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FOSTERING TEACHER SELF-EFFICACY FOR K-12 CLASSROOM TECHNOLOGY INTEGRATION: THE ROLE OF PROFESSIONAL DEVELOPMENT AND GROWTH MINDSET

Audra Lisa Beberman
Saint John's University, Jamaica New York

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Audra L. Beberman

Date Submitted:_____ Date Approved: _____

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Audra L. Beberman Dr. Erin M. Fahle

ABSTRACT

FOSTERING TEACHER SELF-EFFICACY FOR K-12 CLASSROOM TECHNOLOGY INTEGRATION:
THE ROLE OF PROFESSIONAL DEVELOPMENT AND GROWTH MINDSET

Audra L. Beberman

Professional development, in some form, is a critical part of a teachers' evolution and how they learn and develop new skills to integrate into their teaching practice. This quantitative study was conducted to describe the extent to which self-efficacy is fostered by the type of technology integration professional development (one-to-one coaching or traditional professional development) in which a teacher participates when they later try to incorporate technology into their lessons. The sample will be currently working teachers from suburban Long Island school districts who voluntarily responded to a 3-part, 39 question survey distributed via a listserv. The survey collected teacher demographics such as years teaching and subject taught as well as measured their mindset (fixed, mixed, or growth) and self-efficacy for technology integration. The latter two parts of the survey were taken from previously existing surveys and modified for use in this study with permission from the authors. The results of this study help to identify connections between a teacher's mindset, their years of experience, the subject matter they teach, and their feelings of self-efficacy with technology integration.

Keywords: teacher self-efficacy, professional development, technology integration, professional development coaching, professional development classes, mindset

DEDICATION

"I'm glad I did it,
partly because it was well worth it,
but chiefly because I shall never,
ever have to do it again."
-Mark Twain

First, last, and always, to my husband, Michael S. Beberman, who with his quiet acceptance of *any* idea that comes into my head, from the sublime to the ridiculous, ("Let's go to Africa!" "Let's get a dog!" "Let's go to the Galapagos!" "Chinese for dinner?" "We need new rugs." "Let's be a family carnival act for Halloween!" "I'm getting a doctorate!") enabled me to make this journey while he held down the fort, went to puppy classes with our Khaleesi, and found a way to grin and bear the tuition, as well as many a Tuesday night of solitary dining, and other nights of incoherent muttering from the other side of the couch while I wrote, rewrote, and rewrote again. Thank you. This is your accomplishment in as many ways as it is mine. I love you - always have, always will. You and our dog(gies) are my whole world.

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spent reviewing my work gave me a sense of purpose that enabled me to find my way through the frustration I sometimes felt along the way by offering sound advice and possible angles I had not considered. I owe you more than a million words of thanks can express.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Chapter 1: Introduction

Many school districts have become 1:1 computing environments, which means that they have whole schools or whole grade levels where every student receives a personal computing device for use across all disciplines which is taken from class to class, and in some cases may be taken home at the end of the school day (Dorfman, 2016). How teachers make use of these devices in class—or do not—depends upon the quality and type of training they receive and internalize to create self-efficacy. Many teachers, no matter their age, gender, or years of experience, admit to being uncomfortable with using instructional technology as a tool for teaching (Trehearn, 2010). This lack of self-efficacy is concerning. They do, however, concede that with proper training, they would be interested in implementing technology into their classrooms (Davis, Preston, & Sahin, 2009).

Currently practicing teachers, most often, receive training about new techniques and professional standards through professional development. Annual professional development is required by virtually every teaching contract in the country and is widely accepted as a way to improve teaching (Kennedy, 2016). For example, school districts in New York have been required to annually adopt a professional development plan that meets the content requirements since September 2000 (NYSED, 2015). The purpose of the plan is to improve the quality of teaching and learning by ensuring that all teachers participate in significant professional development so that they can remain current with their profession and meet the learning needs of their student population (NYSED, 2015).

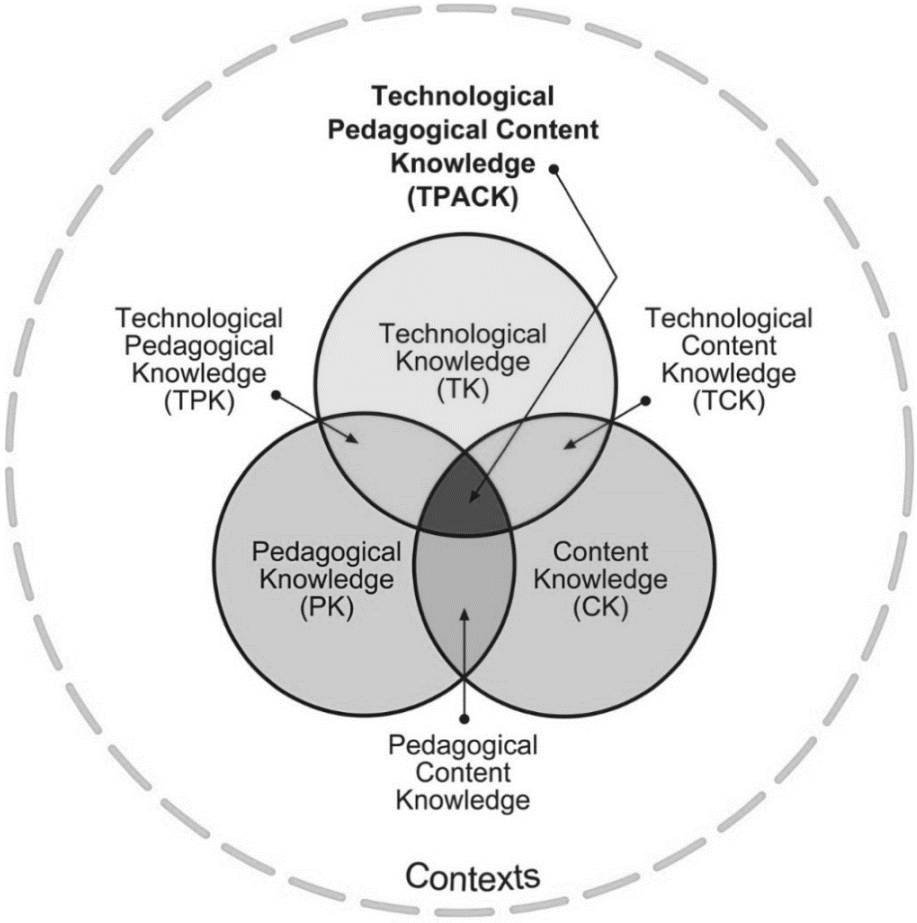
"Technology integration" is the use of technology tools in general education content areas, allowing students to apply computer and technology skills to learning and problem-solving ("What is Successful Technology Integration," 2007). Technology integration professional development (TIPD), therefore, intends to help teachers learn to evolve and change as new technology emerges, as well as learn to use the technology within the context of their pedagogy and their curriculum content. To this end, and to satisfy New York School education law, Nassau County school districts have been implementing a variety of professional development options specifically to aid technology integration and increase teacher self-efficacy in this integration for many years.

Teaching requires content knowledge – specific knowledge about the subject a teacher is teaching – pedagogical knowledge – knowledge about how to teach, including specific teaching methods – and pedagogical content knowledge (PCK) – knowledge about how to effectively teach their subject matter (Shulman, 1987; 1986; Koehler & Mishra, 2009). With the addition to technology to the equation, the Technological Pedagogical Content Knowledge (TPACK) framework has emerged. TPACK describes how technology knowledge intersects with the other forms of knowledge, building on Shulman's (1986, 1987) descriptions of PCK to describe how teachers' understanding of how educational technologies and PCK interact with one another to produce effective teaching with technology (Koehler & Mishra, 2009). In this model (see Figure 1), there are three main components of teachers' knowledge: content, pedagogy, and technology (Koehler & Mishra, 2009). Equally important to the model are the interactions between and among these bodies of knowledge, represented as PCK,

Technological Content Knowledge (TCK), Technological Pedagogical Knowledge (TPK), and TPACK (Koehler & Mishra, 2009).

Figure 1

TPACK Illustration of Intersection of Technological Knowledge, Pedagogical Knowledge, and Content Knowledge. (Koehler & Mishra, 2009)



For teachers to reach the goal of technology integration in their classrooms, professional development must be employed to help them learn the types of skills (TPACK) they need to succeed and feel confident (self-efficacy) using these skills in their classrooms. When and how teachers should receive this type of professional development is an open question. Brand (1997) perceived that training would be more effective if provided at some time outside the normal school day. The author suggested

that time either before or after school should be allotted for training. In this model, teachers would receive training from a technology integration professional development teacher in a class of, typically, between 3 and 15 participants. The format would be a lecture lesson with or without videos, and possibly with some hands-on activity. It may occur as a one-time workshop, seminar, or lecture, and is typically a one-size-fits-all approach (Scherff, 2018).

This strategy may work for traditional professional development classes focused on pedagogical and/or content knowledge; however, true technology integration self-efficacy likely requires interaction with a teacher's students in addition to the teacher. This is so that the coach can model, co-teach, and then observe the teacher under their coaching. This is what makes coaching so different from traditional professional development classes: the ongoing relationship and support between coach and the coached. This is a contrasting professional development model that integrates interactions with both teachers and students from the traditional professional development classes. In the current study the operational definition of "coaching" is one or more sessions between a TIPD coach and one (or perhaps two) teacher(s) in their classrooms - which is their comfort zone. Coaching, when designed well, is typically interactive, sustained, and customized to teachers' needs (Scherff, 2018).

Technology integration into the classroom requires not only that teachers maintain up-to-date content, pedagogical and technological knowledge and skills, but also that teachers feel confident and supported in their use of technology in the classroom. Teachers can develop both skills and self-efficacy through professional development. As previously stated, in the New York State Part 100 regulations, it has been required since

September 1, 2000, for school districts to annually adopt a professional development plan that meets the content requirements. (NYSED, 2015). A problem many teachers have with professional development is that they lack choice in professional development to fit their individual needs (Colbert, et al., 2008), time to further explore and see the strategy in practice, and sometimes, due to financial restrictions, the professional development scheduled does not have the "expert" instructing teachers on how to implement the innovative, integrative instruction. Although not a direct research question in this study, something the researcher considered as the results of the study were being gathered is how the results of this study will help administrators and professional developers create professional development that can create self-efficacy in technology integration for the teachers in their school districts (Wang, et al., 2004). This research concentrated on finding out what fosters greater feelings of technology integration self-efficacy in teachers in relation to their personal demographic information such as mindset, years of experience, gender, and subject matter taught and the type of professional development (traditional professional development classes or one-to-one coaching) in which they participate.

