

QATAR UNIVERSITY

COLLEGE OF EDUCATION

EDUCATIONAL TECHNOLOGY SELF-EFFICACY BELIEFS OF STUDENT

TEACHERS AT QATAR UNIVERSITY AND ITS RELATION TO THEIR PROGRAM

PREPAREDNESS FOR TECHNOLOGY INTEGRATION

BY

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ABSTRACT

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Title: Educational Technology Self-Efficacy Beliefs of Student Teachers at Qatar University and its Relation to their Program Preparedness for Technology Integration

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The purpose of this study was to investigate the educational technology self-efficacy beliefs of student teachers at Qatar University and their relationship with students' perceptions of teacher program preparedness. Additionally, the study looked at the effect of student teachers' area of specialization (primary, secondary education) and their achievement level (average, high GPA) on their technology self-efficacy beliefs and their perception of program preparedness.

This study utilized a 44 item questionnaire that targeted student teachers' perception about their ability to complete educational technology tasks and their perception on three aspects of teacher program preparedness: (1) instructor's role, (2) curriculum content, and (3) field experience. Based on previous self-efficacy measures, the scale was constructed to be aligned with the context of this study. The final scale has been reviewed for validity and reliability and values were acceptable. Data was collected from 174 participants and was analyzed using SPSS.

Results indicated that student teachers possessed an average level of technology self-efficacy and they perceive that the teacher program prepared them moderately to integrate technology in their teaching. Further, student teachers in the primary level

reported significantly higher self-efficacy levels than student teachers in the secondary level. Furthermore, a strong positive relationship was detected between student teachers' technology self-efficacy beliefs and their perception about program preparedness. Technology self-efficacy can be predicted by the perceived role of the instructor and the field experience. The implications of these findings and recommendations were offered.

DEDICATION

To my family who made me who I am

and

To my beloved husband and son who are my future

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TABLE OF CONTENTS

DEDICATION	v
ACKNOWLEDGMENTS	vi
LIST OF TABLES	x
LIST OF FIGURES	xi
CHAPTER 1: INTRODUCTION	1
Purpose of Study	3
Research Questions	4
Significance of Study	5
Definition of Terms	6
CHAPTER 2: LITERATURE REVIEW	9
Theoretical Background	10
Social cognitive career theory.	10
Self-efficacy theory.	11
Technology self-efficacy.	12
Factors Influencing Student Teachers' Competency and Technology Beliefs	13
Social cognitive variables.	14
Program preparedness.	16
Gender.	22

Specialization.....	23
Academic Achievement.....	25
Summary of Literature	27
Previous Studies	28
CHAPTER 3: METHODOLOGY	33
Participants	33
Instrument.....	35
Instrument validity.....	37
Instrument reliability.	37
Procedure.....	39
Literature review.....	39
Instrument preparation and validation.	39
IRB approval.....	39
Participants' recruitment.....	40
Data collection.....	41
Statistical data analysis.....	41
Data screening.	42
CHAPTER 4: RESULTS	44
Respondent Academic Data	44

Research Question One	45
Research Question Two	50
Research Question Three	52
Research Question Four	57
Research Question Five.....	58
Summary of Findings	60
CHAPTER 5: DISCUSSION AND CONCLUSION	62
Discussion of Results for Question One	62
Discussion of Results for Question Two.....	65
Discussion of Results for Question Three.....	67
Discussion of Results for Question Four.....	68
Discussion of Results for Question Five	69
Recommendations	70
Future Direction	72
References.....	74
Appendix: Reviewers' Names and Affiliations	85

LIST OF TABLES

Table 1: Participants Distribution by Specialization	34
Table 2: Distribution of Participants by Gender	35
Table 3: Cronbach’s Reliability Alpha Values for Combined Scale and Subscales	38
Table 4: Participants’ Academic Achievement (GPA)	45
Table 5: Means and Standard Deviations of Technology Self-Efficacy Items	46
Table 6: Summary Statistics of Self-Efficacy One Sample Test	50
Table 7: Univariate Analysis of Student Teachers Technology Self-Efficacy by Specialization and GPA	51
Table 8: Means and Standard Deviations of Program Preparedness Items	54
Table 9: Summary Statistics of Subscales	56
Table 10: Summary Statistics of Program Preparedness One Sample Test	57
Table 11: Univariate Analysis of Student Teachers’ Perceptions of Program Preparedness by Specialization and GPA	58
Table 12: Summary Statistics of Correlation Values by Self-Efficacy and Program Preparedness Scale	59
Table 13: Summary Statistics of Regression between Self-Efficacy and Program Preparedness Subscales	60

LIST OF FIGURES

Figure 1: Significant Effect of Specialization on Technology Self-Efficacy	52
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Chapter 1: Introduction

Schools are increasingly putting technology at the forefront of educational reform practices in hopes of increasing the quality of education in classrooms. Despite its prevalence and dominance in education, there is still a reluctance to use and apply technology in teaching (Roblyer & Doering, 2010). While an abundance of research focuses on current teachers, there is still a need to establish a relationship between the effects of educational technology training and student teachers.

Qatar University (QU) was established in 1973 as the first university in the country for higher education. The College of Education was established first at the request of the Qatari Amir. Education has since been a top priority for the country. QU is the only institution in Qatar that provides degrees in teacher education. The College trains hundreds of students yearly in the relevant knowledge and skills to bridge the gap between the demands of Qatar's community and mission for education.

The education program at the undergraduate level at QU is split into two divisions, primary education and secondary education. Both programs consist of 120 credit hours to be completed over 4 years or 8 semesters. The main language of instruction is Arabic. In the primary education program plan, students can choose one of four concentrations to specialize in: early childhood, mathematics and science, Arabic, or English. Program specializations in secondary education consist of Arabic, English, biology, Islamic studies, mathematics, chemistry, and social studies. General requirement and common courses include curriculum and assessment, a specialized information and communication technology course, and field training. Two additional programs, special

education and physical education, were recently offered as a response to current educational and community demands.

The initiative to incorporate technology in schools was launched by the Ministry of Education and Higher Education. The Ministry's efforts are aligned with Qatar's National Vision of 2030 to lead the world as an example of quality education. The digital technology projects launched to enhance education and learning within schools include the knowledge net, E-schoolbag, global gateway, and model E-school (Al-Jaber & Dutta, 2008; "Ministry of Education," n.d.). The knowledge net aims to establish easy and direct communication between parents, students, and teachers. The E-school bag supplies students with personal computers and tablets equipped with programs to support science, math, and English curricula.

Technology in the classroom allows students access to multiple sources of knowledge, ultimately having a positive effect on learning (O'Hara & Pritchard, 2010). The Ministry of Education aims to combine an exciting learning environment with creativity and independence. Taking charge of their own education, students can experience self-motivated exploration and research. Technology use by teachers in the classroom will create an innovative environment that fosters self-sufficient, self-reliant, knowledgeable, and globally competitive students.

However, it is not only students who benefit; a major portion of the program is dedicated to teachers. Teachers are exposed to new teaching methods and techniques and have access to a communication system for immediate feedback and support ("Ministry of Education," n.d.). The Global Gateway and E-school give teachers and institutions the opportunity to interact with other teachers on a global platform and adopt new practices

(Al-Jaber & Dutta, 2008). Successfully integrating technology into classroom curricula requires a proactive exchange of knowledge to reduce the technology gap (Elstad & Christopherson, 2017). To ensure a lasting learning and teaching environment, educational technology exposure and attitudes toward integration depend heavily on the training teachers receive at universities before entering the classroom (Elstad & Christopherson, 2017).

Self-efficacy of teachers has been demonstrated to be a predictor of successful technology use and integration (Wozney, Venkatesh, & Abrami, 2006). Thus, the theoretical framework of this study is largely based on Albert Bandura's (1994) self-efficacy theory. Bandura (1994) postulated this theory to address the connection between an individual's perceived ability to complete a task and the degree to which the task is accomplished. Self-efficacy beliefs determine how an individual "feels, thinks, and motivates themselves and behaves" (Bandura, 1994, p. 72). Efficacy levels have a great deal to do with individuals' motivation to adopt a behavior or task and produce desired results, including teacher behavior (Moore-Hayes, 2011).

Regarding teachers' efficacy levels toward technology integration, there is a need to understand the various elements that impact the development of their efficacy. Therefore, this study aims to measure educational technology self-efficacy and its relationship to program preparedness. Central to this study is student teachers' belief in their capabilities to achieve technology integration.

Purpose of Study

The purpose of this study is to assess student teachers' educational technology

self-efficacy and its relationship to program preparedness. Further, the study examines the extent to which student teachers perceive the program at QU has prepared them to integrate educational technology, including areas such as instructors' role, curriculum content, and field experience.

Research Questions

In order to achieve the study's purpose, the following research questions will be examined based on the perceptions of student teachers:

1. What is the perceived level of student teachers' educational technology self-efficacy beliefs with regards to their ability to integrate technology in their classrooms?
2. Is student teachers level of educational technology self-efficacy affected by their specialization (primary, secondary), and academic achievement (average GPA, high GPA)?
3. What is the perceived level of student teachers program preparedness with regards to the instructors' role, curriculum content, and field experience to integrate technology in their classroom?
4. Is student teachers level of perceived program preparedness affected by their specialization (primary, secondary), and academic achievement (average GPA, high GPA)?
5. What is the relationship between student teachers' educational technology self-efficacy beliefs and their perceived level of program preparedness for technology integration, including the instructors' role, curriculum content, and

field experience?

To address all of the research questions, this study was designed in a quantitative manner. The particular design chosen allows the researcher to accurately describe and depict the relationships between variables (Thyer, 2001). The overarching variables for this study were student teachers' educational technology self-efficacy beliefs and program preparedness regarding technology integration.

Significance of Study

This is the first study to examine student teachers' self-efficacy for integrating technology at the local context that other studies have not. This study hopes to contribute to understanding educational technology integration at the local level and under the wider umbrella of the field of education.

The impact of the student teacher training program has on teachers can influence curriculum reform at Qatar University. The flow of responsibility between prospective teachers and faculty at the Qatar University cannot be overlooked. Although student teachers enter the program with pre-existing technology literacy, it is not to say that the influence of faculty during training does not shape their classroom techniques (Lee & Lee, 2014). Student teachers observe the use, lack of use, and misuse of technology in their program courses. Such factors play an essential role in influencing beliefs relating to the appropriateness, usefulness, and proficiency of educational technology (Lee & Lee, 2014).

The findings of this study will redirect instructors' attention to their role in their teaching practices. The Ministry of Education in Qatar and Qatar University will be able

to focus their efforts on equipping student teachers with the proper tools and training needed to create innovative, meaningful learning experiences. Ultimately, the ministry and university can work to increase technology self-efficacy and other attitudes student teachers hold toward digital skills.

