-efficacy (see Figure A). Therefore, the application of the GRR during mobile technology integration professional learning should lead to increased teacher self-efficacy. The four components of GRR are: focus lessons, guided instruction, collaborative learning, and independent work.



Figure A. The four primary sources of self-efficacy aligned to the four components of the Gradual Release of Responsibility method of scaffolding.

Background

The four components of the GRR as applied to technology integration with iPads (See Figure B) contain research-based instructional methods that increase teacher self-efficacy. As the researcher and instructor of the courses in this study, I utilized the GRR whenever introducing a new application to graduate candidates during class sessions. I would explicitly model the use of the iPad application during instruction and then guide candidates through the exploration of the app during an informal formative assessment (this was usually done in collaborative groups). Then candidates would work independently on the application in order to complete a course assessment. This process was repeated throughout the duration of the courses with a variety of different apps and assessments.

Through experiencing the gradual release of responsibility model, candidates learned about iPad integration and the content of the course in a comfortable, supported environment. They experienced iPads as *students* before they would consider how to use them as teachers. This modeling and guidance was valuable for graduate teacher candidates as the goal was for them to be able to emulate these practices in their classrooms in order to meet the needs of *their* 21st century learners in the K-12 environment. The purpose of this study was to determine the effect of the Gradual Release of Responsibility method of instruction on graduate teacher education candidates' efficacy with iPads.

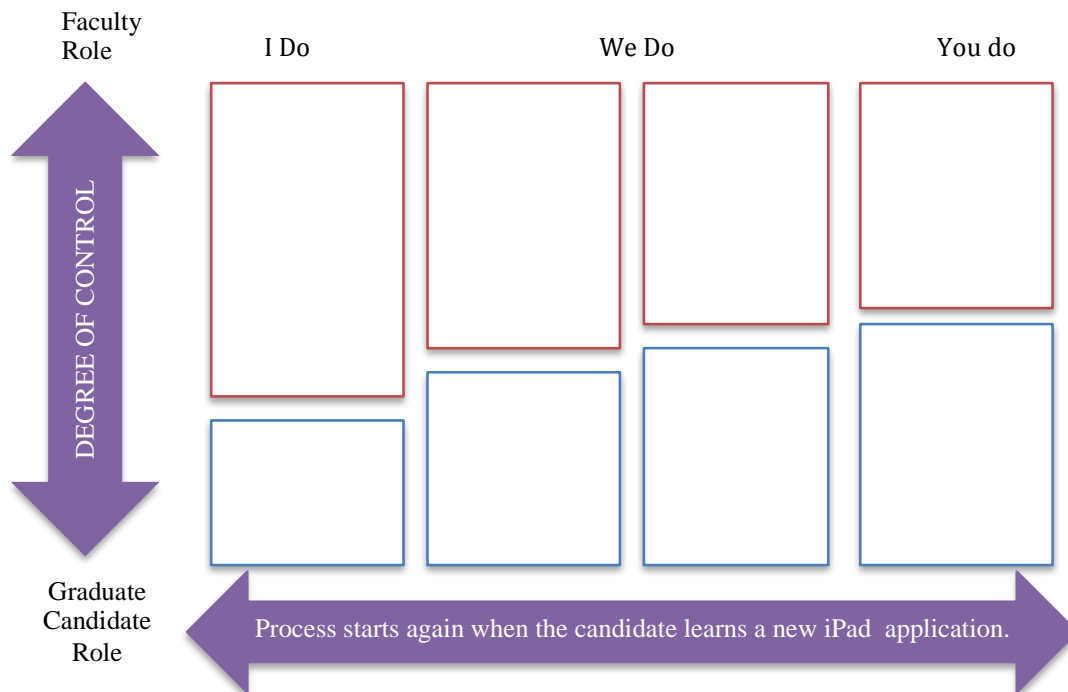


Figure B. The four components of the gradual release of responsibility model applied to iPad integration in the graduate course

Method

A quantitative, pretest-posttest survey was used to measure the significance of the impact of the gradual release of responsibility method of instruction on graduate candidates' self-efficacy with iPads. The following research questions guided this study:

What is graduate candidates' espoused efficacy with iPad integration?

Is there a significant difference between graduate candidates' pre-test and post-test responses on the Mobile Technology Integration Survey regarding their iPad capabilities and strategies (factor 1)?

Is there a significant difference between graduate candidates' pre-test and post-test efficacy levels on the Mobile Technology Integration Survey regarding their external influences of iPad uses (factor 2)?