Purpose of the Study

This quantitative, correlational research investigates how teacher's technology integration self-efficacy can be fostered via two methods of TIPD and compares their effectiveness using a three-part survey of currently practicing teachers. The two models of professional development compared are coaching and traditional professional development classes, which differ in multiple ways. In professional development classes, teachers are passive observers in one-time, one-size-fits-all workshops, seminars, or

lectures (Scherff, 2018). In contrast, professional learning or coaching, when designed well, is typically interactive, sustained, and customized to teachers' needs (Scherff, 2018). A non-dictionary definition of coaching is when a teacher works with a technology integration specialist (coach) to learn to integrate a skill or a tool into their classroom practice, watches the coach use it with their (the teacher's) students, and then co-teaches with the coach and their (the teacher's) students, and finally with the coach observing and just being there for support if things go awry, the teacher and his or her students use the tool successfully in a new or extended lesson on their own. Coaching encourages teachers to take responsibility for their own learning and to practice what they are learning in their own teaching contexts (Scherff, 2018). The differences between traditional professional development classes and one-to-one coaching have important implications with respect to adult learning theories and the development of teacher self-efficacy, described in detail in Chapter 2.

The research further explored how four attributes of participants— their gender, their years of teaching experience, the subject they teach, and their self-reported mindset —relate to their self-efficacy for technology integration and potentially mitigate the effectiveness of either of the methods of professional development. Mindset – growth, mixed, or fixed - can determine a person's willingness to participate in professional development at all, and if forced to do so, what they can reasonably be expected to take away from said activities. If a person's mindset is geared towards growth – they may be able to glean positive results from even the dullest professional development class. However, if a person's mindset is fixed, not even a rock concert and circus acts could engage them in the learning process. In a mixed mindset, one will persevere until

they face a struggle or obstacle. They need help with a strategy before they can overcome the obstacle. With a mixed mindset, a person is inspired to do better by feedback, but cautiously considers the source in order to take it seriously (Growth Mindset? Fixed Mindset or the combination of the two previous ones?, 2018).

The researcher's conceptual framework begins with the personal attributes that teachers may bring to professional development feeding into the two types of professional development they may attend. Once these teachers are situated in their respective types of professional development, the theories of adult learning come into play, alongside their individual mindset. If they have a growth mindset, an educator will most likely be able to achieve valuable technology integration self-efficacy from either type of professional development, however, a person with a fixed mindset may not achieve much self-efficacy with either type of professional development. This is one of the important pieces of information we hope to learn from this research study. What will happen if a person has a mixed mindset? Does a person's mindset matter at all when trying to achieve a level of proficiency in a new skill?

Significance of the Study

There is a great demand for educators to integrate technology into many of the lessons they teach to increase the digital literacy of their students. Schools and districts must help to prepare these teachers in the best and most efficacious way possible. This study examined whether teachers' self-efficacy for technology integration is related to the type of TIPD they receive along with pieces of demographic information. This information can be very valuable to school districts by emphasizing the benefits of one model over the other and help school districts determine how to spend their professional

development budgets most wisely concerning TIPD. The results will also benefit education policymakers by providing information as to whether professional development should be tailored to the type of staff they have, experienced or less so, male/female ratio, and possibly most importantly, the mindset of the staff that needs the professional development.

Research Questions

- RQ1: To what extent is there an association between the type of professional development a teacher receives (one-to-one coaching or traditional professional development) and self-efficacy for technology integration?

  RQ2: To what extent is there an association between teachers' mindset and their self-efficacy for technology integration?
- RQ3: To what extent is there an association between teacher characteristics (gender, years of teaching experience, and subject matter taught) and self-efficacy for technology integration?

Definition of Terms

Coaching. A 1:1 training session that occurs between a TIPD coach and one (or perhaps two) teacher(s). Coaching, when designed well, is typically interactive, sustained, and customized to teachers' needs (Scherff, 2018). These coaching sessions often take place without students in the classroom, then with students in the classroom, and then with the coach observing the teacher doing the work on their own.

Traditional Technology Integration Professional Development. A class of between 3 and 15 but possibly upwards of 20 teachers in attendance, sitting, and possibly responding to a lecture-style lesson, with some hands-on activity.

Technology Integration. The use of technology tools in general content areas in education to allow students to apply computer and technology skills to learning and problem-solving.

Self-Efficacy. According to Bandura, self-efficacy is defined as one's beliefs about their ability to perform on a task (Pajares, 1996). In the case of this research, that task would be technology integration in the classroom. Bandura hypothesizes that self-efficacy is shaped by a number of factors, most importantly mastery experience influence (Pajares, 1996).

Chapter 2: Review of the Literature

Chapter 1 introduced the idea of TPACK and why knowing content, pedagogy, and technology in combination is urgently important for technology integration, and how teachers, given professional development that suits their needs, can help them achieve the self-efficacy required to master the goal of technology integration. Chapter 2 introduces the theories of adult learning and why it is imperative that practitioners of professional development understand these different theories and how to put them into practice when designing professional development classes or coaching sessions in order to achieve learning and feelings of self-efficacy in their teacher-students. Chapter 2 also explores the related literature that surrounds the current research, briefly explains the history of professional development (both the successes and the failures), and explains the gap in the literature which is filled by the current research.

The purpose of this quantitative, non-experimental research is to compare the effectiveness in fostering teachers' technology integration self-efficacy—a teacher's confidence in his or her ability to integrate technology within his or her classroom teaching using two distinct methods of TIPD. In the remainder of this chapter, the researcher lays the theoretical framework for this research, discuss a brief historical perspective of professional development and describe a hypothesis for the research.

Theoretical Framework

In the context of professional development, teachers are the learners. Providing TIPD that both meets the learning needs and styles of teachers and also delivers the appropriate content and skills is critical for teachers' integration of technology in their

work and developing self-efficacy. When considering the two models of professional development in this study (traditional professional development classes versus one-to-one coaching) one must look at how learning theories characterize teacher learning, how these theories work within these two models of professional development, and subsequently, how the theories and the type of professional development both play a part in influencing self-efficacy for technology integration.

Self-efficacy. Bandura (1986) defines self-efficacy as one's beliefs about their ability to perform on a task. In this case, that task would be technology integration in the classroom. Bandura hypothesizes that self-efficacy is shaped by a number of factors, most importantly mastery experience – prior, successful experience performing the task (Pajares, 1996). For teachers who are new to technology integration, professional development provides a space for them to acquire this mastery experience. In this venue, they can obtain the TPACK (defined in Chapter 1) necessary to support the execution of the task, and possibly attempt technology integration in their classrooms. This, in turn, is theorized to build their self-efficacy for technology integration. Evidence from other fields provides face validity to this model. For example, in an experiment in the area of financial literacy, professional development positively affected teachers' implementation of financial education in the classroom and their self-efficacy for teaching these subjects (Hensley, Jurgenson, & Ferris, 2017). Studies, however, have not investigated this model within the framework of technology integration.

As an additional point for coaching as the more effective tool for professional development that creates teacher self-efficacy in technology integration, Kritsonis (2005) describes three methods that exist to increase self-efficacy: provide clear instructions,

provide the opportunity for developing the skill, and model the desired behavior. Kritsonis (2005) additionally states, four processes are likely to increase the chances of success during professional development for reaching social cognitive change: attentional processes (individuals learn from model they relate to), retention processes (the degree in which an individual remembers the model and characteristics), motor reproduction processes (converting observation into doing it), and reinforcement processes (changing behavior due to rewards and positive incentives). These conditions all exist in the realm of one-to-one coaching.

Adult learning. The current study focuses on the comparison of how two models of professional development (traditional professional development classes versus one-to-one coaching) relate to teacher self-efficacy. We need to understand how adults learn (or acquire mastery experience) within professional development. Vygotsky's Sociocultural Theory (SCT) of learning highlights the importance of learners' (in this case teachers') active participation in their learning (David, 2014). If we agree to this premise, then it is likely that professional development models that incorporate active participation, social experience, and interaction, collegiality, etc., will foster more learning and retention.

Similarly, Knowles´ (1988) theory of andragogy reoriented adult educators from "educating people" to "helping them learn" (p. 56). It requires meeting adult learners at a different point than one meets children or teens, even though you might teach them all. It talks about the psychological needs and differences and the fact that adults tend to be more self-directed, internally motivated, and ready to learn. Considering the social and informal nature of professional development one could see how Knowles (1988), in focusing on the notion of informal education, was pointing to the 'friendly and informal

climate' in many adult learning situations, the flexibility of the process, the use of experience, and the enthusiasm and commitment of participants (p. 57). The psychological climate should be one which causes adults to feel accepted, respected, and supported; in which there exists a spirit of mutuality between teachers and students as joint inquirers; in which there is freedom of expression without fear of punishment or ridicule. The psychological climate should be one which causes adults to feel accepted, respected, and supported; in which there exists a spirit of mutuality between teachers and students as joint inquirers; in which there is freedom of expression without fear of punishment or ridicule (Knowles, 1988, p. 47). This is a good description of the activities involved in coaching. To illustrate these points, during the 1990s, some educators suggested that traditional forms of professional development were inadequate for meeting the educational needs of students; some researchers claimed it was missing the focus, intensity, and continuity required to change classroom practices (Choy, Chen & Bugarin, 2006). Therefore, researchers began to establish "best practices" for staff development and numerous experts created guidelines for high-quality professional development (Choy, Chen & Bugarin, 2006). The collaboration process is multi-faceted, it involves teachers identifying their needs and assisting with the creation of professional development opportunities, it devises a method to meet individual teachers' needs while promoting a system of collaboration, is sustained over a period of time along with monitoring coupled with support and ultimately evaluates the impact of teaching practice on student performance (Choy, Chen & Bugarin, 2006). This is not only the definition of coaching but also of building professional relationships.

To effectively move through developmental phases, teachers must have opportunities to observe and discuss expertise. Simply stated, “teachers need input from sources other than themselves" (Marzano, 2011). The input that teachers receive in a traditional professional development class is brief and not particularly individuated. The input a teacher receives through coaching extends over multiple sessions and is tailored to that particular teacher’s needs. The relationship a teacher can build with their coach and the collegiality that entails is unable to be replicated in a single-session professional development session. An example that illustrates where collegiality is key to adult learning and professional development is a 1989 study by Lambert in which he found that when given opportunities for teachers to express their own thoughts and opinions, opportunities to work towards change within the school setting, contributing to the knowledge base of the profession and playing an active part in the leadership of schools, this allowed teachers to gain a greater understanding of their own practices, resulting in an alternate approach to their work, ultimately causing a shift in what they perceive to be important.

Growth mindset. Dweck’s (2016) growth mindset theory states that when students (young or old) believe they can improve their abilities, they understand that effort makes them stronger. Therefore, they put in extra time and effort, and that leads to higher achievement (Dweck, 2016). Dweck’s Growth Mindset theory plays a role in this research because the mindset one brings to professional development might mean the difference between success and failure even more than the type of professional development received. Neither PD model may be successful if mindsets are fixed, whereas both could be if mindsets are growth. Another factor to consider is that one

person may have a mixed mindset and how will that effect their self-efficacy and professional growth?

Ultimately, these learning theories suggest that the coaching model will provide more successful mastery experiences for teachers because they not only develop their TPACK but practice and receive support in the context of the environment in which they will integrate technology. The hypothesis, however, is contingent upon the fact that the coaching is delivered successfully.

Expanded Review of Professional Development

For context, this section provides a quick look at where professional development came from and where it is heading in this research.