Not only will the results inform curriculum developers, but it will also enrich the teaching experience for student teachers and enhance the learning experience for students. The results of this study will raise awareness as to where the university program has failed or succeeded in meeting student needs. The crucial weaknesses identified by student teachers can be targeted and reevaluated for intervention. The necessary modifications and formations of teaching practices by faculty will be vital to build and implement strong program methods, plans, and policies. The information can be used to further support training for teachers and to reevaluate the program and allocate resources for integrating technology.

Definition of Terms

Educational technology: Educational technology is the use of technology to facilitate and assist the learning process (Callaway, 2004). Instructors use educational technology for the “practice, design, development, management, and evaluation processes and resources for learning” (“The Definition of Education Technology”, n.d). This study defines educational technology as a tool to design and promote learning.

Student teacher program preparedness: The program is specifically related to the academic overview of a degree provided at the institute for students to become teachers. Instructors at the institute give students professional knowledge and targeted feedback

(Chizhik, Chizhik, Close, & Gallego, 2018). In this study, program preparedness refers to the level of preparation students felt they received in terms of instruction and training related to educational technology. The level of preparation students received is measured by a series of statements to which they indicate to the level they agree or disagree. Program preparedness is measured by 10 items related to three aspects including, the instructors' role, curriculum content, and field experience. These three subscales are aligned with the social cognitive career theory.

Technology self-efficacy: Technology self-efficacy is a measure of one's ability to succeed in accomplishing a specific task or mission involving technology. In the case of this study, technology that contributed to the measure of self-efficacy is limited to educational tools. While self-efficacy cannot be measured directly, the instrument in this study measures it by asking participants to identify the extent to which they believe they can complete a task with a certain technological tool. The extent to which they believe they can complete a task is measured on a scale that ranges from the absence of an ability to the presence of an ability.

Student teacher: A number of terms are used to describe undergraduate students in the field of education enrolled as teacher candidates. Often, the terms "preservice teacher" and "student teacher" are used interchangeably (Anderson & Maninger, 2007; Teo, 2009a; Teo, 2009b). This study narrows the term to a target population that includes only candidates in their last semester who have completed their student teacher training.

Student teaching course: Student teaching is experiential learning or training of teacher candidates under the supervision of mentors (Cuenca, 2011). Student teaching for this particular study involves the ten-week observation and training of prospective teachers in

Qatari schools. Students in this phase have completed all other courses, are in the last phase of their studies before graduation, and have a minimum required GPA of 2.00.

Technology integration: Technology integration is the act of merging technology with education, utilizing the relationship as a tool for success (Ertmer, 2005). This study identifies technology integration as utilizing technology as a tool to enhance learning and establish a better understanding of course concepts and material. This study refers to the course as field experience.

Chapter 2: Literature Review

The review of literature related to technology integration is grounded in the idea that technology self-efficacy and program preparedness contribute significantly to student teacher use and integration of educational technology in the classroom. The study uses the theoretical frameworks of the social cognitive career theory and self-efficacy theory.

Research indicates that student teachers feel poorly prepared to integrate technology successfully in their teaching (Shaw, Martin, & Daughenbaugh, 2013). By analyzing previous studies, a series of variables became evident as influential factors on which technology integration depends. The predictive power of technology self-efficacy combined with learning and teaching provide evidence toward the significance of teacher education programs in establishing competency (Henson, 2002).

Student teachers can adapt to challenges and changes if they have a considerable amount of literacy and proficiency with technology tools (Henson, 2002). Digital competency in student teacher education programs remains an under recognized dimension (Elstad & Christopherson, 2017).

As technology becomes increasingly common and relevant in the typical classroom, teacher preparation programs provide training on technology integration. There is a lack of extensive research exploring topics covered in teacher education programs, specifically, preparation regarding the instructors' role, curriculum content, and field experience for using technology. Research has yet to highlight the impact course topics have on teaching practices or the empirical basis for including such topics in student teacher programs.

Theoretical Background

Social cognitive career theory. The social cognitive career theory (SCCT) is largely influenced by the SCT. The social cognitive theory (SCT), developed from the social learning theory, is used to explain how individuals learn, persevere, and adopt a behavior (Perkmen & Pamuk, 2011). The SCT theory can be organized into the following constructs: (1) reciprocal determinism which describes the interaction of person, behavior, and environment, (2) behavioral capability which describes actual performance, (3) observation learning which targets learning through observation and modelling, (4) reinforcements which are in the form of external encouragement or discouragement, (5) expectations, and (6) self-efficacy (Bandura, 1986 as cited in Marks, 2002). However, the scope of the SCT is limited in that it does not take into account influential factors other than past experience (Schunk, 2011). SCCT extends on this limitation.

SCCT explains academic and career achievement based on three core properties: (1) interest development in relation to aspects of academic and career interests, (2) academic career choice influenced by personal and experiential factors and (3) performance behavior determined by ability, self-efficacy, outcome expectations and goals (Lent, Brown, & Hackett, 1994). Academic and career interests develop from past performance and learning experiences. (Lent et al., 1994). As a result, self-efficacy and outcome expectations are affected, but also interrelated. Together, the two variables influence interests, goals, and ultimately, performance (Lent et al., 1994).

Social cognitive variables such as self-efficacy, outcome expectations and performance goals can be valuable predictors of student teachers' technology integration

performance (Perkmen & Pamuk, 2011). The performance model examines the influence ability, self-efficacy, outcome expectations, and performance goals have on academic or career-related behavior. The model simply states that past performance and ability play a role in self-efficacy and outcome expectations. Self-efficacy and outcome expectations are interrelated and guide performance goals and academic and career performance.

Self-efficacy theory. The self-efficacy theory has been used in the literature countless times to support research on individual success. Bandura (1994) defined self-efficacy as persons' belief in their self and ability to control their performance and outcome. A persons' feelings, thoughts, motivation, and behavior are all influenced by their self-efficacy beliefs. People are ultimately in control of their own change (Bandura, 1994).

Self-efficacy can be measured on a range from high to low. Those with high self-efficacy often have the strongest level of accomplishments and achievement (Bandura, 1994). They view difficult tasks as a challenge that can be overcome by acquiring knowledge and skills. Thus, the outcome of challenging situations can be controlled.

Holding low self-efficacy beliefs can leave an individual feeling vulnerable in the face of a struggle (Bandura, 1994). They view difficulty as a personal threat and focus on their deficiencies. Often, they give up in a challenging situation.

Efficacy beliefs are fostered from four sources of influence (Bandura, 1994). Mastery experiences is the first and most effective source; success builds and strengthens efficacy beliefs while failures weaken it (Bandura, 1994). However, constantly being fed easy success can lead one to expect quick results with future challenges. Setbacks,

hardships, and difficulties are needed to encourage perseverance in tough situations. The second source of influence is vicarious experiences which strengthen self-efficacy through social modeling (Bandura, 1994). By observing their surroundings, people believe that if those around can succeed then, they too can succeed. If those around them seem to fail even after exerting high effort and investments to overcome their deficiencies, then their efficacy can be negatively influenced. Modeling, though, is not just used as a means of comparing one's self to another but also of judging their competencies in skills and strategies. Thus, as Bandura put it, "acquisition of better means raises perceived self-efficacy" (Bandura, 1994, p. 72). Experiences of social persuasion is the third source for increasing self-efficacy beliefs (Bandura, 1994). Persuasion is the act of verbally supporting a person in their ability to succeed. Persuasion strengthens their efforts and destroys their self-doubt. The opposite can be said negative social persuasion which destroys efficacy. Finally, emotional and physical wellbeing influences efficacy (Bandura, 1994). A strong sense of internal motivation, reduced stress, and self-driven energy toward successfully performing a task is a result of high efficacy.

Technology self-efficacy. Following Bandura's theory, it can be postulated that student teachers' beliefs in their ability to successfully and effectively integrate technology in their teaching is influenced by their self-efficacy. Student teachers with high self-efficacy are motivated to adopt and utilize educational technology because they believe they can do so. They are more likely to participate in training that strengthens their skills and academic achievement (Gersten, Chard & Baker, 2000; Sparks, 1988). A strong sense of efficacy allows for more effort, determination, and resilience in the face

of daunting technology tools. Conversely, low efficacy levels would hinder efforts of integration in classrooms (Kent & Giles, 2017).

New teachers are faced with the responsibility to integrate technology almost immediately as they begin working, finding it difficult (Clausen, 2007). They attribute the difficulty to inadequate training and skill development (Martin et al., 2014).

Since self-efficacy is contextual, program curriculum focusing on technology results in higher efficacy levels (Henson, 2002). Certain teaching behaviors such as instructional planning and preparation can be targeted for improvement and ultimately, increase efficacy for technology tool use (Henson, 2002). Thus, a positive attitude and the appropriate training is correlated with student teachers' belief to integrate technology.

Factors Influencing Student Teachers' Competency and Technology Beliefs

Successfully integrating technology into teaching is considered a basic part of modern education, yet it is one of the greatest challenges teachers face (Wang, Ertmer, & Newby, 2004). Technology competency and skills are important and utilizing them can positively influence academic success. Teachers may not be aware of or may overlook the benefit of a specific educational technology tool, thus hindering their ability to utilize technology to address issues in their classroom (Ottenbreit-Leftwich, Brush, Strycher, Gronseth, Roman, Abaci, van Leusen, Shin, Easterling, Plucher, 2012)

It is worth noting that technologies taught to student teachers are unavoidably different from those available in their future classrooms. However, lack of adequate training in digital competency skills puts teachers at a disadvantage when entering their future classrooms, negatively influencing their efficacy levels (Elstad & Christophersen,

2017; Hidge, Vcar, & Demir, 2014).

Social cognitive variables. Perkmen and Pamuk (2011) examined the relationship between self-efficacy and performance and the influence these variables have on student teachers' performance in technology integration. Participants in this study were completing an introductory instructional technology course. Freshmen participants were eventually excluded from the overall sample. When their data was mixed with the data of participants at the sophomore, junior, and senior levels, it affected the significance of the self-efficacy and performance correlation. Self-efficacy and performance in the upper-level groups strongly predicted technology integration. This was expected since the relationship between beliefs and performance becomes stronger with skill development.

Perkmen and Pamuk (2011) noted a few limitations to the results of their study. The sample size, although it revealed a significant effect, was small. Furthermore, their assessment tool failed to thoroughly assess student teacher's abilities to apply technology to support student learning in a real classroom environment as teachers. The tool focused on the first two dimensions of technology integration, planning and designing. It would be useful to compare the results to other phases of technology integration.

A study to evaluate factors connected with student teachers' intentions to integrate technology within their first year of teaching was implemented on undergraduate teacher candidates (Anderson & Groulx, 2015). All participants completed an educational technology course. Researchers focused on evaluating factors from this critical period of the program since student teachers' experiences ultimately impact their beliefs and intentions. Findings revealed student teachers' self-efficacy and intentions

were positively related. Measurements of self-efficacy, value beliefs and perceived ease of use were significant predictors of intentions (Anderson & Groulx, 2015; Anderson & Maninger, 2007; Anderson, Groulx, & Maninger, 2011).