What impact did the gradual release of responsibility method of instruction have on graduate candidates' total self-efficacy scores on the Mobile Technology Integration Survey?

Participants. Study participants were graduate teacher education candidates in spring and summer children's literature courses that were taught by the researcher. This course is a requirement for the graduate reading specialist Master's program, library science endorsement, and is an elective for the elementary and secondary Master's programs. The sample consisted of in-service teachers from a variety of districts, who teach different grade levels and content areas. This sample was representative of the teacher population based on the diversity of districts, grade level, content areas, and experience of the candidates enrolled in the courses. In addition, in-service teachers take this course to renew their teaching certificates with the state. The sample size was 41 candidates ($N = 41$). Of the total number of subjects ($N = 41$), 39 (95%) were female and 2 (4%) were male. Study participants consisted of 17 (41%) from the ages of 20-29 and 24 (59%) were 30-59 years of age.

Instrument. The survey used for this study was the Computer Technology Integration Survey (Wang et al., 2004), which determines one's confidence level with integrating technology into the classroom. This survey measured graduate teacher candidates' self-efficacy with iPad integration. It contains 21 statements that are consistently worded with the stem of "I feel confident that...", and uses a five-point Likert scale ranging from 1, SD (Strongly Disagree) to 5, SA (Strongly Agree). Wang et al. (2004) states that the survey was reviewed for construct and

content validity. The content validity was reached after a panel of experts reviewed and rated the questions on the instrument. Appropriate revisions were made following this extensive review process. The construct validity was empirical in nature (Wang et al., 2004). A factor analysis was conducted on pre-post data from the survey in order to identify factors. Two factors were identified in doing so, computer technology capabilities and strategies (intrinsic) and external influences of computer technology (extrinsic). After the factor analysis, Wang et al. (2004) found the instrument to be a valid instrument for measuring the constructs measured in the survey. In that same study, “Cronbach alpha coefficients were calculated for both pre-survey data and post-survey data to determine the reliability of the instrument” (Wang et al., p. 236). The Alpha coefficients of .94 and .96 proved that the survey instrument was reliable and demonstrates that it will be useful for future research.

Data Collection Procedure. Prior to distributing the surveys, a graduate assistant coded the surveys by giving each candidate enrolled in the class a random number and placed the corresponding number on the survey to ensure participant anonymity. Two weeks prior to the first day of class, the graduate candidates were mailed a cover letter, a survey and a self-addressed, stamped envelope. Dillman (2008) calls the inclusion of the self-addressed, stamped envelope as a goodwill gesture and encourages respondents to complete the survey. Potential study participants were given the opportunity to turn in completed surveys at the first class session. Shortly after the cover letter and survey were mailed, an email was sent to all candidates in the course indicating that a survey would be arriving in the mail. Thus incorporating a mixed-mode survey method, which is when one mode of communication was used to contact participants (mail) and another to encourage them to respond (e-mail) (Dillman, 2008). The implementation of a mixed-mode survey was selected in the hopes of increasing survey response rates. During the last week of class, a similar method of survey distribution was used. A graduate assistant coded the post-surveys to correspond with the pre-surveys and mailed out a cover letter, post-survey, and a self-addressed, stamped envelope. Again, participants were emailed a notice that the surveys had been mailed and were given the option to turn in their surveys during the last class session.

Data Analysis Procedures. Since Research Question 1 was more descriptive in nature, the mean and standard deviation was calculated for factor 1 (internal influences-capabilities and strategies) and factor 2 (external influences of iPad perceptions and total score). In comparing candidates’ pre-post test scores for Research Questions 2-4, repeated measures *t*-tests were used to examine the significance of the difference between the pre and post scores. Since multiple statistical tests were conducted, a 1-tailed, .01 alpha level were used to help control for type 1 errors.

Results. Data was collected during consecutive spring and summer semesters of the graduate children’s literature course in which 50 total candidates were enrolled. Participation in the survey study was optional and 41 graduate candidates responded to the pre-post surveys, which is a response rate of 82%.