In-service. In the 1970s, well before electronic technology integration was a concern, professional development was referred to as "in-service." Teachers were given the distinction of adult learners and "this 'revolutionary' insight coincided with an increase in knowledge about adult learning" (Lambert, 1989). Based on their awareness of adult learning, school districts during the 1970s delivered in-service programs to teachers as single, isolated events. The in-service event might include motivational speakers or the occasional conference on particular subject matter (Pelezo, 2017). These professional development days were criticized as being an insult to teachers' professionalism. Speakers often came across as experts there to fix what was wrong with the teachers to whom they were presenting (Senge, et al., 2000), decreasing teachers' sense of dignity, professionalism, and vision. This method of "in-servicing" teachers did not meet the teachers' needs for targeted training for improving classroom instruction (Lambert, 1989). As a result, in-service evolved into staff development.

Staff development. Staff development focused on longer-term, multi-part classes and on participant teachers becoming experts in content and techniques which they could/would then teach to their colleagues (Lambert, 1989). This new method was problematic in that these so-called and newly created "expert" teachers lacked a sufficient knowledge base in adult learning or in the actual concept they were teaching to train and assist their colleagues, thus causing them to turn to outside researchers to answer their questions (Lambert, 1989). Hunter (1979) and Berliner (1984) assisted school districts by providing frameworks and techniques on how to deliver information to other teachers. In the 1990s, a push to "professionalize" teaching careers gave birth to the term "professional development" (Trehearn, 2010). Despite the challenges to find the right professional development at the right time, this is the model that is prevalent across the United States and specifically in Nassau County where the current research took place.

Coaching. Joyce and Showers (1980; 1981; 1982) insisted that to support reading, technology, math, or science, coaching integrated supporting elements such as companionship, technical feedback, analysis, and adaptation as a teacher integrated their newly acquired knowledge in their classroom (Sparks, G.M., 1983; Sparks, D., 2013). Joyce (1980) emphasized that it was not enough to show and tell a teacher about a new skill or technique, that for newly acquired skills to be successfully integrated into the teacher's classroom routine modeling, practice and feedback were all a vital part of the teacher's development

Learning a new skill and transferring it to the classroom constituted a fresh new approach to teacher development (Pelezo, 2017). By most accounts, coaching has served as an effective model of professional development, and research supports the use of one-

to-one coaching in the classroom as a positive method to aid in improving classroom practices (Pierce, 2015; Haager, et al., 2010).

Research is ongoing to establish a specific set of goals or rules for professional development coaches and another set for professional development classes. Almost like a curriculum. This is currently at a county level. Neither of these things currently exist. Nassau BOCES has, for the last two years, been holding quarterly "Technology Integration Roundtable" meetings for all Technology Integration Specialists, Coaches and providers of TIPD to provide some type of consistency among practitioners as well as give them a place where they can learn new stratagem together. Educational Technologists and Technology Coaches need messaging to help their learners (teachers) understand the significance of becoming self-efficacious in technology integration, and this message needs to be consistent in all districts (Appendix E).

Professional Development, Teacher Self-Efficacy, and Teacher Practice

Research shows that professional development can raise teacher self-efficacy. Overbaugh and Lu (2008) investigated the impact of professional development courses on the course participants' self-efficacy in learning about and implementing instructional technology among 377 course participants. The authors developed a 17-item Self-Efficacy instrument, comprising four domains: (a) Technology and Curriculum Standards (b) Product/Productivity (c) Process/Learning (d) Course Delivery Method and Media (Medium). Each domain had an alpha reliability coefficient greater than 0.9. Using ANOVAs, the authors find the courses did increase participants' confidence and competence in technology integration in all domains
tested (Overbaugh & Lu, 2008). The biggest increase in self-efficacy was for the items

that assessed the use of new technologies/instructional strategies to enhance learning by participants' students (Overbaugh & Lu, 2008).

Mouza (2011) investigated the potential of a professional development program centered on case development to help urban teachers: (a) integrate technology with content and pedagogy and (b) cultivate habits of reflection required to learn from practice. Data collected at the beginning of the PD program indicated that most teachers were fairly comfortable with technology but did not make substantial use of it in their classrooms (Mouza, 2011). Qualitative analysis revealed that case development helped teachers develop an understanding of the nuanced relationships among technology, content, and pedagogy and engage in the type of reflection that enables learning from practice. Nevertheless, variability existed in the ways that teachers applied new knowledge to practice (Mouza, 2011). Evidence from case narratives illustrated that teachers' reluctance to integrate technology in complex student-centered ways was largely attributed to three factors: (a) beliefs about students' deficits, (b) prescribed curricula, and (c) limited amount of resources rather than their own self-efficacy beliefs (Mouza, 2011).

Professional Development and Other Outcomes

Teacher retention. Teacher retention has been studied for decades, yet it has recently assumed renewed significance due to current teacher shortages (Watson, 2018). Watson (2018) studied whether teachers' job embeddedness (JE) is related to turn over. For this study over 143 teachers with less than five years of experience in three school districts in Central California were surveyed, and the researchers identified a correlation between retention and embeddedness through the use of multivariate analysis of variance

(Watson, 2018). The results indicate that JE is indeed related to novice teacher retention (Watson, 2018). "Organizational fit," which included professional development, was positively related to novice teachers' retention (Watson, 2018).

Student achievement. Martin, Strother, Beglau, Bates, Reitzes, and Culp (2010) evaluated an instructional technology professional development program that used many practices advocated by professional development experts. The researchers discovered that greater professional development fidelity was associated with higher-quality lesson plans and higher student achievement. (Martin, et. al., 2010). The researchers found a significant correlation between overall professional development fidelity scores and the quality of the lesson plans teachers created; $r\ (151) = .302$, $p < .001$ (Martin, et. al., 2010). They then estimated correlations between the quality of lesson plans and the different factors that comprise fidelity to see if certain aspects of the professional development had a stronger relationship to teacher outcomes than others (Martin, et. al., 2010). The professional development factors most strongly associated with high-quality teacher self-efficacy and products include modeling instruction, technology utilization, connection to practice, and inquiry-based learning (Martin, et. al., 2010). These factors correspond to the current research because these are all facets of excellent coaching. The researchers did one more quantitative analysis and entered all five factors together in one step. The overall model predicted a significant amount of variance (16.0%, $f^2 = 0.19$) and, as expected from the correlation analyses, modeling instruction was the strongest predictor of the quality of lesson plans (Beta = 0.433, $t = 3.30$, $p < .001$) (Martin, et. al., 2010). The higher the quality of lesson plans, the more confident the teacher, therefore the higher the self-efficacy. This lends tremendous support to the idea that coaching

would be the stronger of the two types of professional development in the current research that would affect teacher self-efficacy in a positive way.

Summary: Creating a Community of Learners

The urgent need for successful technology integration and elevation of teacher's self-efficacy with same has redoubled efforts of professional development organizers to understand what works and why. This chapter presented a framework for adult learning, examples of how professional development has evolved in approximately the last forty years, and why sometimes it has been perceived as ineffective by both the participants and leaders who put it in place. Moreover, it showed that professional development can raise teacher self-efficacy, as well as reduce teacher attrition and increase student achievement. This dissertation directly compares teachers' self-efficacy for technology integration between those who have experienced coaching and professional development classes to identify if there are meaningful differences by type of professional development.

Chapter 3: Methodology

Research Design

To answer the research questions, the researcher used a non-experimental, correlational design. In this study, the researcher surveyed a sample of teachers, described below, using a three-part survey that collected demographic data, measured the teachers' mindset, and measured the teachers' feelings of self-efficacy with technology integration. The researcher used a series of linear and multiple regressions to identify the patterns of teacher self-efficacy alongside demographics, mindset, and type of professional development.

Hypotheses/Specific Research Questions

RQ1: To what extent is there an association between the type of professional development a teacher receives (one-to-one coaching or traditional professional development) and self-efficacy for technology integration?

H_0: There is no association between the type of PD a teacher receives (one-to-one coaching or traditional professional development) and their technology integration confidence level.

RQ2: To what extent is there an association between teachers' mindset and their self-efficacy for technology integration?

H_0: Teachers' level of self-efficacy will not differ based on teachers' mindset; the mindset-self-efficacy interaction term will be zero.

RQ3: To what extent is there an association between teacher characteristics (gender, years of teaching experience, and subject matter taught) and self-efficacy for technology integration?

H_0: There is no association between teacher characteristic and self-efficacy for technology integration after controlling for gender, years of teaching, or subject matter taught.

Instrument

A single survey with three components was provided to all teachers. Part one asked for teachers' demographic information; part two measured teachers' growth mindset; and part three measured teachers' self-efficacy for technology integration. A copy of the entire survey is provided in Appendix A. In total, the survey should take no more than 13 minutes to complete. According to Survey Monkey Data, many people completed in less than the estimated time (6 minutes).

Demographic information. The following information was requested in this section: gender, years teaching, what percentage of the total professional development they have had was with a coach, and finally, what percentage of the total professional development they have had was in a traditional professional development class. Some questions asked for more thought such as describing the most memorable professional development they ever attended. The researcher used this information to categorize the teachers into PD categories. There are 15 questions in this section that range from multiple choice to Likert to fill-in the blank.

Growth mindset. The questions, used with permission (see Appendix B), come from the Project for Education Research that Scales (PERTS) survey. According to Hanson (2017), the PERTS study empirically tested the scale reliabilities using the predetermined indicator of Cronbach's alpha > .80 as an acceptable level for internal

reliability of a widely used scale (Nunnally, 1978). A variety of studies have been performed and reported in the literature demonstrating concept validity of the operationalized constructs on the PERTS scale (Farrington et al., 2012). The scale has strong face validity being currently used in large scale studies (Hanson, 2017). The use of the PERTS survey instrument provides data to make valid decisions on the factors; student self-efficacy in the classroom, (Hanson, 2017) and two other factors irrelevant to the current research. There are just 3 questions in this section and are answered on a Likert scale of six levels ranging from "strongly agree," "agree," "somewhat agree," "somewhat disagree," "disagree," to "strongly disagree."

Technology Readiness Survey (TRS). The third part is the Technology Readiness Survey and is being used with permission by the authors (see Appendix C). This survey measures a teacher's familiarity with and self-efficacy feelings about technology use in their classrooms. During development, the TRS survey was reviewed by a panel of six content experts in the area of self-efficacy (five professors and one graduate student). The experts were provided with a bibliography and a summary of the literature review. These served as the content universe. Individually, the experts reviewed the materials and commented on the adequacy of the conceptual definition. Wang (the author) also developed a rating sheet so that the experts could rate and make suggestions for each item on the instrument. With the feedback obtained from the experts' ratings, appropriate revisions of the instrument were made. Based on these revisions, it was believed that the content validity of the instrument was convincing (Wang, Ertmer, & Newby, 2004). Factor analysis further confirmed that the final 16 items formed a valid instrument measuring a single construct (Wang, Ertmer, & Newby, 2004). This section

consists of 20 questions, all on a 5 level Likert scale. These levels are: “strongly agree,” “agree,” "neither agree nor disagree” “disagree,” and “strongly disagree.”