However, not all findings were consistent, as perceived ease of use was an independent predictor of student teachers' intentions (Birch & Irvine, 2009). Furthermore, perceived ease of use was found to have little effect on intention to use educational technology. Self-efficacy indirectly affected intention to use technology in instruction, but significantly predicted perceived ease of use (Birch & Irvine, 2009; Teo & van Shaik, 2012). Perceived usefulness had a minor effect on intention (Birch & Irvine, 2009). Perceived usefulness of educational technology indirectly contributed to the formation of attitudes (Teo & van Schaik, 2012). Ultimately, student teachers' intentions depend heavily on their internal motivation to perform technology integration (Teo & van Schaik, 2012). It is important to consider that these studies lacked the ability to clearly distinguish student teachers' perceived usefulness from their perception of ease of use.

Another study by researchers in Tanzania also looked at student teachers self-efficacy beliefs toward educational technology integration (Raphael & Mtebe, 2017). Researchers collected data from 386 secondary school level student teachers. Results revealed that self-efficacy was effected by support, perceived ease of ease, social influence, and performance. Student teachers believed that when their challenges were met with support, their capabilities increased. As for performance, participants believed that using educational technology enhanced their teaching. Furthermore, perceived ease of use had a negative effect suggesting difficulty with technology. Interestingly, social

influence had a negative effect too. Meaning, student teachers opinions on educational technology integration is not influenced by the opinion of their colleagues and anyone else.

The study by Raphael & Mtebe (2017) asked participants about their technology ownership. Most participants claimed to own a desktop computer or laptop and used the internet several times a week to find teaching material. Despite having access and ownership to educational technology, student teachers still are not using it after graduation. This suggests that extrinsic barriers are coming into play. Researchers only focused on intrinsic factors. Other limitations of this study included a restricted sample, Tanzania secondary school student teachers.

On the contrary, intrinsic factors such as computer ownership, internet access, and computer were not found to be correlated with attitudes toward educational technology (Baturay, Gokcearslan, & Ke, 2017). The study by Baturay et al., (2017) also found internet access and ownership did not have an effect on intention to accept and use educational technology. Interesting to note, computer competence, attitudes, and technology acceptance are related. As well, perceived ease of use and attitudes had a positive relationship toward technology acceptance. The study sampled of 476 participants, male and female of various specialization and all classes (freshman, sophomore, junior, and senior. While this study did have a large representative, the researchers did not compare between each group which could prove to be significantly valuable.

Program preparedness. Successful technology program training rests on three factors: technology skills and experience within an educational context, opportunities to

train with technology resources, and training consistent with needs and problems teachers face in their classroom (Hew & Brush, 2007 as cited in Ottenbreit-Leftwich et al., 2012). There is not an absence of educational technology courses and training in universities; in fact, 85% of four year institutions reported to provide support and training to promote technology integration (Ottenbreit-Leftwich et al., 2012). Educational technology courses cover a range of topics such as integrating technology into instruction, using the internet to find resources and tools, using technology to meet standards, and using multimedia and data to compliment and guide instruction (Kleiner, Thomas & Lewis, 2007). It is important to note that most of the literature looked at program preparedness as a factor of technology integration after the fact; meaning, program preparedness was often collected from current teachers about their past and from instructors. Rarely does the literature point to program preparedness from the perspective of current student teachers.

A study by Giles and Kent (2016) focused on measuring student teachers' self-efficacy levels for teaching with technology after they took a technology integration course. Data revealed that more than half of teachers felt confident in selecting and utilizing technology in their teaching and learning, but were not confident in their ability to evaluate software (Giles & Kent, 2016). The majority of teachers reported they could integrate technology across the curriculum and could justify why it was appropriate to integrate, establish when to integrate it, and determine how to integrate it (Giles & Kent, 2016). Another study by Birgin, Coker, & Catioglu (2010) found that most teachers were competent in email use, multimedia use, word processing software, presentation software, and spreadsheet software use.

In each university and program, instructors take different approaches to introducing and emphasizing technology integration in instruction. Lecture-based teaching styles are simply informative, but integration requires action and practice. That being said, a single class may be sufficient, but technology should also be infused within all relevant aspects of student teacher programs to further ensure competency (Pope, Hare, & Howard, 2002). It is evident that the courses and instructors significantly and positively influence the development of teachers' self-efficacy (Pope et al., 2002; Kontas & Demir, 2015).

Educational technology courses cover a range of topics, such as integrating technology into instruction, using the internet to find resources and tools, using technology to meet standards, and using multimedia and data to complement and guide instruction (Kleiner et al., 2007). A study by researchers (Gronset, Brush, Ottenbreit-Leftwich, Strycker, Abaci, Easterling, Roman, Shin, & van Leusen, 2010) gathered information from universities in the United States about the course structure of teacher programs. Participating universities reported personal productivity and information presentation as the most common courses. The least commonly reported courses available in teacher programs were about using technology to analyze student achievement data. Researchers found that 60% of institutions required a specific course on educational technology in their programs. Other courses, not specifically related to educational technology, were required to include coursework, projects and activities that utilized technology. Interestingly, 90% of student teacher programs focus on topics that use technology to enhance instruction, but a large number of student teachers use technology for lower-level tasks (Kleiner et al., 2007). Observing the use and application of

educational technology was only required in some programs. Sixty percent of institutions required students to “develop or implement technology lessons” during their field training (Gronseth et al., 2010, p. 32). Regardless, all preparation programs enhanced teachers’ skills in using instructional technology directly or indirectly (Gronseth et al., 2010).

Ottenbreit-Leftwich et al. (2012) also investigated the knowledge gap between what programs do to prepare student teachers to integrate technology and how teachers actually apply educational technology in their practices. Data collected from teachers and teacher instructors revealed inconsistent and varying responses between the two groups on educational technology topics. Teacher educators identified how to use technology for classroom preparation and teaching specific topics as the most important topic, followed by technology for personal productivity and documenting professional growth. Teachers identified the best way to use technology in the classroom as supporting higher-order thinking; this was the largest disparity identified in the data. Interestingly, while 90% of student teacher programs focus on topics that enhance technology use to support instruction, the majority of student teachers used technology to support low-level thinking (Kleiner et al., 2007). Other popular ways to use technology in the classroom by teachers included productivity tools and computer literacy, classroom preparation and access/use of electronic resources. Teachers also indicated collaborative capabilities of technology as the best way to facilitate student learning.

Two themes emerged from interviews with teachers and teacher educators: the use of tools to support student collaboration and project-based learning (Ottenbreit-Leftwich et al., 2012). Nearly 70% of teachers used technology to promote higher-order

thinking skills during a single school week, but less than half of those teachers had training on this in their program. When it came to applications for student collaboration, teachers used tools such as the comment feature on blogs and social media. On the other hand, teacher educators focused less on collaborative features of technology in K-12 learning and instead modeled educational technology advantages by assigning collaborative tasks to student teachers in their program coursework. There was a significant difference between teachers and teacher educators on this topic; only 9% of teacher educators believed collaborative uses in technology to be an important topic for education programs, but almost half of the participating teachers believed technology tools to be the best way to facilitate higher-order thinking. Although the need to prepare teachers to use assistive technology is present, only a mere 5% of programs claimed to prepare teachers to use technology to meet special educational needs of students (Gronseth et al., 2010).

Furthermore, teachers used technology as a means of communication between students to facilitate instruction and feedback and to encourage participation through email or a classroom blog (Ottenbreit-Leftwich et al., 2012). Although applying technology tools in the form of instruction was not as popular, almost all teachers identified using technology to communicate with students and parents as important. Dialogue was initiated in various forms, such as emails, newsletters and blogs. In contrast, teacher educators seldom trained teachers to use technology for communication purposes; and if they did, they focused on one-way dialogues such as websites and newsletters.

Finally, teachers reported using performance systems and portfolios for analyzing

student data, monitoring student progress and assessment purposes, but this was the least reported topic in education preparation programs (Ottenbreit-Leftwich et al., 2012). Teacher educators merely emphasized the importance of designing assessments that are aligned with classroom objectives without addressing how to do this. Interviews revealed an inconsistency between teachers and teacher educators on the importance of technology for professional growth. Teacher educators rated it as far more important than teachers did, and indicated that they included it in their program preparation more than teachers recognized.

Factors within the program classroom that contribute to student teacher perceptions of technology integration can be identified and targeted for intervention. However, extrinsic factors during student teacher training, such as access to technology, technology support and technology modeling, cannot be controlled by faculty but still shape beliefs (Lee & Lee, 2014). There are a number of variables that influence internal motivation and intention that ultimately predict technology acceptance. It is important to consider that modern student teachers have been influenced considerably by and have interacted with educational technology outside of their program training (Teo & van Schaik, 2012). Furthermore, student teachers claimed to already possess the necessary skills and knowledge to use technology effectively without support (Teo & van Schaik 2012). But, consistent inadequate use is reported in the literature which can be attributed to insufficient training and practices (Higde et al., 2014).

The literature for program preparedness demonstrates a link between curriculum content, instructor's role, and field training. As well, each variable is related to technology self-efficacy. Curriculum content allows for the proper skill development

needed for successful integration. The instructors' role is based on quality modeling that shapes student teachers' beliefs about technology use. Finally, field training takes into account support and challenges to shape proper intervention. The aspects mapped together to construct student teachers' technology self-efficacy beliefs.

Gender. Educational technology, specifically the use of computers and internet is common in educational settings (Li, Kirkup, & Hodgson, 2001). These tools are constantly being transformed and molded into something new for teachers and students. With the widespread influence of educational technology, teachers are encouraged and expected to use these tools regardless of gender. The issue of gender differences regarding use and attitude continues to persist (Birgin et al., 2010). Earlier and recent studies have found gender differences, favoring males for technology use and attitude (Schumacher & Morahan-Martin, 2001). However, other studies have failed to support gender differences (Demirel & Akkoyunlu, 2017; Birgin et al., 2009; Pamuk & Peker, 2009). For example, gender did not play a significant role in web-pedagogy self-efficacy (Higde, Uucar, Demir, 2014) and gender did not have a significant effect perceived usefulness, perceived ease of use, attitudes toward computer use, and behavioral intent (Wong, Teo & Russo, 2012). The literature continues to present mixed conclusions for gender.

A study by Krause, Pietzner, Dori, & Eilks (2017) revealed valuable findings regarding educational technology in future teaching for gender. An online survey collected data from 239 student teachers, 62% were female and 38% were male. Educational technology attitudes and self-efficacy were measured for teaching in general

and then for teaching chemistry. Male student teachers had higher self-efficacy for using educational technology in general and for chemistry. However, attitudes toward educational technology was the same among both genders. Interestingly, when focusing on female student teachers, their attitudes were positively affected by the course of their studies, training, and use. Furthermore, there was a positive development in self-efficacy for female teachers toward the end of their teacher training program but not for males. Thus, it can be inferred the differences and gap between genders regarding educational technology use can be reduced with training.