Overall, participants’ espoused efficacy with iPad integration prior to the graduate course was positive ($M = 3.51, SD = 0.86$). Possible factors contributing to this high-espoused efficacy with iPads prior to the course is candidates’ access to iPads and the prevalence of iPads in educational environments. Post-test results indicate that all participants had a positive espoused efficacy with iPad integration after taking the graduate course ($M = 4.27, SD = 0.53$). Table 1 contains survey questions and data for the internal influences (factor 1), and Table 2 includes questions that pertain to the external influences (factor 2) that impact iPad integration efficacy

Table 1

Graduate Candidates’ Espoused Efficacy with iPad Integration-Internal Factors

Question	Pretest		Posttest	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
#1 I feel confident that I understand the capabilities of iPads in order to maximize them in my classroom.	3.34	1.11	4.29	0.72
#2 I feel confident that I have the skills necessary to use an iPad for instruction	3.61	1.14	4.29	0.68
#3 I feel confident that I can successfully teach content with the appropriate use of iPads.	3.44	1.07	4.32	0.69
#4 I feel confident in my ability to evaluate iPad apps for teaching and learning.	3.61	1.05	4.22	0.65

#5 I feel confident that I can use correct terminology when directing my students.	3.40	1.22	4.20	0.64
#6 I feel confident that I can help students when they have difficulty using the iPad	3.63	1.02	4.22	0.72
#7 I feel confident that I can effectively monitor students' iPad use for project development.	3.49	1.05	4.22	0.69
#8 I feel confident that I can motivate my students to participate in iPad-based projects.	3.80	1.01	4.63	0.49
#9 I feel confident that I can model educational uses of iPads during instruction.	3.66	1.09	4.51	0.55
#10 I feel confident that I can consistently use iPads in effective ways.	3.46	1.14	4.27	0.81
#11 I feel confident that I can provide appropriate feedback to students using the iPad.	3.25	1.13	4.15	0.73
#12 I feel confident that I can regularly incorporate iPads into my lessons.	3.24	1.16	4.29	0.64
Table 1 (Continued)				
#13 I feel confident about selecting appropriate iPad apps for instruction based on curriculum standards.	3.34	1.00	4.27	0.59
#14 I feel confident assessing students' iPad-based projects.	3.24	1.04	4.15	0.65
#16 I feel confident about using technology resources to collect and analyze data in order to improve instruction.	2.90	1.07	3.83	0.86
#18 I feel confident that I can be responsive to students' needs during iPad use.	3.51	0.98	4.46	0.50
Total Internal Factor	3.45	0.90	4.27	0.52

Table 2

Graduate Candidates' Espoused Efficacy with iPad Integration-External Factors

Question	Pretest		Posttest	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
#15 I feel confident about keeping curricular goals and iPad uses in mind when selecting an ideal way to assess student learning.	3.24	1.07	4.32	0.72
#17 I feel confident that I will be comfortable using iPads in my teaching.	3.54	1.07	4.24	0.73
#19 I feel confident that my ability to address my students' iPad needs will continue to improve.	4.32	0.72	4.73	0.45
#20 I feel confident that I can develop creative ways to cope with system constraints and continue to teach effectively with iPads	3.49	1.03	3.93	1.01

Table 2 (Continued)

#21 I feel confident that I can carry out iPad-based projects even when skeptical colleagues oppose me.	3.88	0.90	4.29	0.64
Total				
External Factor	3.69	0.76	4.30	0.58

When comparing the pre-test scores ($M = 3.45, SD = 0.90$) to the post-test scores for the internal influences (factor 1) of graduate candidates' efficacy with iPad integration, there was a statistically significant difference. Cohen's d indicated that the effect size was large ($d = 0.94$). Thus demonstrating an increase in candidates' efficacy to integrate iPads in their teaching environments. The high score on the pre-test for question # 8 ($M = 3.80, SD = 1.01$) that states, "I feel confident that I can motivate my students to participate in iPad-based projects," shows a possible projection of candidates' awareness of iPads' potential to motivate and engage P-12 students. The growth on candidates' efficacy on the post-test for this question ($M = 4.63, SD = 0.49$) may indicate that their experiences in the course increased their skills and motivation to utilize iPads during instruction. These results are displayed in Table 3.

There was a significant difference when comparing the pre-test scores ($M = 3.69, SD = 0.76$) to the post-test scores ($M = 4.30, SD = 0.58$) of graduate candidates' external influences (factor 2) on their efficacy with iPad integration. Cohen's d ($d = 0.94$) indicated a large effect size. The substantial increase in candidate's efficacy in relation to the external influences (co-workers, system restraints, and access) demonstrates an increase in their efficacy to integrate iPads in their current classroom, regardless of the impact external factors. Table 4 contains this data. It is worthy to note that the total pre-test scores were high at the beginning of the course and continued to rise

Table 3
Internal Influences Of Graduate Candidates' Efficacy

Internal Influences	Pretest		Posttest		t	p	d
	M	SD	M	SD			
	3.45	0.90	4.27	0.52	7.07	< .01	1.11

after the completion of this course; especially, the pre-test responses to survey question #19 ($M = 4.32, SD = 0.72$). This question states, "I feel confident that my ability to address my students' iPad needs will continue to improve." This high level of efficacy prior to the class shows that candidates in this course are willing to improve their knowledge in the area of iPad integration and even more so after the completion of the course based on the post-test results of this question ($M = 4.73, SD = 0.45$).