Data Collection Procedures

This survey was made available to approximately 16,000 educators in 56 school districts in Nassau County, on Long Island (316 schools total) via Survey Monkey (https://www.surveymonkey.com). The researcher accessed these teachers via the Nassau Association of School Technologists (NASTECH) Listserv, by permission (Appendix D). From there the survey link was disseminated to teachers by those member Technology Directors to the school district employees. Data collection took place over a period of 30 days in early 2020. A reminder email was sent to potential participant district Technology Directors to remind their teachers halfway through the data collection period to attempt to increase the response rates.

Data was then exported from Survey Monkey into SPSS for analysis. Participation in this research study is completely voluntary. Informed consent was explained and obtained via the opening page of the survey in a letter to prospective participants that gave information detailing the study, voluntary participation, and confidentiality of information (Appendix A). In order to continue with the study, participants must acknowledge that they have read and understand the informed consent page. Any educator who did not wish to acknowledge their agreement or did not wish to participate simply did not complete the survey.

Sample/Participants

There were 218 people who clicked the link to the survey and answered the consent question. 149 of these responded to additional questions, three of these were

incomplete, 65 didn't answer any questions except for the consent question. In total there were 156 complete surveys from which to glean information for this study. This is a 71.56% completion rate. When the data was closely read, some flaws in the responses were observed. The two questions regarding the type of professional development teachers had received over their total career should have totaled 100%. 42 cases were deleted because the respondent's answers were ambiguous and could not be interpreted as to how much of each type of professional development they had received over the course of their career.

The participants in this study consisted of currently practicing teachers from suburban school districts in Nassau County, on Long Island, New York. The sample is one of convenience, as the teachers work in districts that have Technology Directors who are members of the Nassau Association of School Technologists (NASTECH) group at Nassau County Board of Cooperative Educational Services (BOCES). The researcher, and the school district in which she works are members as well.

Nassau County is located in southern New York State, on western Long Island, and includes 56 public school districts with 209,064 students enrolled in grades K-12 in the 2018-2019 school year, and 16,301 teachers in the 2018-2019 school year ("Nassau County School Districts," 2019). The targeted school districts have both technology integration coaching during the school day which occurs throughout the year and traditional professional development technology integration classes that occur throughout the year, before, during, and after school. The target population for this study was K-12 teachers who have received either or both types of professional development (coaching and/or regular classes) at some point in their careers. To participate in this study, teachers

need to be currently practicing and have taken/received TIPD at some point in their careers. The teachers that were surveyed represent a variety of various career experience levels.

The subjects of this study are 106 currently practicing teachers. Respondents who completed the survey represent all disciplines with the three highest certification areas identified as were 30 Elementary school teachers, 10 Secondary Math Teachers, 13 Secondary English Teachers, 13 Secondary Science Teachers, 4 Secondary Social Studies teachers, and 36 Other Teachers, which included Art, Music, Technology, AIS, Math Support, Library-Media, Physical Education, Health, etc. (Table 1). 84 respondents were female, 17 were male, 5 preferred not to answer (Table 2).

Table 1

Subject Areas Taught of Survey Respondents

Subject Area	Number of Respondents	Percent
General Education	30	28.31%
Math	10	9.43%
English	13	12.26%
Science	13	12.26%
Social Studies	4	3.77%
Other	36	33.97%
Total	106	100.00%

Note: Other Includes: Art, Music, Technology, Physical Education, Health, World Language, Library-Media, Technology, Speech, OT, Reading, AIS, RTI, Math Support

Table 2

Gender of Survey Respondents

Gender	Number of Respondents	Percent
Female	84	79.24%
Male	17	16.04%
Prefer Not to Respond	5	4.72%
Total	106	100.00%

On a scale of 1-4 survey respondents were asked, "Thinking over your total career, how big a percent of your professional development has been in traditional professional development, teachers' center, or outside classes in technology integration (meaning more people than just you and the trainer in the room.)" (1 = 0%-25%, 2 = 26%-50%, 3 = 51%-75%, and 4 = 76%-100%) The mean of all 106 of the respondents' answers was 2.51; meaning that the average respondent spent 25%-75% of their time in a traditional professional development setting. On a scale of 1-4 survey respondents were asked, "Thinking over your total career, how big a percent of your professional development has been via one-to-one coaching in technology integration (meaning just you [and no more than one other teacher] and the coach in the room.)" (1 = 0%-25%, 2 =

26%-50%, 3 = 51%-75%, and 4 = 76%-100%) The mean of all 106 of the respondents' answers was 1.11; meaning that the average respondent spent 0%-25% of their time in a coaching type professional development setting

The dependent variable is teachers' technology integration self-efficacy as measured by the survey. A single composite score was generated from the items on the TRS survey (Part 3) for each participant and was considered their self-efficacy score. The independent variables in this study are type of professional development (one-on-one coaching or traditional professional development classes), years of teaching experience, subject matter taught, and self-reported mindset. Most independent variables were all dummy coded so that regression analysis could take place using SPSS. A single variable TIPD (0 = traditional professional development and 1 = some coaching) indicated professional development status. There were three independent variables indicating mindset: a dummy coded variable for growth mindset, a dummy coded variable for fixed mindset, and a dummy coded variable for "mixed" mindset (those who did not fall strongly into either the fixed or growth categories). Gender was also coded into three indicator variables (female, male, and prefer not to respond). Finally, subject taught was coded as 1=SubjectES and 0=SubjectHS. The independent variable for years of experience is the exact number that respondents input rounded to the nearest full year.

Data Analysis

To answer research question 1, the following linear regression was estimated:

$$efficacy_i = \beta_0 + \beta_1 TIPD_i + e$$

In this regression, $efficacy_i$ is the self-reported survey response (average) and $TIPD_i$ is an indicator that the teacher received some coaching (other than or besides traditional PD) for $teacher_i$.

As seen in Table 3 there were 21 individual questions on feelings of self-efficacy surrounding technology integration in the classroom. The mean for each question is reported on this table. Those individual means were then added and averaged and single value for self-efficacy was determined. This was used in the linear regression.

To answer research question 2, the researcher estimated a multiple regression, shown below. In this regression, the researcher included two of the indicators for mindset:

$$efficacy_i = \beta_0 + \beta_1 fixedmindset_i + \beta_2 growthmindset_i + e$$

Here, $efficacy_i$ is defined as above and $fixedmindset_i$ is defined as people believe their basic qualities, like their intelligence or talent, are simply fixed traits and was expressed as "Agree" or "Strongly Agree" on the survey, whereas, $growthmindset_i$ is defined as people believing that their most basic abilities can be developed through dedication and hard work and was expressed as "Disagree" and "Strongly Disagree" on the Likert scale on the survey. Note that the omitted category in the regression on mindset is "mixed mindset." and were defined as having part fixed, part growth mindsets and was expressed on the survey as "Somewhat Agree" and "Somewhat Disagree"

To answer research question 3, the researcher estimated the following regressions of efficacy on teacher characteristics individually and together:

$$efficacy_i = \beta_0 + \beta_1 male_i + \beta_2 female_i + e$$

$$efficacy_i = \beta_0 + \beta_1 subjecttaught_i + e$$

$$efficacy_i = \beta_0 + \beta_1 yearsexperience_i + e$$

Note that the omitted category in the regression on gender is "prefer not to respond." For all regressions, the data was tested to be certain that the assumptions of the model were met (tests for autocorrelation, multicollinearity, normally distributed residuals), as well as external validity (generalization) boundaries.

Chapter 4: Results

This study sought to better understand factors that predict teachers' self-efficacy for technology integration in their classrooms, including the TIPD they have received, their demographics and subject matter, and their mindset. Self-efficacy refers to an individual's belief in his or her capacity to execute behaviors necessary to produce specific performance attainments (Bandura, 1986). This chapter details the results of a series of linear and multiple regressions applied to the survey data described in Chapter 3, to answer each research question.

Results/Findings

Teacher self-efficacy. The mean scores on each self-efficacy question (Table 4) demonstrate that respondents feel somewhat efficacious in their ability to use technology in the classroom. Average responses on most items ranged between 3.0 and 4, which falls somewhere between "neither agreeing nor disagreeing" and "agreeing." Responses to one item -- "I feel confident that as time goes by, my ability to address my students' technology needs will continue to improve" – is higher than the rest (M= 4.12). While this item does not judge teachers' immediate efficacy, it signals that they are approaching this area with a growth mindset. The Growth Mindset means show that most teachers (N=106) that responded to these three questions had scores that tended towards fixed mindsets. Where Strongly Agree = 1, Agree = 2, Somewhat Agree = 3, Somewhat disagree = 4, Disagree = 5, and Strongly Disagree = 6.

Table 3

Mindset Question Means

Mindset Statement	Mean

You can learn new things, but you can't really change your basic intelligence.	1.63
Your intelligence is something about you that you can't change very much.	1.52
You have a certain amount of intelligence and you really can't do much to change it.	1.44

Note: Number of respondents to these questions was 106

Table 4

Mean Self-Efficacy by Question

"I feel confident that I…"	Mean
…understand the Chromebook/Other Device capabilities well enough to maximize them in my classroom.	3.23
…have the skills necessary to use the Chromebook/Other Device for instruction.	3.55
…can successfully teach relevant subject content with appropriate use of technology.	3.73
…in my ability to evaluate apps/ software for teaching and learning.	3.45
…can use correct Chromebook/Other Device terminology when directing students' Chromebook/Other Device use?	3.36
…can help students when they have difficulty with the Chromebook/Other Device.	3.31
…can effectively monitor students' Chromebook/Other Device use for project development in my classroom.	3.40
…can motivate my students to participate in technology-based projects.	3.88
…can mentor students in appropriate uses of technology.	3.64
…can consistently use educational technology in effective ways.	3.75
…can provide individual feedback to students during technology use.	3.69
…can regularly incorporate technology into my lessons, when appropriate to student learning.	3.88
…about selecting appropriate technology for instruction based on curriculum standards.	3.60
…about keeping curriculum goals and technology uses in mind when selecting an ideal way to assess student learning.	3.65
…about using technology resources (such as spread-sheets, electronic portfolios, etc.) to collect and analyze data from student tests and products to improve instructional practices	3.30
…will be comfortable using technology in my teaching.	3.76
…can be responsive to students' needs during Chromebook/Other Device use.	3.56
…as time goes by, my ability to address my students' technology needs will continue to improve.	4.12
…can develop creative ways to cope with system constraints (such as budget cuts on technology facilities) and continue to teach effectively with technology.	3.47
…can carry out technology-based projects even when I am opposed by skeptical colleagues.	3.77

Note: The scale of each questions was 1-5.

Research question 1. A simple linear regression was carried out to investigate the relationship between self-efficacy and TIPD. A scatterplot was used to check the assumptions of the regression. Both the homogeneity of variance and linearity assumptions were determined to have been met. The results of this linear regression indicated that the model was not significant, $F(1,105)=.086$, $p=.770$, $R^2 = .001$. Therefore, the null hypothesis that there is no association between the type of PD a teacher receives, and their technology integration confidence level must be retained.

The results indicated that the type of professional development a teacher receives was not a significant predictor of their self-efficacy in using technology in their classroom. The Self-Efficacy mean score $M=3.575$ was shown to be non-significant when looked at by PD type (Table 5).