There are a few plausible explanations by research to explain the inconsistencies of gender as a factor in educational technology self-efficacy and attitudes. Whitley (1997) points out that although patterns may be consistent, the effect sizes of most studies were small and hardly practical in his meta-analysis. As well, Brosnan & Lee (1998) demonstrated that differences can be as a results of cultural and background characteristics in their cross-cultural comparison study. Finally, characteristics of socioeconomic status influence technology access and use and ultimately, attitudes (Bimber, 2000).

Specialization. A study by Higde et al., (2014) did focus on the self-efficacy beliefs of student teachers specializing in science and in physics. A web pedagogical content knowledge survey consisting of 30 items was administered to 150 student teachers. The researchers narrowed their research items to focus specifically on internet use. Science and physics student teachers held high self-efficacy beliefs regarding web pedagogy but the differences between average scores for each specialization was not

significant. Researchers also identified significant factors that positively influenced self-efficacy including, internet usage and owning a personal computer.

Teo (2008) looked at student teachers' attitudes toward computers by specialization, too. A survey instrument targeted computer experience, confidence, and attitude on a 5-point scale. There were 4 major components: affective (liking), perceived usefulness, perceived control, and behavioral intent. A 139 participants who specialized in the sciences, language arts, and humanities participated. Results revealed there was an overall positive attitude for student teachers' affective components and intentions to use computers.

The computer efficacy in teaching concept by Teo (2008) was further extended by researchers to determine its ability to predict perceived usefulness, perceived ease of use, attitudes toward computer use, and behavioral intent (Wong et al., 2012). Wong et al., (2012) surveyed 302 participants regarding their beliefs in their ability to use computers in teaching and learning. Results revealed that computer teaching efficacy positively affected perceived usefulness, perceived ease of use, and attitude.

Researchers also looked to see the extent to which training in technology as an antecedent effects self-efficacy (Shittu, Gambari, Gimba, & Ahmed, 2016). They collected data from 146 student teachers specializing in mathematics education. Results revealed technology preparedness had a positive effect on self-efficacy, perceived usefulness, and intention to use technology in future teaching. As well, perceived usefulness had a positive effect on intention, as did self-efficacy. Finally, self-efficacy had a positive relationship with perceived usefulness. This study highlights the

importance of technology training in teacher programs; training has a lasting effect on enhancing teaching.

Finally, researchers looked at attitudes and self-efficacy levels of chemistry student teachers for using technology in teaching (Krause et al., 2017). An online survey collected data from 239 participants. Attitudes toward educational technology in general and for teaching chemistry were measured on a Likert scale. As well, self-efficacy toward educational technology in general and for teaching chemistry were measured on a Likert scale. When looking at these variables from the perspective of years of study (experience gained), technology attitudes in general were the same. However, self-efficacy in general displayed a positive trend. Self-efficacy for teaching with technology in chemistry education was better for teacher trainees (5th year) as opposed to 1st year student teachers. Regarding differences in technology use and integration by specialization, research points to major barriers teachers face that include lack of resources, time, and support (Inan & Lowther, 2010; Kopcha, 2012). As well, teachers' lack of knowledge, beliefs, and self-efficacy about educational technology can attribute to failed integration (Hew & Brush, 2007). While these barriers are general, subject, culture and lack of knowledge on how to use technology in a particular subject or where to locate resources has emerged in the literature (Hew & Brush 2007).

Academic Achievement. The relationship between self-efficacy and academic achievement is well documented in the literature. However, the target population rarely focuses specifically on student teachers in a similar context as this study. In general, self-efficacy has a positive relationship with academic achievement and performance (Chowdhury & Shahabuddin, 2007; Jungert & Rosander, 2010; Uzuntiryaki-Kondakci &

Senary, 2015). Also found in trending in the literature is: self-efficacy significantly predicts achievement, especially for cognitive skills (Uzuntiryaki-Kondakci & Senay, 2015) and self-efficacy is an accurate predictor of current ability (Jansen, Scherer, & Schroeders, 2015).

Villafane, Xu, & Raker (2016) tested the relationship between self-efficacy and academic performance in chemistry university students. Self-efficacy was measured with a chemistry specific questionnaire four times in the semester. Academic performance was measured five times by collecting grades from exams. The results revealed a significant positive relationship between the two variables. As well, researchers described a snowball effect for self-efficacy and performance; that is, self-efficacy and performance levels increased and accumulated.

A study by Valdebenito & Andrea (2017) analyzed the relationship between self-efficacy beliefs and academic behavior and achievement. Researchers targeted 405 undergraduate students across Chile. Data was collected from questionnaires to reveal correlations between the variables analyzed. Data revealed a direct relationship between self-efficacy and academic behavior and achievement. Furthermore, data supported an inverse relationship for self-efficacy and challenges. Although the sample in this study was large and representative of the Chilean community, cultural differences restrict its generalizability.

Another study sought to establish a relationship between academic self-efficacy and academic performance of final year students in college (Kolo, Jaafar, & Ahmad, 2017). Quantitative data was collected from 339 students. GPA was collected to

determine academic performance. Data was analyzed and revealed a significant and positive relationship between the two variables. While the results are aligned with the literature, this study is limited in the sense that it only used 8 items to measure academic self-efficacy.

The studies observed in the literature regarding self-efficacy and academic achievement are valuable. However, there are limitations across the literature. Self-efficacy was measured differently, using different instruments and items. For example, studies that focused on the two variables in the context of chemistry education used the Organic Chemistry Self-Efficacy scale (Villafane, Xu, & Raker, 2016). Other studies used more general scales such as the College Student Self-Efficacy Scale (Abdelmotaleb & Saha, 2013). Moreover, academic achievement was collected differently through GPA or test scores.

Summary of Literature

Technology integration in classrooms is seen as a highly important accomplishment. Prospective teachers require extensive preparation to bridge the gap between the national vision of the country and the reality in classrooms. Student teacher experiences with technology begin in their university preparation programs. Although student teachers may be able to use technology to support their teaching and learning environments, this does not mean they can do so effectively or promote student learning in reality.

Social cognitive variables such as self-efficacy beliefs, outcome expectations and value beliefs influence affective components in behavior adaptation and performance.

High self-efficacy levels can be used to predict the success of technology expectations. The significance of education technology integration influences student teacher's intentions and attitudes. In addition to these variables, perceived usefulness and ease of use contribute to the intention of achieving effective and efficient performance.

A logic balance between challenges and opportunities empowers student teachers to adopt their role as educators (Elstad & Christopherson, 2017). Thus, the success of the programs can influence their readiness to effectively put into use educational technology in their real classroom environments (Tondeur, van Braak, Voogt, Fisser & Ottenbreit-Leftwich, 2012). However, research needs to take a different approach. Self-efficacy levels, perceptions of program preparedness as a whole, and skill levels are hardly measured while teachers are students in training. Further, the relationship between self-efficacy and program preparedness has not been examined deeply in previous studies.

Previous Studies

The topic of teacher self-efficacy has been a focus among researchers. Bandura first came up with the concept of the self-efficacy theory used in this study in 1994. Since then, researchers have applied and connected this theory to their research. The majority of studies about student teacher technology self-efficacy and other relevant attitudes have been conducted outside the Middle East. This section limits research to only the student teacher population.

Often, the concern regarding education technology in classrooms stemmed from teachers being poorly prepared as technology users during their education. Watson (1997) surveyed student teachers during their information technology training in their teacher

education. Her findings revealed that student teachers had low computer self-efficacy and hold negative feelings about technology. Interestingly enough, the attitudes and beliefs were related to gender and age favoring younger students and male students. Like most literature, Watson concluded by pointing highlighting the important need for technology competency among student teachers and technology training programs must account for experiences and attitudes to succeed.

In 2001, Albion looked at various factors that contribute to the development of computer self-efficacy beliefs and use among student teachers. He measured students' beliefs at the beginning of a semester and then again after the semester passed. By this time, students had completed computer courses. Time spent using computers and gaining computer competency was the main factors that contributed to self-efficacy.

Mayo and researchers (Mayo, Lawrence & Jesus, 2005) conducted a longitudinal study on student teacher preparation to effectively incorporate technology in their lessons. Three variable were investigated, comfort with technology, frequency of technology, and technology efficacy. Pre-test and post-test results demonstrated positive statistically significant differences for all three variable. Upon comparing the group of student teachers with exposure to a who did not have technology training, they held higher positive scores.

Further, studies examined the impact of self-efficacy with intent to use technology. Teo (2009) assessed self-efficacy of student teachers based on three factors, teaching skills, pedagogy, and intent. Technology use was categorized as either tradition approach or constructivist approach. Participants responded to series of items on a 7-point scale. Findings supported statically significant relationships for teaching skills,

technology pedagogy, traditionalist approach and constructivist approach. Evidence led to the conclusion that student teachers' self-efficacy significantly influences technology use regardless of the approach for teaching.

Rarely does the recent literature compare educational technology use and self-efficacy to student teachers practice teaching, otherwise known as practicum or field training. Liu (2012) aimed to identify the significance and relationship between factors that affected technology integration among student teachers. Student teachers completed a questionnaire regarding the context of their practice teaching. The results revealed that their general teacher courses failed to prepare them for technology integration for their practice training. However, their experience with their mentors did make a difference in their attitudes. Liu (2012) made the important distinction that "technology should be integrated into core method course, not limited to isolated courses".

The literature is limited regarding studies about student teacher technology self-efficacy in the Middle East. A study by researchers in Jordan aimed to measure student teachers' technology integration (Abu Al-Ruz & Khasawneh, 2011). Two models were tested on student teacher participants to predict technology integration and current classroom teachers. The first model focused on the university environment and three measured factors: technology self-efficacy, technology proficiency, and usefulness of technology. The second model focused on the work environment and tested factors such as technology availability and overall support. Descriptive data was collected in a quantitative manner. Within the university setting, technology modeling impacted student teachers' technology self-efficacy, proficiency, and perceptions of usefulness of technology. Within the work setting, technology self-efficacy was the most important

variable that directly impacted technology integration.

A study in Kuwait the Technological Pedagogical Content Knowledge framework as the basis of their study on student teachers (Alayyar, Fisser & Voogt, 2012). Student teachers were presented with a technology problem that occurred in their field training. The sample was split into two groups to develop an approach to the problem. The first group simple had access to an expert while the second group had access to an online portal with resources and an expert. Upon measuring attitudes, pre and post conditioning, attitudes toward technology and technology skills increased in both groups but more in the group with a mixed condition.