Table 4
External Influences Of Graduate Candidates' Efficacy

External influences	Pretest		Posttest		T	P	d
	M	SD	M	SD			
	3.69	0.76	4.30	0.58	6.00	< .01	0.94

There was a significant difference in the comparison of pre-test scores ($M = 3.51, SD = 0.86$) to post test scores ($SD = 4.27, M = 0.53$) regarding the impact of the gradual release of responsibility method of instruction on graduate candidates' self-efficacy with iPads as demonstrated on Table 5. The effect size was large as indicated by Cohen's d ($d = 1.09$). The data shows that the impact of the gradual release of responsibility method of instruction increased graduate candidates' self-efficacy with iPad integration.

Table 5
Overall Impact Of Gradual Release Of Responsibility On Graduate Candidates' Self-Efficacy Scores

Overall Impact	Pretest		Posttest		<i>T</i>	<i>P</i>	<i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
	3.51	0.86	4.27	0.53	6.86	< .01	1.09

Limitations. The intervention in this study was the course that candidates were enrolled in that was taught by the researcher. The researcher/professor of this course had a strong background in iPad integration, which may make it difficult to replicate or generalize this study. The survey instrument measured efficacy but did not identify factors that influence efficacy. The survey data was self-reported based on participants' perceptions, however efficacy is a perception. There were no criteria of prior experience with technology for enrollment in this course. Therefore, participants offered a wide range of technology and teaching abilities and backgrounds. The data shows that the impact of the gradual release of responsibility method of instruction increased graduate candidates' self-efficacy with iPad integration. This method of instruction consists of four stages: focus lessons, guided instruction, collaborative learning, and independent work. Although the data shows an increase in participants' self-efficacy, this study did not determine which stage of instruction was the most effective in raising self-efficacy.

Discussion

Barriers to change are the extrinsic and intrinsic factors that affect a teacher's innovation implementation efforts" (Ertmer, 1999, p. 2). First order barriers are extrinsic, on the surface level, and relatively easy to overcome and measure. These are typically the focus of technology integration efforts, e.g. procuring devices, accessories, bandwidth, etc. The assumption is made that once there is access, integration will automatically occur in classrooms. However, this is not the case. This approach to technology integration ignores the complexity of the human capacity to change and is why most technology integration efforts tend to fail. In order for effective technology integration to occur in today's classrooms, a paradigm shift in current teaching practices and beliefs must occur. This is why technology integration efforts need to extend beyond first-order barriers of access and also confront intrinsic, second-order barriers. Teachers' belief systems and routines begin to shift only when second order barriers are addressed. This involves redefining what learning and engagement look like and what behaviors define "teaching" (Fullan & Stiegelbauer, 1991). The results of this study indicate that the gradual release of responsibility (GRR) method can create changes in teaching practices that are necessary for technology integration to be implemented in classrooms.

Bandura's Social Cognitive Theory (1986) has been the focus of several technology integration studies because of the impact self-efficacy has on behavior. Bandura (1997) states "perceived self-efficacy refers to beliefs in one's capabilities to organize and execute the courses of action required to produce given attainments" (p. 3). Self-efficacy influences actions. If people believe they have the ability to produce results, then they will attempt to do so. Furthermore, Berman and McLaughlin's research (1977) emphasized that teachers' sense of efficacy is one of the best predictors of their willingness to adopt new educational practices. The predictive nature of self-efficacy is what makes it such an important component of the change process that occurs during learning, especially when dealing with mobile technology integration.

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Wendy Loewenstein, Ed.D., is Coordinator of the IDEAS Room in the College of Education at the University of Nebraska at Omaha. Within this role, Dr. Loewenstein provides professional learning opportunities for the faculty and candidates of the College of Education in the area of educational technology. In addition to these roles, she also teaches graduate and undergraduate courses for the Library Science department. Dr. Loewenstein has taught in both elementary and secondary buildings as a school librarian and English teacher. She has held various leadership roles both within the buildings where she has taught and at the district level.