Table 5

Linear Regression Self-Efficacy by PD Type

Model		B	Standard Error
1	Intercept	3.575	0.088
	PDType	-0.051	0.174

Note: Sample size is 106 teachers

Research Question 2. A multiple regression was estimated out to investigate whether type of mindset was a significant predictor of participants' self-efficacy scores. The assumptions of multiple regression were met; the relationship between the independent and dependent variables is linear, there is no multicollinearity (*VIF*=2.979, *Tolerance* =.336) in the data, the values of the residuals are independent (*Durbin-Watson*

1.802), the variance of the residuals is constant, the values of the residuals are normally distributed based on the P-P plot, and there are no influential cases biasing the results (*Cook's Distance* < 1). The resulting regression was non-significant, $F(2,104)=.426$, $p=.654$, R^2 of .008. This suggests that teacher mindset is not a significant predictor of their self-efficacy; the null hypothesis was retained. Table 6 shows us that neither growth nor fixed mindset gives a clear advantage in forming self-efficacy.

Table 6

Mindset as a Predictor of Self-Efficacy

Model		B	Standard Error
1	Intercept	3.75	0.277
	Mindset Fixed	-0.178	0.291
	Mindset Growth	-0.291	0.324

Note: Sample size is 106 teachers

An effect size and power analysis was performed on this linear regression. It was found that there was a non-significant p-value, even though there was a large effect. This is likely because there was a relatively small sample. The power analysis showed us that at least 241 subjects are needed in each group to have 80% power in order to detect an effect with inferential statistics (i.e. using p-values). The entire sample for this study was only 106. Small studies (< 100) may have medium or large effects but not yield statistically significant p-values. Large studies (> 2000) may have small and often inconsequential effects but be statistically significant. And mid-size studies (> 100 and < 2000) usually have agreement in that medium to large effects generally also yield a p-

value < .05 (Sullivan & Feinn, 2012). This suggests that the study was severely underpowered to detect the effect of 3 standard deviations given that the sample size was less than half the size needed for a power of 80% for a mid-sized study.

Research Question 3. Four multiple linear regressions were calculated to investigate whether gender, years of teaching experience, and subject taught predict participants' self-efficacy scores. When included in the model separately, none of these factors were significant predictors of teachers' self-efficacy (Tables 7, 8, and 9). For the analysis of Gender assumptions of multiple regression were met; the relationship between the independent and dependent variables is linear, there is no multicollinearity (*VIF*=3.701, *Tolerance* =.270) in the data, the values of the residuals are independent (*Durbin-Watson* 1.846), the variance of the residuals is constant, the values of the residuals are normally distributed based on the P-P plot, and there are no influential cases biasing the results (*Cook's Distance* < 1). The analysis shows that gender did not significantly predict self-efficacy (Table 7).

Table 7

Gender as a Predictor of Self-Efficacy

Model		B	Standard Error
1	Intercept	4.124	0.348
	Male	-0.541	0.395
	Female	-0.599	0.358

Note: Sample Size 106 Sample size is 106 teachers

For Years of Teaching Experience the assumptions of multiple regression were met; the relationship between the independent and dependent variables is linear, there is no multicollinearity (*VIF*=1.00, *Tolerance* =1.00) in the data, the values of the residuals are independent (*Durbin-Watson* 1.840), the variance of the residuals is constant, the values of the residuals are normally distributed based on the P-P plot, and there are no influential cases biasing the results (*Cook's Distance* < 1). The analysis of years of teaching experience shows that although the years of experience was also not significant predictor value of self-efficacy (Table 8).

Table 8

Years of Teaching Experience as a Predictor of Self-Efficacy

Model		B	Standard Error
1	Intercept	3.83	0.188
	Experience	-0.015	0.009

Note: Sample size is 106 teachers

In the analysis of Subject Taught the assumptions of multiple regression were met; the relationship between the independent and dependent variables is linear, there is no multicollinearity (*VIF*=1.00, *Tolerance* =.000) in the data, the values of the residuals are independent (*Durbin-Watson* 1.93), the variance of the residuals is constant, the values of the residuals are normally distributed based on the P-P plot, and there are no influential cases biasing the results (*Cook's Distance* < 1). Subject taught was, again, not significant predictor value of self-efficacy (Table 9).

Table 9

Subject Taught as a Predictor of Self-Efficacy

Model		B	Standard Error
1	Intercept	3.44	0.142
	SubjectHS	0.17	0.168

Note: Sample size is 106 teachers

However, although the regression for subject area was not statistically significant, there is suggestive evidence that looking at subject area in more detail – had the sample been sufficiently sized – could have led to a different conclusion. Specifically, subject area was analyzed as General Education Elementary vs. Middle/High School Subjects. The table below shows evidence of some variability – particularly that science teachers may differ from the other groups. (Table 10) The result makes sense as most science classes generally include a fair amount of computer usage in class due to the new Next Generation Science Standards (NGSS) and the availability of textbooks on-line as well as on-line labs that have replaced dissections and so on (NYSED, 2019). Table 10 also illustrates the fact that the results for the category of "Other" (n=36) which included Art, Music, Technology, AIS, Math Support, Library-Media, Physical Education, Health, the self-efficacy mean was high, as well. When delving into the daily tasks of many of these teachers it is noted that technology plays a rather large part in their teaching. Library Media, Technology and Art all provide curriculum that have a technology rich environment while AIS, Math Support, and Health have on-line programs to supplement the in-person teaching done in the classroom (New York State, 2017).

Table 10

Mean Self-Efficacy by Subject Area

Subject Area	Number of Respondents	Mean Self-Efficacy Score
General Education(ES)	30	3.44
Math	10	3.52
English	13	3.53
Science	13	3.76
Social Studies	4	3.40
Other	36	3.63
Total	106	

Note: Other includes Art, Music, Technology, Physical Education, Health, World Language, Library-Media, Technology, Speech, OT, Reading, AIS, RTI, and Math Support

Finally, the assumptions of multiple regression were met when including all of the IVs in one analysis; the relationship between the independent and dependent variables is linear, there is no multicollinearity (*VIF*=1.006, *Tolerance* =.994) in the data, the values of the residuals are independent (*Durbin-Watson* 1.889), the variance of the residuals is constant, the values of the residuals are normally distributed based on the P-P plot, and there are no influential cases biasing the results (*Cook's Distance* < 1). When including all of the IVs simultaneously (Table 11), this model remained non-significant, $F(4,102) = 1.506$, $p=.206$, $R^2=.056$. All null hypotheses were retained.

Table 11

Gender, Experience, Subject Taught as Predictors of Self-Efficacy

Model		B	Standard Error
1	Intercept	4.216	0.398
	SubjectHS	0.17	0.167
	Male	-0.491	0.394
	Female	-0.55	0.357
	Experience	-0.014	0.009

Note: Sample size is 106 teachers

Overall, none of the factors explored significantly predicted teacher's self-efficacy for technology integration. The implications of these results will be explored in the next chapter.

Chapter 5: Discussion

Introduction

The key findings of this study are that none of the factors explored – professional development, mindset, and teacher characteristics – significantly predicted teachers' self-efficacy for technology integration in the classroom – his or her confidence in his or her ability to integrate technology within his or her classroom. This chapter includes a discussion of major findings as related to the literature. Also included is a discussion on connections to this study and adult learning theories and mindset. The chapter concludes with a discussion of the limitations of the study, implications for future practice, areas for future research, and a brief summary.

Implications of Findings

On average, teachers' self-efficacy for technology integration is 3.5 on a scale of 1-5. This shows that teachers need to build their self-efficacy throughout all grade levels and subjects and no matter the years of teaching experience they may or may not have. It was not determined exactly what would help build that self-efficacy because the limitations of this study make it difficult to apply any results to advance the field's understanding of teacher's self-efficacy for technology integration.

In interpreting the findings it was found that the results do not fit with the researcher's hypothesis that one type of professional development will help build a teacher's feelings of self-efficacy more than another. Also, it seems that none of the other factors studied (gender, years of experience, and subject taught) predict a teacher's feelings of self-efficacy either. Yet, all the results should be considered when considering how to plan professional development delivery in a school district, not simply a

significant or non-significant result. Seeing that the null hypothesis must be retained in all three research questions, the researcher had to look further into the data to make meaning from what was available. For example, studying the self-efficacy means by "subject taught" (see Table 10) revealed that there was a small difference among teachers of different subjects, albeit non-significant result. This tells us that purely quantitative research can yield an incomplete picture and can be supplemented by more qualitative analyses and anecdotal evidence.

Relationship to Prior Research

Wake & Mills (2018) wrote that professional development may be common, but there is no common agreement on which type of technology integration professional development works to make teachers able to feel self-confident in their use of the tools they are introduced to in these professional development sessions. This is reflected in the results of this research. Type of TIPD was unrelated to self-efficacy of teachers in technology integration. Nothing in their personal data combined with a specific type of TIPD points to an overall rise in self-efficacy either.

In contrast to the current research results, Hensley, Jurgenson, & Ferris (2017) study the use of a "teacher-as-learner" PD modality that uses adult learning theories and practice. Subsequently, significant increases in teacher confidence were seen. However, this 2017 study and the current research connect in several ways, and looking at meeting teachers where they are both personally and professionally helps create relationships that allow for individual connection is one way. In the Hensley et al. 2017 study this created an elevation of feelings of self-efficacy in the subjects, in the limited data in the current

research we could not see a similar effect. A larger sample might have changed the outcome of the current research.

While mindset has been linked to adult/teacher/student learning (Dweck, 2016), this study does not find any association between mindset and self-efficacy.

Limitations of the Study

There are several limitations to this study. A possible threat to this non-experimental research design was response bias. Those who responded may differ from the general population. For example, because we do not know the location in which each respondent teaches, they may be concentrated in certain schools.

In the case of this particular study low response rate is also a limitation of the study. Once again, this suggests that the study was underpowered in order to detect the effect of 3 standard deviations given that the sample size was less than half the size needed for a power of 80%. Respondents may have been intimidated by the length of the survey and just chose not to finish. Out of the 218 respondents who began the survey only 149 saw it all the way through to completion and of those only 106 produced useable data. The survey was sent within days of the two-week holiday break. Teachers who ordinarily might have responded did not due to the overwhelming amount of email, regular mail, and student needs they faced when they came back to work in the new year.

A critical limitation is the misinterpretation of the survey questions, which led to the loss of 42 cases from the data. These were specifically for the questions on TIPD. While every effort was made to code the data accurately, the response patterns were difficult to interpret and may not be entirely accurate. Changing the questions on how

teachers perceived the amount of and how they received professional development may have made a difference in the results.

Finally, due to convenience sampling, the findings of this study may not be generalizable to a population of teachers outside of Nassau County or in any other school districts where professional development is delivered in even a slightly different manner. The generalizability of the results is further limited by the fact that the respondents were not only so few but come from unknown places. This would have helped to triangulate the type of PD and coaching available to teachers, as well.

Recommendations for Future Practice

Given that the results of the current study were non-significant, this research does not allow for advocating for one model of TIPD or mindset intervention. However, the results also do not suggest that these factors be ignored – given the limitations. What can be suggested is that because teachers are not currently very self-efficacious for technology integration and administrators should be responsive to this finding and take some action to improve.