Researchers in Saudi Arabia collected student teachers' self-efficacy beliefs regarding technology integration into their pedagogical approaches (Robertson & Al-Zahrani, 2012). As well, researchers aimed to understand how computer access their university, computer experience, and computer qualifications influenced participants' self-efficacy levels. A questionnaire was administered on 325 male student teachers and follow up interviews were carried out on 13 participants. Regarding computer access at the university, 55% said yes. A third of participants had more than 5 years of computer experience and over half had no formal qualifications in computer training. Overall, participants had high self-efficacy level. Computer access significantly impacted self-efficacy beliefs as did computer experience and qualifications.

Finally, a study in the United Arab Emirates designed their study to assess the effect of student teachers field training experience on their technology self-efficacy (Al-Awidi & Alghazo, 2012). The participant sample was composed of 62 student teachers specializing in elementary education. A technology self-efficacy questionnaire was

administered to participants before and after their field teaching experience. To further explore the source of self-efficacy beliefs and examples of field experiences, 16 of the 62 participants were interviewed. Results revealed the mastery experiences and vicarious experiences, sources of self-efficacy, were significantly improved after participants' field experience.

Researchers utilized various questionnaires to measure self-efficacy beliefs for technology use, computer use, or even internet use. As well, studies aimed to look at other aspects of attitude to compare to technology integration. Social cognitive factors, program preparedness, gender, have shown up in the literature. Researchers have targeted student teachers to connect the self-efficacy theory to technology integration in their future classroom. Each study applied theories and variables but none have actually compared technology self-efficacy, in general, to an in-depth measurement of program preparedness. The same can be said for local literature that extends to the Middle East; the research is limited. The studies, often cannot be generalized to the Qatari context because the unique educational structure the country is developed on. This study hopes to contribute valuable research to provide effective guidance toward improving technology integration in classrooms and the role of QU and the Ministry of Education and Higher Education.

Chapter 3: Methodology

The current study focused on the technology self-efficacy beliefs of student teachers in relation to their program preparedness. The purpose of this study was to measure their beliefs regarding their ability to integrate technology in their teaching and to measure their perceptions of the program at QU. This chapter discussed the methodology and procedures that were used to answer the research questions. It reports information on the participants, instrument, and procedure.

Participants

Participants in this study were student teachers from the undergraduate program in the College of Education at Qatar University taking the course, Student Teaching. Data was collected during the academic year of 2018. All participants were student teachers in their final semester and had completed a majority of their student teaching course. They held a minimum GPA of 2.00, as required by the college to qualify for their student teaching training. All participants volunteered their participation and no course credits were granted.

A total of 174 students consented to their participation. Of the 174 students, 87 were enrolled in the primary education program and 74 were enrolled in the secondary education program. 13 students did not mention their specialization. Table 1 describes the distribution of participants according to their area of specialization.

Table 1. Participants Distribution by Specialization

Area of Specialization	Frequency	Percent
Primary Early Childhood	35	20.1
Primary Math and Science	13	7.5
Primary English	10	5.7
Primary Arabic	29	16.7
Secondary Islamic	21	12.1
Secondary Math	8	4.6
Secondary English	11	6.3
Secondary Arabic	3	1.7
Secondary Social Studies	21	12.1
Secondary Chemistry	3	1.7
Secondary Biology	7	4.0
Missing	13	7.5
Total	174	100.0

Based on participants' demographic data, the majority of participants were between 21 and 25 years old, with an average age of 24 years. Furthermore, students of the Qatari nationality represented 60% of the participants. The gender distribution for the participants was characterized as 94% females and 6% males. Table 2 describes the distribution of the participants according to their gender

Table 2. Distribution of Participants by Gender

Responses	Frequency	Percent
Male	11	6.3
Female	163	93.7
Total	174	100.0

As demonstrated in the table above, the size of the male population was small when statistically compared to the female population. Thus, male participants' data was excluded from this study.

Instrument

A series of questionnaires from previous studies were reviewed to determine their appropriateness to the constructs and variables this study aimed to measure. A single assessment tool could not accurately measure all the constructs in the current study; therefore, a combination of questionnaires were analyzed, dissected, and modified for applicable items. Bandura (2006) argues in support of tailoring self-efficacy scales to better accommodate the specific context of a study.

Overall, the assessment tool consisted of three sections. The first section consisted of 5 items that asked participants for demographic and educational data, including age, GPA, gender, nationality, and area of study.

The second section consisted of 34 items that assessed participants' educational technology self-efficacy beliefs. Items from this section were adapted from the

Technology Implementation Questionnaire (Technology Implementation Questionnaire, n.d.) and from the Preservice Teacher Technology Survey (Spazak, 2013). Examples of items assessing technology self-efficacy beliefs included, “to what extent can you evaluate, select and use technology for teaching and student learning”, to what extent can you evaluate select and use software for teaching and student learning” and “to what extent can you integrate technology into curriculum”.

The final section consisted of 10 items that targeted the degree to which the program prepared students to integrate educational technology in their teaching practices. This section assessed three aspects of the teacher preparation program related to technology integration: the instructors’ roles, the curriculum content, and student teachers’ experiences during their field training. Examples of items in this section were, “teachers in my program courses model the integration of technology in education well”, “the number of educational technology courses offered in my program is enough to equip me with the skills needed to use technology in my teaching”, and “the internship provided an opportunity to apply the use of technology during my teaching”. These items were also adapted from the Preservice Teacher Technology Survey.

The Technology Implementation Questionnaire and the Preservice Teacher Technology Survey used a 5-point scale and to remain consistent, the same scale was applied to the instrument in this study. Likert scales categorize responses a continuum with even distribution (Likert, 1932). The five point Likert scale allows for an even balance between positive and negative ratings with the option to remain neutral on an item (Likert, 1932). Further, ordered responses are necessary when asking participants to respond meaningfully but in a close ended manner (Likert, 1932).

The questionnaire was constructed in English. Upon finalizing the items for the questionnaire, they had to be translated to Arabic because the language of instruction of the program is Arabic. The questionnaire was finalized by translating the items back to English to ensure concepts and ideas were not lost in translation.

Instrument validity. Validity is the extent to which an instrument can accumulate evidence to accurately support the relationship between concepts, constructs, and variables (Thorndike, 1997). Specifically, construct validity establishes if the instrument measures what it is intended to (Thorndike, 1997). In the case of this study, the questionnaire items aimed to measure educational technology self-efficacy and program preparedness.

Content validity refers to the extent to which items represent the targeted construct (Thorndike, 1997). The accuracy of construct validity does not depend on a numerical calculation solely, but also on rational judgement (Thorndike, 1997). Content validity was examined by a team of instructors at the College of Education to identify the educational technological skills specific to student teachers (see Appendix A). The instructors were given the questionnaire for their review and feedback. The experts commented on the clarity of each item and its relation to the measured constructs. The experts' comments were taken into consideration upon finalizing the questionnaire

Instrument reliability. To determine the reliability of the questionnaire, the researcher conducted a commonly used indicator of internal consistency, the Cronbach's alpha coefficient (Pallant, 2010). Acceptable Cronbach's alpha values are above 0.7, but the higher the value, the stronger the internal reliability (Pallant, 2010). Internal

reliability was calculated for items composing each construct, creating a subscale. Items 1-34 were intended to measure participant’s self-efficacy with regards to educational technology integration. Items 35-44 measured participant’s perceptions of the teacher program preparedness. Within the subscale program preparedness, items 35-37 targeted instructors’ role and modeling of technology use, 38-40 targeted the content of the curriculum, and 41-43 targeted the field training experience. Item 44 asked for an overall rating of the program. Cronbach’s alpha values for the technology self-efficacy scale and program preparedness subscales ranged from 0.84 to 0.96. The values confirmed strong internal consistency and reliability for the subscales and the combined scale. Examination of Cronbach’s alpha indicated that deleting items from the instrument would not improve internal reliability. Cronbach’s Reliability Alpha Values are shown in table 3.

Table 3. Cronbach’s Reliability Alpha Values for Combined Scale and Subscales

Scale	Cronbach’s Alpha	Number of Items
Technology Self-efficacy	0.95	34
Program Preparedness	0.92	10
Instructors’ Role	0.88	3
Curriculum Content	0.91	3
Field Experience	0.84	3
Combined Scale	0.96	44

Test retest was also used to test instrument reliability; the study instrument was piloted on a group of 30 student participants. The same group of students completed the questionnaire after two weeks. Pearson correlation results between the two applications were computed. Results showed a significant positive correlation between self-efficacy test-retest $r= 0.77$, $p\leq 0.05$ and a significant positive correlation between program preparedness test-retest, $r= 0.62$, $p\leq 0.05$ (see Appendix D for the final version of the questionnaire).

Procedure

Literature review. A thorough literature review was deployed searching educational databases for previous studies about theories related to self-efficacy beliefs of student teachers, characteristics and factors that contribute to self-efficacy, and the gaps in literature. English and Arabic databases were utilized to extensively review previous studies.

Instrument preparation and validation. A number of reliable tools were identified from the literature. Eventually, the study tool was developed based on the ability to assess constructs and variables of the current study. The instrument in this study was tested for its validity and reliability.

IRB approval. Prior to data collection the researcher applied for a QU-IRB request for ethics approval. The application form specific to research involving human subjects was completed. Both the student researcher and faculty supervisor are listed. The IRB form included a summary of the study, details of the research methodology, subjects, and criteria. The instrument was included and the technique for analyzing data was

specified. The risks potentially experienced by participating were listed. A consent form was included in the IRB form. To ensure data confidentiality, details of how and where the data will be stored, reused, and participant identity protection were clearly stated.

The IRB form was signed and dated upon submission. There were a number of documents that supplemented the form. The questionnaire and consent forms were attached in Arabic and in English. An approval letter from the department head was required and obtained. This study successfully received IRB approval.

Participants' recruitment. The Office of Student affairs provided the researcher with the number of students enrolled in the program. This provided a basis to support the selection of the targeted population; not only were students easily accessible but the amount of students expected to participate will contribute to strengthening the reliability of the results. As well, the office provided details about the professors instructing the course, Student Teaching. All participants were recruited from this course because at this point in their studies, students had completed the educational technology course and had a chance to apply their teaching methodology in their training. The professors of the student teaching course were approached and the researcher requested instruction time to administer the questionnaire. Time and location were arranged to apply the questionnaire. The questionnaires were collected and stored in an envelope by the researcher to ensure participant privacy.

Alternatively, a copy of the questionnaire was placed in envelopes and given to instructors for distribution to students if the researcher could not be present. Instructors were briefed on how to administer and handle the questionnaire. Each completed survey

was returned back to the envelope and sealed to ensure the privacy of each participant. Questionnaires were picked up from the instructors immediately after completion. All questionnaires were stored securely.

Data collection. Data from student teachers was collected, recorded, and analyzed in the same manner. The questionnaire was administered as a paper and pencil format. Directions for completing the questionnaire directed students to mark the response they felt best described their demographic and education information, self-efficacy beliefs, and perceptions of program preparedness. Participants marked Likert item responses on a scale from 1-5 according to their beliefs and perceptions.