The literature seems to support the idea that it is the relationship between people (coach and coached or teacher and learner) that helps support, encourage, and gird the teacher in their learning phase as well as the first implementation phase of their technology integration with a new tool or skill. If the learner feels this support, their self-efficacy may well grow at a greater rate. This could be a discussion at faculty or union meetings as a reminder to teachers who are often allowed choose their TIPD (meaning it isn't chosen for them by the district), that they should choose something that they know works for them personally as an individual and to choose a class taught by someone they

have enjoyed learning with in the past, or to seek opinions from those they trust regarding the teachers available..

In the narrative response to long-form questions on the survey, teachers responded to a question about who plans technology integration professional development in their district. So many responses were "administrators, IT department, Teacher's Center," etc. Nowhere did someone say, "me" or "I do" when it was a free response question. This may be a something to look at for future practice. Allowing teachers to contribute ideas, questions and to the decision making of what type of TIPD should be given, how it should be delivered and by whom. It would make the people for whom it was intended feel more a part of the process and more empowered to take the reins that lead to self-efficacy. Research needs to explore how teachers can take a more active role, because clearly, they are lacking in ownership. This might be something to study. Ownership over something might lead to greater self-efficacy.

TPACK is a framework that generated a lot of interest when it first was presented by Koehler & Mishra in 2009. However, some modifications could be suggested that might make it more realistic. For example, in reexamining the TPACK framework, the realization that pedagogical knowledge, content knowledge, and technological knowledge are all given the same weight in the design of the theory (Figure 1) seems to be spurious. For surely educators need to be experts in their chosen field (content) then need to have been educated in excellent teaching skills (pedagogy), and after a number of years become experts at both. However, if they are not specifically "technology" teachers, they may never reach the same amount of expertise in technology that they have in content and pedagogy, and probably will never, with very few exceptions, reach that level, no

matter how much TIPD they experience. However, technology when taught well, the way it is supposed to be taught to the students in their classrooms when they go to their technology classes and within their own subject, in fact, is more organically a part of learning. The technology is not separate or apart from content or pedagogy, it is instead learned though using it in situ, and making mistakes and correcting them on the fly. Wessner (2019) wrote: "Treating my classroom as separate from the outside world is idealistic at best and foolhardy at worst. Science does not exist in a vacuum. Our students do not live in a vacuum. Yes, I'm a scientist, but I'm also a person living in a complex world. So are my students." Technology is the same. It should not be taught to students or teachers in a vacuum, but through practical application within the subject taught by the teacher or being learned by the student. It is a tool, not a subject within itself, and should be looked at that way. This is where TPACK can be modified. The Technological Knowledge should sit inside of Pedagogical Knowledge and Content Knowledge and only exist outside of those areas very slightly. In Figure 2 an example of how this might look when expressed as a diagram can be seen.

Figure 2

A revised TPACK according to anecdotal evidence gathered in this research

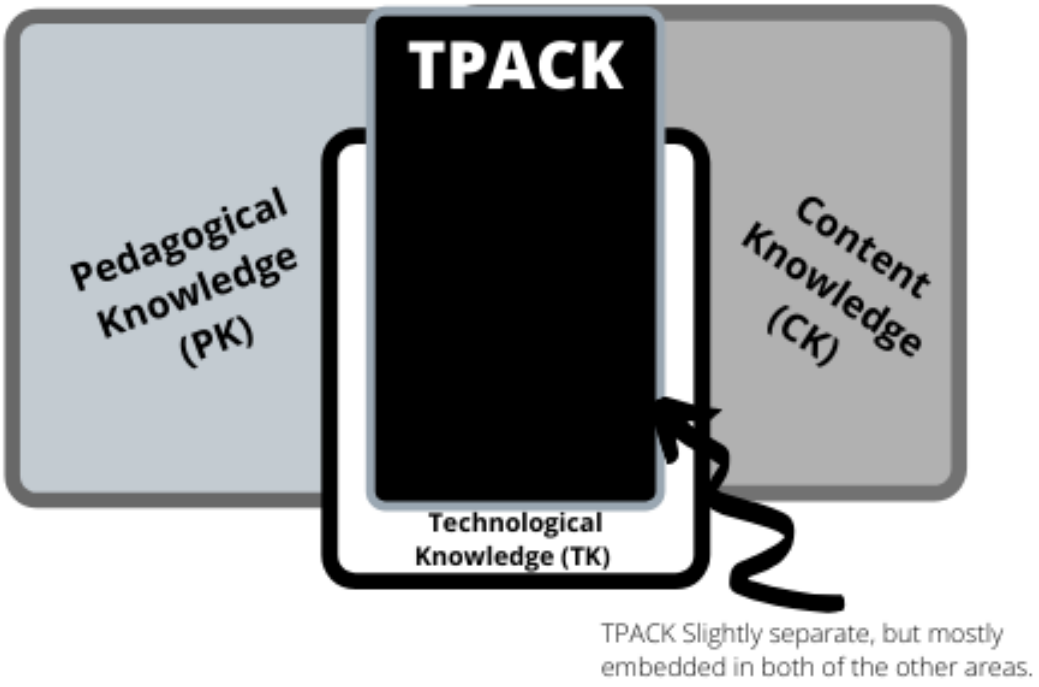
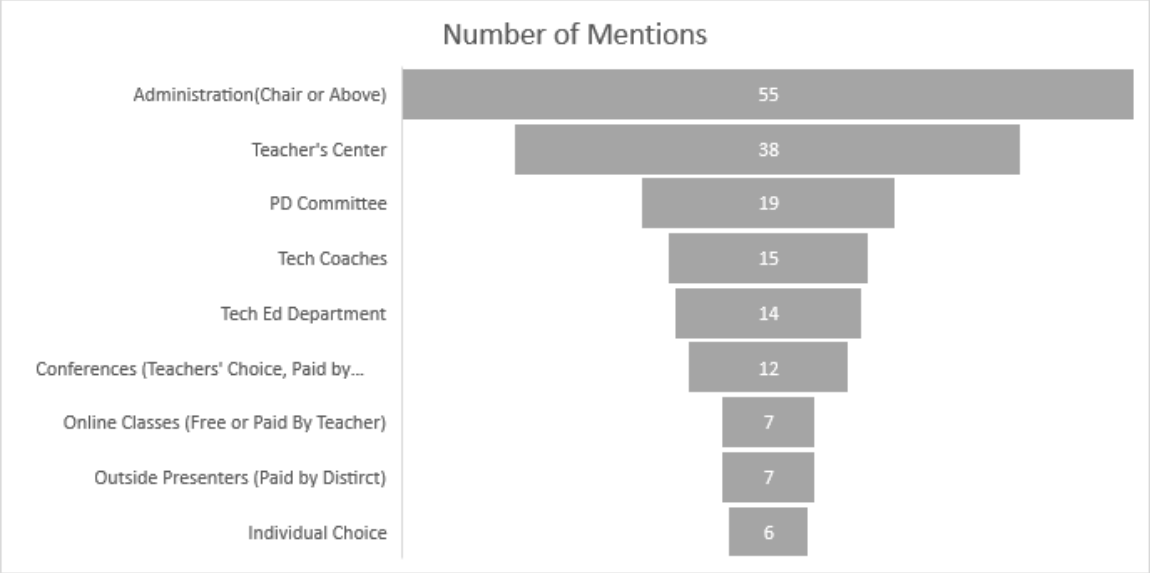


Figure 3 demonstrates how little input teachers have into their own professional development choices, and how much input is at the administration level (Department Chair or above). This figure is derived from question 11 on the survey by determining how often a respondent used a word to answer the question: "Please describe professional development in your school / district (who plans it, how often and when it occurs, typical activities, etc.)."

Figure 3

Frequency of words in answer to question 11: "Please describe professional development in your school/district (who plans it, etc.)" on the survey used in this research



Recommendations for Future Research

The first recommendation is to repeat this study with additional demographic questions on the survey. The researcher should also make the questions about "type of PD" into a single question on a sliding scale of percentages rather than two separate questions. That was a flaw in the survey that needs correction.

To ensure that teachers surveyed received a variety of types of PD, a good recommendation might be to pick two school districts that do TIPD in two distinctly different ways – one mostly coaching and one mostly traditional PD. Using guidelines for best practice set out by Nassau BOCES, the schools and the practitioners would have a model and best practices to follow. In this document are a sample of the Nassau BOCES Technology Integration Roundtable meeting agendas (Appendix E). These agendas show the topics under discussion and time for sharing best practices. Nassau

BOCES Member Districts are trying to form a cohesive message and curriculum for technology integration coaches. This lack of consistency and message could be why there are no significant results to the questions posed in this research. Every district, despite good intentions, does things a little differently from the next, so that what one teacher deems as coaching, another might consider professional development in the traditional sense. Based upon long-form answers gathered on the survey for this research, no two places seem to "do professional development" quite the same way. This is both a limitation and an avenue for further research. Somehow, in the complexity of all facets that must be considered when regarding professional development, the most important element is generally disregarded – the students (the K-12 students). Students are ultimately the product, yet they are largely ignored in virtually all professional development studies. It is critical that new studies be conducted with a focus on investigating the impact of professional development on student outcomes.

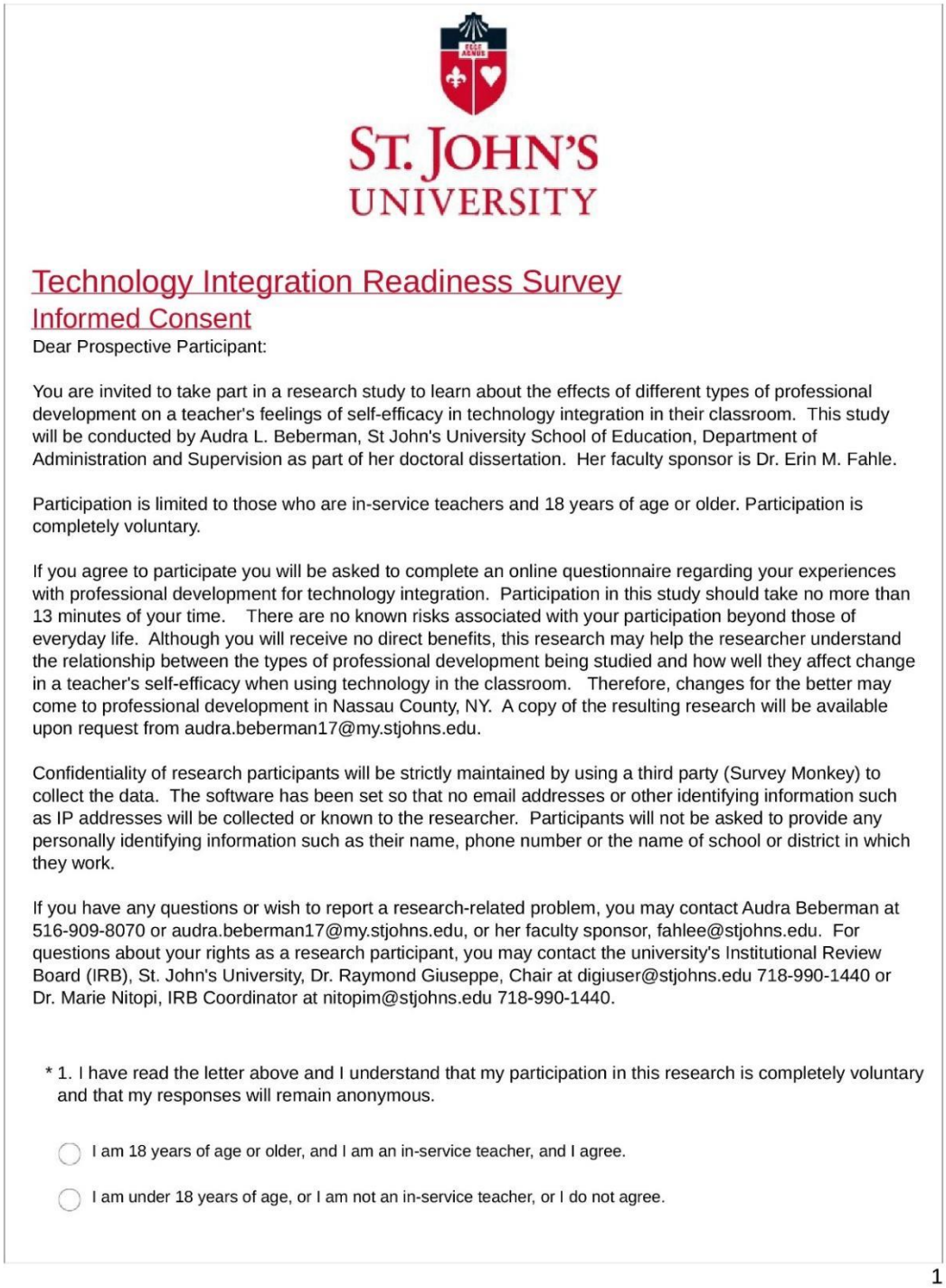
An additional recommendation that an action research study be completed implementing the use of coaching and traditional PD in a school that has never used coaching. A transformative planning scenario can take place to see the possible futures. Another recommendation to continue this research is to do a qualitative study observing classrooms where teachers self-report the amount of coaching versus traditional PD they have experienced and how they interact with students when explaining technology projects. A further recommendation is to conduct research on how teacher perceptions have changed for the districts that have converted from traditional professional development to solely coaching.

Conclusion

The results of this study suggested that teacher self-efficacy for technology integration in their classrooms is currently low. However, the results of this study do not point us to an obvious answer as to "why." Years of experience, gender, subject matter, mindset, and type of professional development did not seem to move the needle in any one direction for any teacher that responded to this survey. Perhaps this is because technology is something that in the year 2020, all teachers learn to use (albeit haltingly or fearfully) because they must, not because it is a natural part of their pedagogy. It is, therefore, incumbent on practitioners of professional development to recognize that professional development must be transformed through rigorous inspection, dissection, and reconfiguration with the intent of making it the vital agent it should be to enhance teachers' effectiveness and self-efficacy. Teacher perceptions of self-efficacy in a variety of areas should be considered when planning curriculum and professional development. This will assist educators in truly becoming master teachers. Asking a teacher to implement a tool or skill they are unsure if they will ever use or are uncomfortable with does not bode well for the tool or skill's future use within the classroom environment. Teachers will not build self-efficacy with a tool or a skill they are not trained on and in which they have no stake. Ultimately, the goal is to systematically connect these ideas of mindset, professional development, and perhaps ownership to provide practical recommendations for growing teacher self-efficacy in order to maximize and improve student learning.

Appendices

Appendix A: Instrument



ST. JOHN'S UNIVERSITY

Technology Integration Readiness Survey

Informed Consent

Dear Prospective Participant:

You are invited to take part in a research study to learn about the effects of different types of professional development on a teacher's feelings of self-efficacy in technology integration in their classroom. This study will be conducted by Audra L. Beberman, St John's University School of Education, Department of Administration and Supervision as part of her doctoral dissertation. Her faculty sponsor is Dr. Erin M. Fahle.

Participation is limited to those who are in-service teachers and 18 years of age or older. Participation is completely voluntary.

If you agree to participate you will be asked to complete an online questionnaire regarding your experiences with professional development for technology integration. Participation in this study should take no more than 13 minutes of your time. There are no known risks associated with your participation beyond those of everyday life. Although you will receive no direct benefits, this research may help the researcher understand the relationship between the types of professional development being studied and how well they affect change in a teacher's self-efficacy when using technology in the classroom. Therefore, changes for the better may come to professional development in Nassau County, NY. A copy of the resulting research will be available upon request from audra.beberman17@my.stjohns.edu.

Confidentiality of research participants will be strictly maintained by using a third party (Survey Monkey) to collect the data. The software has been set so that no email addresses or other identifying information such as IP addresses will be collected or known to the researcher. Participants will not be asked to provide any personally identifying information such as their name, phone number or the name of school or district in which they work.

If you have any questions or wish to report a research-related problem, you may contact Audra Beberman at 516-909-8070 or audra.beberman17@my.stjohns.edu, or her faculty sponsor, fahlee@stjohns.edu. For questions about your rights as a research participant, you may contact the university's Institutional Review Board (IRB), St. John's University, Dr. Raymond Giuseppe, Chair at digiuser@stjohns.edu 718-990-1440 or Dr. Marie Nitopi, IRB Coordinator at nitopim@stjohns.edu 718-990-1440.

* 1. I have read the letter above and I understand that my participation in this research is completely voluntary and that my responses will remain anonymous.

- ◯ I am 18 years of age or older, and I am an in-service teacher, and I agree.
- ◯ I am under 18 years of age, or I am not an in-service teacher, or I do not agree.

1

ST. JOHN'S UNIVERSITY

Technology Integration Readiness Survey

Part 1

Please answer each question honestly. This is your personal experience ... completely confidential. Neither the researcher nor the reader of the end product will be able to identify you as an individual.

* 2. Current gender identity (How do you describe yourself?)

- ◯ Female
- ◯ Male
- ◯ Transgender
- ◯ Non-binary/ third gender
- ◯ Prefer Not to Respond

* 3. How many years have you been teaching? (Round to the nearest whole number.)

* 4. (What subject do you predominantly teach?

- ◯ General Ed (Elementary K-6)
- ◯ Math
- ◯ English
- ◯ Science
- ◯ Social Studies
- ◯ Other (World Language, Art, Library-Media, Music, PE, Technology, Speech, OT, Reading, AIS, RTI, Math Support, etc.)

2

* 5. How long ago did you receive your first Chromebook/Other Device from your school district?

- ◯ I don't have a Chromebook/Other Device
- ◯ Less than 1 Year
- ◯ More than 1 year - Less than 2 years
- ◯ More than 2 years ago - Less than 3 Years
- ◯ 3-5 years ago
- ◯ 6+ years ago

* 6. How often do you use the Chromebook/Other Device for instructional purposes?

- ◯ Less than 10% of the time
- ◯ 11%-25% of the time
- ◯ 26%-50% of the time
- ◯ 51%-75% of the time
- ◯ 76% or more of the time

* 7. Typically, what percent of your class time do your students use their Chromebooks/ Other Device for schoolwork?

- ◯ Less than 10% of the time
- ◯ 11%-25% of the time
- ◯ 26%-50% of the time
- ◯ 51%-75% of the time
- ◯ 76% or more of the time

* 8. Do you feel you have received enough Chromebook/Other Device training opportunities to allow you to use this device effectively in your teaching?

- ◯ Yes
- ◯ No

3

* 9. Thinking over your total career, how big a percent of your professional development has been in traditional professional development, teachers' center, or outside classes in technology integration (meaning more people than just you and the trainer in the room.)

- ◯ 0%-25%
- ◯ 26%-50%
- ◯ 51%-75%
- ◯ 76% - 100%

* 10. Thinking over your total career, how big a percent of your professional development has been via one-to-one coaching in technology integration (meaning just you [and no more than one other teacher] and the coach in the room.)

- ◯ 0%-25%
- ◯ 26%-50%
- ◯ 51%-75%
- ◯ 76% - 100%

* 11. Please describe professional development in your school / district (who plans it, how often and when it occurs, typical activities, etc.).

* 12. What is your role in technology professional development in your school / district? Please check all that apply.

- ☐ Attending
- ☐ Planning
- ☐ Facilitating/Teaching
- ☐ Evaluating
- ☐ Other

* 13. Please describe the most memorable technology integration technique shared by a professional development presenter/facilitator/coach.

4

* 14. Was this experience (Q 13) in a class or with a coach in a one-on-one setting?

- ◯ Class
- ◯ Coach

* 15. What did you find to be most effective about the experience (Q 13)?

* 16. Were you able to implement something you learned from the presenter/coach with relative ease into your own classroom (Q 13)? Please explain.

5

ST. JOHN'S UNIVERSITY

Technology Integration Readiness Survey

Part 2

Directions: Read each sentence below and mark the choice that shows how much you agree with it. There are no right or wrong answers.

* 17. You can learn new things, but you can't really change your basic intelligence.

Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○

* 18. Your intelligence is something about you that you can't change very much.

Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○

* 19. You have a certain amount of intelligence and you really can't do much to change it.

Strongly Disagree	Disagree	Somewhat Disagree	Somewhat Agree	Agree	Strongly Agree
○	○	○	○	○	○

6

ST. JOHN'S UNIVERSITY

Technology Integration Readiness Survey

Part 3

Directions: For items 19-39, using the definition of technology integration with accompanying examples below as a baseline, please choose one response for each of the following statements.

Technology integration:
Using Chromebooks/Other Device to support students as they construct their own knowledge through the completion of authentic, meaningful tasks.

Examples of integrating technology:

Students working on research projects, obtaining information from the Internet. Students constructing Web pages to show their projects to others.
Students using application software to create student products (such as composing music in Soundtrap, or videos using WeVideo, developing Buncee, Padlet, Google Slides or Prezi presentations).