Participants were solicited and asked to complete the questionnaire during instruction time in their student teaching course. The researcher briefly explained the purpose of study and the terms of voluntary participation as highlighted on the consent document. Consent forms were attached to the front of each questionnaire. Students were guaranteed anonymity and confidentiality and the right to withdraw without facing consequences. The questionnaire was not timed, allowing students to complete it at their leisure.

Statistical data analysis. The data analysis in this study was conducted using SPSS, a statistical analysis software package. The program includes the necessary functions for data analysis for this study.

The data from each section of the questionnaire was coded. Age, gender, nationality, and area of study were coded similarly; each response was assigned a chronological coordinating number. The Likert response items were assigned a

numerical point value that represented high or low self-efficacy beliefs and details about the program.

To answer research questions 1 and 3, means and standard deviations were computed. To answer research questions 2 and 4, a univariate analysis was conducted. Finally, to answer research question 5, the Pearson product correlation coefficient and linear regression were calculated.

Important to note, the male sample was excluded from statistical analyses. The small size of the male sample created empty cells while performing tests such as the multivariate analysis. For example, when running the univariate analysis, only one male in the primary specialization was considered. A significant interaction was detected but it was not a true one given that one male participant was included in the tests (Whitley, 1997).

Data screening. Prior to conducting the statistical analysis, the data was screened for miscoded and missing values. Inevitably, the data included missing values from a number of participants. There are possible explanations for missing data such as participants refused to reveal personal information, participants accidentally skipped items, and some items were not applicable to participants (Allison, 2001). Patterns related to missing cases may reveal valuable information (Odom & Henson, 2002). The cases were examined for abnormalities by looking at deviations from a normal distribution and skewness (Odom & Henson, 2002). It was determined by the researcher and supervisor to be missing at random. The literature identified two common methods for dealing with missing data, likewise deletion and imputation or substitution (Odom & Henson, 2002; Helms, 1999). Marginal mean substitution is one of the most commonly used methods

which entails using the variable mean of all case data without missing values to generate a variable mean (Odom & Henson). The generated variable mean is substituted for the missing variables (Odom & Henson, 2002). This study utilized marginal mean substitution for improving the performance of statistical methods.

Chapter 4: Results

This study was designed to examine student teachers' technology self-efficacy beliefs about their competency in regards to technology integration. Further, the study assessed student teacher's perceptions about the role of Qatar University teacher program in preparing them to integrate educational technology in their future classrooms. This chapter reports the findings of the study questions, which were answered by conducting statistical data analysis.

Respondent Academic Data

A total of 174 student teachers from Qatar University participated in the current study. Participants GPA were self-reported in the questionnaire. GPA ranged from 2.00 to 3.88. It is important to note that students with a GPA lower than 2.00 are not permitted by the college to move on to their student teaching training. Thus, GPA levels for participants in this study began at 2.00. The remaining GPAs were divided into average achievement (2.00-3.00) and high achievement (above 3.00-4.00). Table 4 shows participants' GPA.

Table 4. Participants' Academic Achievement (GPA)

		Frequency	Percent
Valid	Average	82	47.1
	High	38	21.8
	Total	120	69.0
Missing	System	54	31.0
Total		174	100.0

Research Question One

What is the perceived level of student teachers' educational technology self-efficacy beliefs with regards to their ability to integrate technology in their classrooms?

In order to assess the level of student teachers' self-efficacy beliefs, the researcher examined the mean scores and standard deviation of the student teachers' responses for each of the 34 items assessing technology self-efficacy in Table 5. Results are organized in descending order according to the mean value. Among the items with the highest means were, "use a projector to assist with teaching", "use the internet to find supplemental material for teaching", and "to what extent do you feel you can learn new educational technology and apply it in your teaching". Among the items with the lowest means were, "use assistive technology for students with disabilities" and "use applications and programs to receive and correct student work". Detailed results are listed in Table 5.

Table 5. Means and Standard Deviations of Technology Self-Efficacy Items

	N	Mean	Std. Deviation
Use a projector to assist with teaching	174	4.52	.824
Use applications or programs to create presentations	174	4.47	.878
Use of graphics, images and videos to enrich teaching material and instruction	174	4.41	.906
Use the internet to find supplemental material for teaching	174	4.40	.936
Use applications or programs to create lesson plans	174	4.19	1.028
Use computer applications or programs to prepare class material	174	4.13	.995
To what extent do you feel you can learn new educational technology and apply it in your teaching?	174	4.07	.867
Use applications and programs for activities to strengthen student involvement	174	4.07	1.068
To what extent can you integrate technology into the curriculum?	174	3.97	1.017
To what extent can you integrate technology into your teaching during your internship?	174	3.93	1.000
To what extent can you evaluate, select and use technology for teaching and student learning?	174	3.91	.892

	N	Mean	Std. Deviation
To what extent can you select the appropriate technology to support your teaching method?	174	3.90	.954
Use e-mail to communicate with teachers, students, and parents	174	3.87	1.288
To what extent can you help other teachers integrate technology into their teaching?	174	3.86	1.028
To what extent can you use technology to evaluate student learning?	174	3.82	1.063
To what extent can you justify why, determine when, and explain how used educational technology?	174	3.78	.930
To what extent can you modify the technology you have learned to suit different education activities?	174	3.74	1.075
Use programs or applications to analyze student data	174	3.72	1.166
To what extent can you evaluate, select, and use software for teaching and student learning?	174	3.69	.965
Use applications and programs to create an E-Portfolio/Digital Portfolio	174	3.69	1.266
Use smart phone applications to assist with teaching	174	3.55	1.383
Use applications or programs to create educational games.	174	3.52	1.355

	N	Mean	Std. Deviation
To what extent do you feel you are able to fix any problems that may occur while using technology in your teaching?	174	3.49	1.152
Use application or programs to create interactive lessons on the computer	174	3.47	1.284
Use computer applications or programs to record and track student grades	174	3.43	1.283
Design and implement electronic assessments	174	3.34	1.209
Use smart board to assist with teaching	174	3.29	1.435
Use applications and programs to create a model simulation	174	3.23	1.362
Use an existing class website to post class material	174	3.22	1.294
To what extent can you evaluate, select, and use technology to support students with learning disabilities?	174	3.15	1.330
Conduct online discussion forums for students	174	3.09	1.307
Create a class website to post class material	174	3.07	1.259
Use applications and programs to receive and correct student work	174	2.85	1.254

	N	Mean	Std. Deviation
Use assistive technology for students with disabilities	174	2.72	1.384
Valid N (listwise)	174		

Further, to assess student teachers' overall technology self-efficacy beliefs, the mean and standard deviation for the 34 items were computed. On 5-point scale ranging from strongly disagree (1) to strongly agree (5), participants held a mean of 3.69 with a standard deviation of 0.71 for self-efficacy beliefs toward integrating educational technology.

A one sample t-test was conducted to determine if a statistically significant difference existed between self-efficacy levels of the student teacher sample used in this study and the general population. Student teachers scored within the expected scores (M=3.69, SD=0.71) of the general population, $t(173)=68.3$, $p \leq 0.05$. The student teacher sample mean fit within the expected mean of the population. This indicated that student teachers possessed an average level of technology self-efficacy. T-test results are shown in Table 6.

Table 6. Summary Statistics of Self-Efficacy One Sample Test

	t	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference Lower	Upper
Self-efficacy	68.28	173	.000	3.69	3.58	3.80

Research Question Two

Is student teachers level of educational technology self-efficacy affected by their specialization (primary, secondary) and academic achievement (average GPA, high GPA)?

A univariate analysis was performed to assess the effect of student teachers' specialization (primary, secondary) and academic achievement (average GPA, high GPA) on their self-efficacy. Results are shown in Table 7.

Table 7. Univariate Analysis of Student Teachers' Technology Self-Efficacy by Specialization and GPA

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5.758 ^a	3	1.919	4.288	.007
Intercept	1329.801	1	1329.801	2971.375	.000
GPA	.088	1	.088	.197	.658
Specialization	5.423	1	5.423	12.117	.001
GPA * Specialization	.631	1	.631	1.410	.238
Error	46.544	104	.448		
Total	1596.303	108			
Corrected Total	52.302	107			

As shown in Table 7, the analysis of variance did not reveal statistical significant differences in student teachers' self-efficacy scores due to their academic achievement, $F(1) = .197, p > 0.05$. However, there was a statistical significant difference in student teacher's self-efficacy scores due to their specialization, $F(1) = 12.12, p \leq 0.05$. Figure 1 shows the significant difference of student teachers self-efficacy beliefs according to

their specialization.

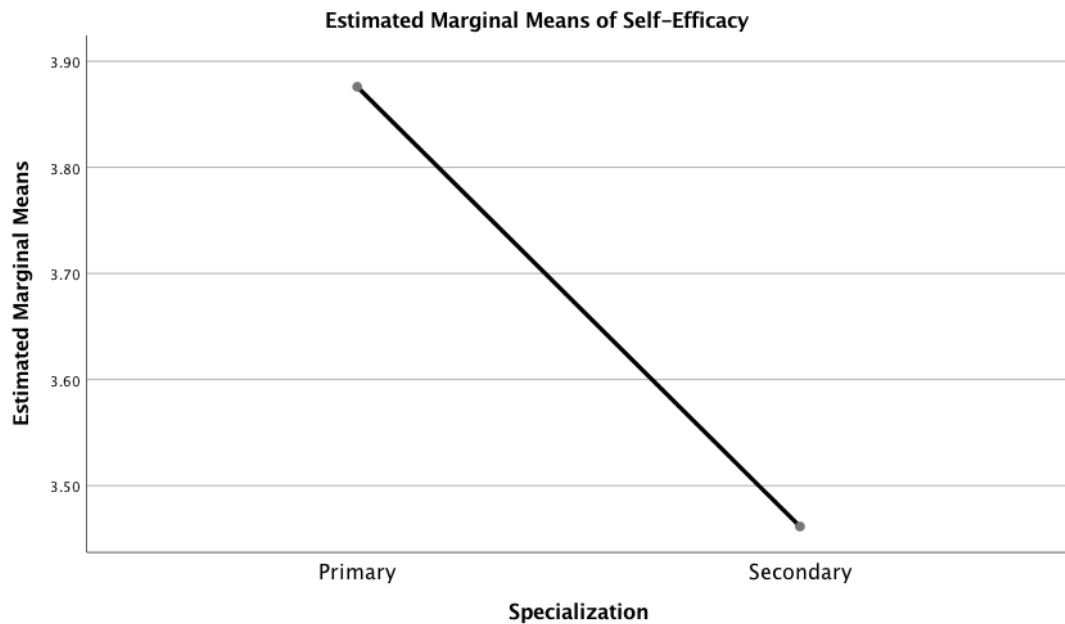


Figure 1. Significant Effect of Specialization on Technology Self-Efficacy

As shown in Figure 1, student teachers in the primary level ($M = 3.88$, $SD = 0.65$) reported significantly higher self-efficacy levels than student teachers in the secondary level ($M = 3.46$, $SD = 0.73$).