* 20. I feel confident that I understand the Chromebook/Other Device capabilities well enough to maximize them in my classroom.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
○	○	○	○	○

* 21. I feel confident that I have the skills necessary to use the Chromebook/Other Device for instruction.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
○	○	○	○	○

* 22. I feel confident that I can successfully teach relevant subject content with appropriate use of technology.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
○	○	○	○	○

* 23. I feel confident in my ability to evaluate apps/ software for teaching and learning.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
○	○	○	○	○

* 24. I feel confident that I can use correct Chromebook/Other Device terminology when directing students' Chromebook/Other Device use.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
○	○	○	○	○

* 25. I feel confident I can help students when they have difficulty with the Chromebook/Other Device.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
○	○	○	○	○

* 26. I feel confident I can effectively monitor students' Chromebook/Other Device use for project development in my classroom.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
○	○	○	○	○

* 27. I feel confident that I can motivate my students to participate in technology-based projects.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
○	○	○	○	○

* 28. I feel confident I can mentor students in appropriate uses of technology.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
○	○	○	○	○

* 29. I feel confident I can consistently use educational technology in effective ways.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
○	○	○	○	○

8

* 30. I feel confident I can provide individual feedback to students during technology use.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
○	○	○	○	○

* 31. I feel confident I can regularly incorporate technology into my lessons, when appropriate to student learning.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
○	○	○	○	○

* 32. I feel confident about selecting appropriate technology for instruction based on curriculum standards.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
○	○	○	○	○

* 33. I feel confident about assigning and grading technology-based projects.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
○	○	○	○	○

* 34. I feel confident about keeping curriculum goals and technology uses in mind when selecting an ideal way to assess student learning.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
○	○	○	○	○

* 35. I feel confident about using technology resources (such as spreadsheets, electronic portfolios, etc.) to collect and analyze data from student tests and products to improve instructional practices.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
○	○	○	○	○

* 36. I feel confident that I will be comfortable using technology in my teaching.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
○	○	○	○	○

9

* 37. I feel confident I can be responsive to students' needs during Chromebook/Other Device use.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
○	○	○	○	○

* 38. I feel confident that, as time goes by, my ability to address my students' technology needs will continue to improve.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
○	○	○	○	○

* 39. I feel confident that I can develop creative ways to cope with system constraints (such as budget cuts on technology facilities) and continue to teach effectively with technology.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
○	○	○	○	○

* 40. I feel confident that I can carry out technology-based projects even when I am opposed by skeptical colleagues.

Strongly Disagree	Disagree	Neither Agree or Disagree	Agree	Strongly Agree
○	○	○	○	○

10

ST. JOHN'S UNIVERSITY

Technology Integration Readiness Survey

Thank you for Participating! Your experience counts!

11

Appendix B: Permission to Use TRS Survey (Letter Asking/Receiving Permission)

Audra L. Beberman

Mon 3/25/2019 10:41 AM

- lingwang@nova.edu

Dear Dr. Wang:

My name is Audra Beberman, and I am a student in the doctoral program at St. John's University here in New York. I wrote to you once before (4/3/18), seeking permission to use your survey:

I am working on my dissertation regarding professional development classes versus one-to-one coaching. Along with a survey, I am going to be doing interviews for a mixed methodology study. My work school district and many others here on Long Island have gone from the iPad implementation and on to Chromebooks as 1:1 in our schools. We are still using iPads in Art and classes. I would like permission to implement your Technology Integration survey (with the modification of Chromebooks in place of the word iPads in 13 locations) with the teachers in my district and in other districts here on Long Island. You can contact me at Audra.Beberman17@my.stjohns.edu or 516-909-8070. I will be sure to share my results with you!

Thank you so much for your consideration of my request. I look forward to hearing back from you.

I need updated permission from you to use the survey as my dissertation is finally underway this year! Thank you once again for your help in this matter!

Sincerely Yours,

Audra L. Beberman

Ling Wang <lingwang@nova.edu> Wed 3/27/2019 1:40 PM

* External Email *

Audra,

Yes, you can use the survey for your dissertation.

All the best,

Ling

Ling Wang

Professor and Chair of Information Systems and Cybersecurity

College of Engineering and Computing

Office (954) 262-2020

lingwang@nova.edu

Appendix C: Permission to Use PERTS Survey

Letter from PERTS:

Hello Audra,

Thanks for your interest in PERTS. Yes, you can use the questions. Please keep in mind that our programs were designed for quality improvement efforts and not for research purposes. Additionally, because we're a small, mission-driven team, we cannot provide additional support or feedback on project.

Hope that helps and good luck!

Warmest,

Arnrow at PERTS

Free use of the Mindset Meter is generously supported by the William and Flora Hewlett Foundation and the Raikes Foundation. https://survey.perts.net/share/toi (Questions 21-23)

Appendix D: Permission to Use Nassau BOCES NASTECH Listserv

nassau BOCES

NASTECH

Department of Curriculum, Instruction and Technology

Matthew Hejna
Supervisor
(516) 608-6648
mhejna@nasboces.org

January 9, 2020

Audra Beberman, Doctoral Candidate
St. John's University
C/O 101 Hazelnut Court
Melville, New York 11747
516.909.8070

Dear Audra:

I understand you have been given permission by the St. John's IRB to go ahead with your survey. Congratulations!

This letter serves as permission for you to use the NASTECH (Nassau Association of School Technologists) email Listserv as the distribution point for your letter and survey link to the Technology Directors of Nassau County, New York.

Good luck with your research.

Regards,

Matthew Hejna, Supervisor
Data Privacy & Security Services
Guidance Technology Support
ITP RIC Reviewer
NASTECH
mhejna@nasboces.org
516.608.6648

Appendix D: Permission to Use Nassau BOCES NASTECH Listserv (Preliminary)

Matthew Hejna <MHejna@nasboces.org>

Mon, Aug 5, 8:36 AM

to Laura, me

Hi Audra – yes, it is okay to post the survey on the NASTECH listserv. All the best with your dissertation – glad to hear you are pursuing.

Regards,

Matt

Matthew Hejna

Supervisor

Data Privacy & Security Services

Guidance Technology Support

ITP RIC Reviewer

NASTECH

mhejna@nasboces.org

516.608.6648

Appendix E: Sample Agendas from Technology Integration Specialist Roundtables

January 22, 2019

Technology Integration Specialist Roundtable

Instructor(s): Matthew DiMenna

Dates: 01/22/2019
Status: Final Approval

1 Meeting(s)

#	Date	Time	Location
1.	Tue Jan 22, 2019	12:30 pm to 3:00 pm	Nassau BOCES

This meeting will connect various in-district and Nassau BOCES professional developers who focus on instructional technologies. The afternoon will consist of discussions and training opportunities relevant to those who train educators on the use of instructional technologies.

•Agenda
12:30-12:40 Introductions, discussions and framework for the afternoon
12:45-1:20 Breakout 1
1:25-1:55 Breakout 2
2:00-2:30/3:00 Success/Failures Conversation & Networking

Please complete the following survey when registering: goo.gl/BUuno1

Hours: 3.00 | Program: Curriculum & Instruc… | Form: BOCES Pre-Approved …

June 10, 2019

Technology Integration Specialist Roundtables

June 10, 2019
Shared Resources

Adobe Spark Presentation, Glen Cove Schools

Giving Students a Voice, Locust Valley Schools

Google Expeditions, Island Trees Schools

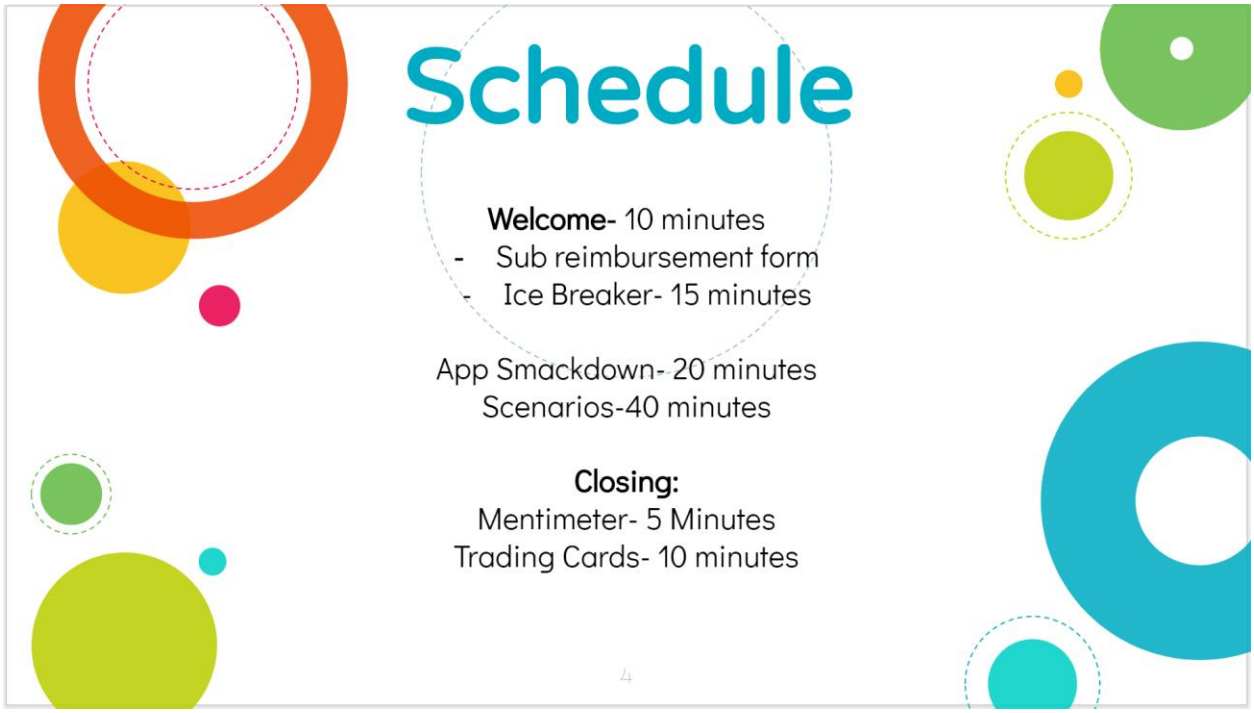
Google Sides for the Elementary Students, New Hyde Park-Garden City Park Schools

Great You Have Chromebooks Now What, New Hyde Park-Garden City Park Schools

S'way Cool: Elevate Student Voice Across the Curriculum, Islip Schools

Using Devices in the Mathematics Classroom, Locust Valley High School

November 11, 2019



February 7, 2020

Tech Integration Specialist Round Table - Session 2
Instructor(s): Jessica Gregorovius

Dates: 02/07/2020
Status: Approved & In Progress
Note: Mark Complete by 2/6/2021 3:00 pm

1 Meeting(s)

#	Date	Time	Location
1.	Fri Feb 7, 2020	1:00 pm to 3:00 pm	CR 1,2,3

This is the second in a series of three meetings for the 19-20 school year. The goal of the meetings is to connect in-district technology specialists with Nassau BOCES professional developers to share best practices, troubleshoot issues and discuss current trends in instructional technology. Light refreshments will be provided. Agenda

- Welcome
- Networking opportunities
- App smackdown 2.0
- Scenario problem solving
- Feedback and Wrap-up

Hours: 2.00 | Program: Curriculum & Instruc | Form: Cat. 2: Nassau BOCES

Appendix F: Certificate Protecting Human Subjects (NIH)

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Audra Beberman** successfully completed the NIH Web-based training course "Protecting Human Research Participants."

Date of Completion: 09/15/2018

Certification Number: 2933169

NIH National Institutes of Health
Office of Extramural Research

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Vita

Name	Audra Lisa Beberman
Baccalaureate Degree	Bachelor of Arts, Hofstra University Hempstead, NY Major: English Literature/Creative Studies Date Graduated: May, 1996
Other Degrees and Certificates:	Master of Science in Elementary Education, Queens College, Flushing NY Date Graduated: May, 1999 Master of Science in Educational Technology K-12, New York Institute of Technology, Old Westbury, NY Date Graduated: May, 2004 Professional Certificate in School Building Leadership, College of St. Rose, Albany, NY (CITE) May, 2017 Professional Diploma in School District Leadership, College of St. Rose, Albany, NY (CITE) May, 2017