Research Question Three

What is the perceived level of student teachers program preparedness with regards to the instructors' role, curriculum content, and field experience to integrate technology in their classroom?

To assess the perceptions of student teacher preparedness, the researcher examined the mean scores and standard deviations of student teachers' responses for each of the 10 items used to assess program preparedness in Table 8. Results are organized in descending order according to the mean value. Among the items with the highest means were, "overall, I think the program effectively prepared me to integrate technology in my teaching and student learning", "the internship provided an opportunity to apply the use of technology during my teaching", and "my duties and responsibilities during my internship included integrating technology into my teaching". Among the items with the lowest means were, "the content of the educational technology courses offered in my program provided me with the information needed to apply technology in my teaching", "training during the educational technology courses are sufficient to equip me with the necessary skills for integrating technology in my teaching", and "the number of educational technology courses offered in my program is enough to equip me with the skills needed to use technology in my teaching".

Table 8. Means and Standard Deviations of Program Preparedness Items

	N	Mean	Std. Deviation
Overall, I think the program effectively prepared me to integrate technology in my teaching and student learning.	174	3.75	1.154
The internship provided an opportunity to apply the use of technology during my teaching.	174	3.74	1.117
My duties and responsibilities during my internship included integrating technology into my teaching.	174	3.68	1.020
Teachers in my educational technology courses model the integration of technology in education well.	174	3.59	1.092
Teachers in my specialized program courses model the integration of technology in education well.	174	3.45	1.110
The supervising teacher during my internship modeled technology integration in teaching well.	174	3.43	1.260
Teachers in my general requirement courses model the integration of technology in education well.	174	3.39	1.105

	N	Mean	Std. Deviation
The number of educational technology courses offered in my program is enough to equip me with the skills needed to use technology in my teaching.	174	3.13	1.284
Training during the educational technology courses are sufficient to equip me with the necessary skills for integrating technology in my teaching.	174	3.06	1.193
The content of the educational technology courses offered in my program provided me with the information needed to apply technology in my teaching.	174	3.00	1.258
Valid N (listwise)	174		

Further, to assess student teachers' overall program preparedness perceptions, the mean and standard deviation for the 10 items were computed. On 5-point scale ranging from strongly disagree (1) to strongly agree (5), participants held a mean of 3.42 with a standard deviation of 0.89 for program preparedness toward integrating educational technology. Further, the means and standard deviations of students' responses on items assessing the instructors' role, the curriculum content, and the field experience were

computed. Results are reported in Table 9.

Table 9. Summary Statistics of Subscales (N=174)

Subscale	Mean	SD
Program Preparedness	3.42	0.89
Instructors Role	3.47	0.99
Curriculum Content	3.06	1.14
Field Experience	3.61	0.99

A one sample t-test was conducted to determine if a statistically significant difference existed between the sample of student teachers' perceptions of program preparedness used in this study and the general population. Student teachers scored within the expected scores ($M= 3.42$, $SD=0.89$) of the general population, $t(173)= 50.45$, $p \leq 0.05$. The student teacher sample mean fit within the expected mean of the population. This indicated that student teachers perceived that the teacher program has moderately prepared them for technology integration. T-test results are shown in Table 10.

Table 10. Summary Statistics of Program Preparedness One Sample Test

	t	df	Sig. (2-tailed)	Mean Difference	95% Interval Difference Lower	Confidence of the Upper
Program Preparedness	50.45	173	.000	3.42	3.29	3.55
Instructors Role	46.11	173	.000	3.48	3.33	3.62
Curriculum Content	35.24	173	.000	3.06	2.89	3.23
Field Experience	48.25	173	.000	3.61	3.47	3.76

Research Question Four

Is student teachers level of perceived program preparedness affected by their specialization (primary, secondary) and academic achievement (average GPA, high GPA)?

A univariate analysis was performed to assess the effect of student teachers' specialization (primary, secondary) and academic achievement (average GPA, high GPA) on their perceptions of program preparedness. Results are shown in table 11.

Table 11. Univariate Analysis of Student Teachers' Perceptions of Program Preparedness by Specialization and GPA

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	3.673 ^a	3	1.224	1.399	.247
Intercept	1101.477	1	1101.477	1258.479	.000
Specialization	2.806	1	2.806	3.206	.076
GPA	.500	1	.500	.571	.451
Specialization * GPA	.160	1	.160	.183	.670
Error	91.025	104	.875		
Total	1387.770	108			
Corrected Total	94.699	107			

As shown in Table 10, the analysis of variance did not reveal statistical significant differences in student teachers' perceptions of program preparedness scores due to academic achievement, $F(1) = .571$, $p > 0.05$ nor specialization, $F(1) = 3.21$, $p > 0.05$. Furthermore, a statistical significant difference was not detected as a result of the interaction between specialization and achievement, $F(1) = .183$, $p > 0.05$.

Research Question Five

What is the relationship between student teachers' educational technology self-

efficacy beliefs and their perceived level of program preparedness for technology integration, including the instructors' role, curriculum content, and field experience?

In order to examine the relationship between student teachers' self-efficacy beliefs and program preparedness, a correlation analysis of the linear relationship between the two variables was conducted. By analyzing the correlation, strength and direction of the relationship can be determined (Palland, 2010). The Pearson product-moment correlation coefficient (r) was calculated between the two subscales. As shown in Table 12, the Pearson product moment correlations indicate a significant positive correlation, $r = 0.51$, $p \leq 0.05$.

Table 12. Summary Statistics of Correlation Values by Self-Efficacy and Program Preparedness Scale

Self-Efficacy	Program Preparedness Scale		
	Pearson Correlation (r)	Sig. (2-tailed)	N
	0.518**	.000	174

Correlation is Significant at the 0.01 level (2-tailed).

The strength of the relationship between the variables can be determined on a range from weak ($r = .10$ to $.29$) to medium ($r = .30$ to $.49$) to strong ($r = .50$ to 1.0)

(Pallant, 2010). Thus, the r values reveal a strong relationship between the technology self-efficacy subscale and program preparedness subscale (see Table 13). Further, the regression analysis was used to test if the subscales for program preparation (instructor’s role, curriculum content, and field experience) predict student teachers’ self-efficacy.

Table 13. Summary Statistics of Regression between Self-Efficacy and Program Preparedness Subscales

	B	SEB	β	T	sig
Instructors Role	.256	.069	.356	3.706	.000
Curriculum Content	-.075	.060	-.120	-1.244	.215
Field Experience	.264	.057	.365	4.619	.000

As shown in table 13, a significant regression equation was found $F(3,170) = 25.132, p \leq .05$ with an R^2 of .307. This indicates that the instructors’ role significantly predicted student teacher’s self-efficacy beliefs ($\beta = .256, p \leq .05$), as did field experience ($\beta = .264, p \leq .05$). Ultimately, self-efficacy can be predicted by the role of the instruction and field experience. Both variables contributed to the variance in student teacher’s self-reported self-efficacy beliefs.

Summary of Findings

This chapter presented the results and findings for the research questions of this study. In order to answer the questions, quantitative data was collected from 174 student teachers and analyzed using SPSS. Question 1 assessed student teachers' self-efficacy levels through 34 items. The mean score for participants was 3.69 and individual item means ranged from 3.69-4.52. Data analysis for question 2 revealed that participants' self-efficacy scores were statistically significant due to specialization where primary student teachers reported higher means. For question 3, program preparedness was assessed through 10 items. The overall reported mean was 3.42. Individual item means ranged from 2.00-3.75. Data analysis for question 3 did not reveal a statistically significant effect of specialization or achievement on program preparedness. Finally, question 5 supported a significant correlation between self-efficacy and program preparedness.

Chapter 5: Discussion and Conclusion

The purpose of this study was to examine the relationship of educational technology self-efficacy beliefs of student teachers and their perceptions of program preparedness at Qatar University. Technology self-efficacy beliefs were self-reported and measured on a scale with 34 items. Program preparedness was measured using three subscales that targeted the instructors' role, curriculum content, and field experience. Additionally, the study looked at the effect of factors such as specialization and achievement on self-efficacy beliefs and perception of program preparedness. This study was based on five research questions that were formulated in chapter one. A supporting literature review was discussed in chapter two. Empirical data was collected and presented in chapter three and four. Finally, this chapter discusses the results of this study related to the existing literature. A list of recommendations and limitations are provided with suggestions for future research.

Discussion of Results for Question One

What is the perceived level of student teachers' educational technology self-efficacy beliefs with regards to their ability to integrate technology in their classrooms?

Student teacher participants self-reported their technology self-efficacy on a Likert scale that targeted their skills and abilities to complete various tasks related to their teaching profession. Participants were presented with skills that they identified on a range from "no knowledge (1)" to "expert knowledge (5)". They rated their abilities ranging from "not at all (1)" to "great extent (5)". Overall, student teachers held an average mean for educational technology self-efficacy beliefs. The literature is clear and consistent

regarding self-efficacy as a predictor for technology integration; high self-efficacy beliefs, which can be strengthened with skill development, indicate a strong likelihood of integrating technology in teaching (Perkmen & Pamuk, 2011). While a number of studies demonstrated high self-efficacy beliefs, context, sample demographics, and research variables make a huge difference (Higde et al., 2004; Giles & Kent, 2016; Teo, 2009). It can be assumed that with average self-efficacy beliefs, technology integration will not be persistent (Perkmen & Pamuk, 2011).

Looking closer at Qatar University student teacher technology self-efficacy beliefs, each item was analyzed for individual means. Items with the highest means were rated from 4.00 and above. Students indicated they held advanced knowledge and skills for using a projector, applications and programs, graphics, images, and videos in their teaching. They also rated their skills as advanced for using the internet and computer to find and create educational materials and create lesson plans. These findings are consistent with the literature; among the most common educational technology course topics are integrating technology, using the internet to find resources and tools, and using multimedia (Kleiner, Thomas, & Lewis, 2007). Thus, student teachers are often the most competent in those skills (Birgin et al., 2010). The literature also points out that using technology for productivity, preparation and, finding resources online is popular with current teachers (Ottenbreit-Leftwich et al., 2012).

Participants also believed they could learn new technology and apply it in their teaching to a great extent. This particular finding is reassuring for future technology integration in classrooms and self-efficacy for teachers as student teachers become service teachers. Technology, programs, and softwares continue to change and, without

the proper training in skills, teachers cannot adapt (Elstad & Christophersen, 2017; Hidge et al., 2014). Qatar University student teachers are, thus, at an advantage when entering their future classrooms. They believe that they are able to adapt to and adopt new educational technology as it changes. It is worth noting that participants in this study could integrate technology into the curriculum and help other teachers integrate technology to a great extent. They could also select appropriate educational technology, justify why when, and how to use it to a great extent. These skills all contribute to high self-efficacy and the relationship becomes stronger with skill development (Perkmen & Pamuk, 2011; Giles & Kent, 2016).

However, student teachers rated some items on the technology self-efficacy scale poorly with the lowest means ranging from 2.00 and below. For example, students indicated they had simple knowledge and skills for using applications and programs to receive and correct student work and for using assistive technology to accommodate students with disabilities. Interestingly, a similar item was rated slightly higher; to what extent can you evaluate, select, and use technology to support students with learning disabilities". The literature demonstrates the least common course content available to student teachers is about using technology to analyze student achievement data (Gronseth et al., 2010). Also, the need for training in assistive technology is present but only a handful of programs prepare teachers to meet special needs of students.

There were two items that were rated by students as intermediate level knowledge and skills that are worth pointing out. Participants rated their skills as average for creating a class website to post class material and conducting online discussion forums for students. This is interesting because the literature related to the importance of these skills

presented mixed results. Current teachers indicate that collaborative technology such as blogs and comment features are the best way to encourage and facilitate student learning and feedback (Ottenbreit-Leftwich et al., 2012). Most instructors in student teaching programs do not believe collaborative technology to be an important topic in teacher training and tend to rarely focus on it (Ottenbreit-Leftwich et al., 2012).

Discussion of Results for Question Two

Is student teachers level of educational technology self-efficacy affected by their specialization (primary, secondary), and academic achievement (average GPA, high GPA)?

Student teachers' technology self-efficacy beliefs were analyzed to find out if they are affected by their specialization and academic achievement. Specialization refers to students' area of study, primary education and secondary education. Academic achievement was self-reported as the overall GPA.

The results in this study demonstrated a statistically significant relationship between self-efficacy and students' area of specialization. Primary student teachers reported higher self-efficacy beliefs than secondary student teachers. The common trend in the literature is to conduct research on a specific sample. For example, self-efficacy of primary level teachers and secondary level teachers were investigated in separate studies. Kent and Giles (2017) found that elementary student teachers had high self-efficacy which contributed to the likelihood of using technology in their teaching. While the mean level for secondary student teachers of this study was not far from primary teachers, there are a number of factors to explore that could have influenced the

differences. The level of technology integration is decided by the teacher, a huge responsibility that can be difficult to manage (Clausen, 2007). The burden placed on secondary level teachers, in combination with lack of confidence in teaching abilities may have resulted in lower self-efficacy (Martin, Shaw, & Daughenbaugh, 2014). Furthermore, efficacy is contextual; looking at curriculum content for secondary teachers and teaching behaviors such as instructional planning and preparation and tool use may help identify the reason for lower efficacy (Henson, 2002).

The results of this study revealed that there was not a statistical significance in self-efficacy scores due to their academic achievement. Educational technology self-efficacy did not vary according to students' GPA. The literature reviewed in this study did not discuss academic achievement as a factor that affects technology self-efficacy. However, there is a wealth of research in the academic context that highlights self-efficacy for learning and performance in the academic context (Joet, Usher & Brassoux, 2011; Alivernini & Lucidi, 2011, Richardson, Bond, & Abraham, 2012). Academic self-efficacy has consistently been demonstrated in the literature to positively correlate with academic performance, especially in the university setting (Richardson et al., 2012). Furthermore, based on the self-efficacy theory, those with low self-efficacy often struggle academically and those with higher self-efficacy perform tasks well and effectively (Bandura, 1994). Thus, it would seem possible that technology self-efficacy and achievement would correlate but this study failed to find the significance between the two. However, this study collected students' overall academic achievement rather than students' academic achievement in educational technology. It is important to consider that there are a number of variables in the university setting that are interacting

with achievement and self-efficacy that cannot be identified. The relationship between the variables is complex and factors such as personality, past performance, past experience, and learning strategies influence efficacy as do, perceived ease of use, perceived usefulness, and perceived importance.

Discussion of Results for Question Three

What is the perceived level of student teachers program preparedness with regards to the instructors' role, curriculum content, and field experience to integrate technology in their classroom?

Participants in this study self-reported their perceptions of technology preparedness on a Likert scale that targeted characteristics of the program limited to the instructors' role, curriculum content, and field experience. Participants were presented with items that they indicated the degree to which they agree with the statement from "strongly disagree (1)" to "strongly agree (5)".

Overall, student teachers at Qatar University assessed their program preparedness as average in regards to technology integration. The subscales of program preparedness were also analyzed. Student teachers rated field experience the highest, followed by the instructors' role, and finally curriculum content. The literature highlights that meaningful teaching with technology requires educators within programs to hold and implement technology inclusive pedagogies (Hew & Brush, 2007). The program at Qatar University made an average impact on student teachers technology preparedness and it is not adequate. It is important to consider that technology is so prevalent within the digital age, so student teachers enter the program with preexisting perceptions and with the necessary

skills and knowledge for technology (Teo & van Shaik, 2012). Also, successful technology program training depends on technology skill development, training opportunities, and training consistent with teacher needs and challenges (Hew & Brush 2007). Based on this, the program is touching on topics and content that students already know, rather than expanding on their knowledge.

This conclusion can be supported by looking closer at Qatar University student teacher perceptions of program preparedness where each item was analyzed for individual means. These items included the overall rating of the program preparation for technology integration and teachers modeling technology well in the educational technology course. As well, the field experience, duties, and responsibilities for teaching with technology were rated similarly. The item with the lowest rating by participants was, “content of the educational technology courses offered in my program provided me with the information needed to apply technology in my teaching”. Educational technology courses and instructors significantly influence student teachers’ perceptions (Pope, 2002; Kontas & Demir, 2015). Aligning with explanations in the literature, Ottenbreit-leftwich et al., 2012 found great inconsistencies with instructors’ roles and content within programs when compared to the reality of teaching with technology tools. Preparation to integrate technology requires action and practice and should be infused within all aspect of the program. Thus, factors within programs that contribute to perceptions of preparedness can be identified and targeted for intervention to create a greater positive impact on student teachers.

Discussion of Results for Question Four

Is student teachers level of perceived program preparedness affected by their specialization (primary, secondary), and academic achievement (average GPA, high GPA)?

Student teachers' technology perceptions of technology program preparedness were analyzed to find out if they are affected by students' specialization and academic achievement. Just like question two, specialization refers to participants' area of study, primary education and secondary education. Academic achievement was self-reported as the overall GPA. The results revealed that students' evaluation of program preparedness was not affected by their specialization and academic achievement, nor by the interaction between the two. That is, students at the primary and secondary level, as well as students with average and high GPA, possess similar perception about program preparedness.

Discussion of Results for Question Five

What is the relationship between student teachers' educational technology self-efficacy beliefs and their perceived level of program preparedness for technology integration, including the instructors' role, curriculum content, and field experience?

Results of this study support a significant positive relation between student teachers' educational technology self-efficacy and their perception of program preparedness for technology integration. The program preparedness subscales were analyzed further to point out which aspects of program preparedness contributed to the significance. Results showed that the instructors' role and field experience significantly predicted self-efficacy but curriculum content did not. Self-efficacy for student teachers

is not limited to their knowledge and skills. Rather, a number of factors contribute to their beliefs and perceptions such as teaching behaviors, training, vicarious experiences and social persuasion (Henson, 2002; Bandura, 1994). For student teachers to integrate technology into practice, instructors utilize tools in their teaching as a model (Paraskeva, Bouta, & Papagianni, 2008). Meanwhile, underutilized tools can be linked to a diminished self-efficacy. (Teo, 2009b) Research links instructor self-efficacy to student technology self-efficacy (Henson, 2002). Thus, the findings in this study reveal a deeper relationship between instructor technology self-efficacy that allowed students to learn and generalize tools to various situations, perfect their skills, and successfully apply their skills Bandura, 1977; Brosnan & Lee, 1998; Whitley, 1997). As for the curriculum content, it is not effective enough to give student teachers the leverage they need to use technology as a meaningful tool (Kent & Giles, 2017).

Recommendations

Results of this study have some vital implications for student teachers, program instructors at QU, program developers at QU, and the Ministry of Education and Higher Education. In addition, researchers can use this study, its findings and limitations, as a starting point for future research. Based on the data analysis of this study, findings and discussion, the following recommendations are made:

1. Student teachers, the university, and the ministry should be aware of the importance in developing positive and strong self-efficacy beliefs among future teachers. While high self-efficacy does not necessarily mean success, it is a strong predictor of adopting behaviors and successfully implementing

tasks or goals such as technology integration. Thus, it is the most reasonable to dedicate efforts to enhancing training and development in education technology.

2. Student teachers self-reported that they held advanced and knowledge and skills for a number of educational technology tools. As well, they strongly believed they could learn and apply new technology in their future classrooms. These skills contribute and strengthen self-efficacy. However, student teachers do not believe that they are capable of using technology to accommodate students with disabilities or special needs. Schools host students with special needs and that cannot be ignored. Teacher programs in the College of Education must focus their efforts to aligning the program requirements and experiences to meet the demand of this students' cohort.
3. In this study, primary student teachers reported higher self-efficacy beliefs than secondary student teachers. This gap needs to be further explored. Workload, stress, and lack of adequate training to meet the conditions of their environment may result in secondary teachers being reluctant to implement technology. Further efforts should be placed to enhance instructional planning and preparation with technology to increase self-efficacy levels for specific environments and curriculum content.
4. Program preparedness at QU is essential for training teachers who can integrate technology appropriately and effectively. Student teachers in this study an average attitude toward the program. When compared with the means of individual items, it can be inferred that training and skill development is not

consistent with their needs. It could be that the QU program may be covering what students already know. Instead, the program developers at QU need to take a step forward and challenge students and branch away from traditional learning of technology. As well, program content should touch on using tools for up keeping with student homework and grades, and assistive technology.

5. Finally, this study found a significant interaction between self-efficacy beliefs and program preparedness for technology integration. A larger emphasis can be placed on the instructors' role since their attitudes and modeling influence student teachers' perceptions and self-efficacy. There is a relationship between the instructors' role and student teacher technology self-efficacy that should be analyzed deeper and beyond this study. The curriculum content is not sufficient to contribute to students' self-efficacy. Students can be interviewed further to identify the gaps and needs. In turn, the efforts will prove useful to meet the goals of the ministry of education.

Future Direction

The data collected in this study used self-reported measures in the form of a questionnaire. Future research should consider collecting qualitative data using interviews and focus groups. This will allow for an in-depth analysis of the gaps in students' program preparedness and identify areas to improve in curriculum content, instructors' role, and field training.

It is also recommended to follow the sample through their career to see their actual integration of technology in their teaching and identify factors affecting their

technology use.

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