CHAPTER 1:

RESEARCH PROBLEM AND SETTING

Statement of the Problem

A survey conducted in 2013 by The Harris Poll, revealed 92% of teachers believe technology should be used in the classroom but only 14% are actually integrating technology in their curriculum (Culala, 2016). In a report issued by the U.S. Department of Education (U.S. DOE) (2016) the DOE stated, "School districts have an obligation to provide equitable access to technology in order to close the digital divide and reduce barriers for students while also preparing them for the digital complexities of the future" (p. 22). In addition to access, the U.S. DOE issued the Common Core State Standards (CCSS), a document that stated states are to be held accountable and include over 100 references to technology expectations in today's learning environments. Demographers and social scientists studying populations and the human society have coined the most recent generation of children entering preschool and kindergarten as Generation Alpha (Culala, 2016). These children are following Generation Z and while Generation Z make up about 30% of the global population, Generation Alpha children making their entrance into the world in 2010, are increasing nearly 2.5 million every week (Culala, 2016 & McCrindle 2018). As the most technologically literate group of children enter the classroom, it is necessary to look at current educational practices and consider "the skills, competencies, values needed on the future global age, and how generation alpha should be prepared, scholastically" (Culala, 2016). Speaker, author, and educator, Marc Prensky (2001a) stated, "Today's students are no longer the people our educational system was designed to teach" (p. 1). In an effort to provide access to technology and prepare students for the "digital complexities of the future", school board members in a small, rural community in Southern Iowa recently spent $225,000 to purchase Chromebook and iPads. In addition, administration sent the researcher and a team of teachers to a workshop to be trained in the Instructional Practices Inventory – Technology (IPI-T) process.

The IPI-T process was piloted during the 2017-18 school year after purchasing $100,000 in Chromebooks.

The educational landscape is changing. The learning needs of our Digital Native (Prensky, 2001b) students warrant the integration of technology, however, when teachers do use technology for instruction, they may not be using it to its fullest potential to promote high levels of student cognitive engagement (Alan & Sunbul, 2015; Bixler, 2019; Cuban, Kirkpatrick, & Peck, 2001; Lai, 2016; Lynch et al., 2017; Prensky, 2015; Russell, Bebell, O'Dwyer, & O'Connor, 2003; Samsudin, Guan, Yusof, & Yaacob, 2017; Schrum & Levin 2012; Uhomoibhi & Ross, 2018; Young, Ortiz, & Young, 2017; Zhao, Pugh, Sheldon, & Byers, 2002). It is important to provide in-service teachers the opportunities to learn how to integrate technology into their teaching practices (Beschorner & Kruse, 2016; Boyle & Farreras 2015; Celebi, 2019; Cuban et al., 2001; Dittmar & Eilks, 2019; Kuehnert, Cason, Young, & Pratt, 2019; Serhan, 2019; Russell et al., 2003; Zhao et al., 2002). In line with recent studies (Cuban et al., 2001; Ghavifekr & Rosdy, 2015; Russell et al., 2003) despite large expenditures of Chromebooks, baseline data collected at the targeted high school indicates teachers are the users of technology, rather than students. In addition, 70.4% of the time when technology was being used within the learning activity, students were participating in lower-order, surface thinking.

The Topic

The target school board and administration in this proposed study was interested in determining if students were using the devices as well as if they were cognitively engaged when using technology. Data collected using the IPI-T process suggested teachers were typically the users of the technology, students were often disengaged, and teachers were asking students to participate in lower-order, surface activities. The researcher noticed that the IPI-T data collecting process was not implemented with fidelity. Missing from the process was the implementation of the faculty collaborative sessions.

The Research Problem

The researcher and team of teachers at the target school were trained in the IPI-T data collection process; however, the process was not completed with fidelity because only data

collection occurred and faculty did not participate in collaborative sessions. A key piece of the process is the implementation of faculty collaborative sessions to follow each of the four data collecting dates. It is recognized that teachers living in rural, high poverty areas don't always have the same access to digital resources, technology, and professional development opportunities to gain the knowledge and skills to integrate technology in a way that encourages student cognitive engagement as larger, neighboring districts (Howley, Wood, & Hough, 2011; Mangue & Gonondo, 2019; Sundeen & Sundeen, 2013). In order to create change in technology use and increase higher-order, deeper thinking, implementation of the IPI-T process in its entirety was necessary (Valentine, 2012b; Valentine, n. d.). That is teacher leaders collecting the data should engage faculty in studying the data to identify patterns, trends, and changes in each data profile as well as establish and deliver purposeful professional development and continuous conversations (Valentine, 2012b; Valentine, n. d.).

Background and Justification

Research for this study was conducted in a public high school (grades 9-12) located in a small, rural district in Southeast Iowa. The researcher has offered graduate courses, as well as short-term and infrequent mini sessions, to support faculty and the integration of technology. Attendance was on a volunteer basis resulting in zero faculty members participating in the mini sessions and six faculty members out of twenty-seven took advantage of the graduate course work that focused on the integration of technology in ways that increase higher-order, deeper thinking among students. At the start of the 2017-18 school year there were approximately 120 technology devices that included, one cart of 30 Lenovo ThinkPad Laptops in the science wing and a cart of 30 Lenovo ThinkPad Laptops in the English/Language Arts wing, as well as, four computer labs, which housed a total of 60 desktops. In November 2017, the school board approved $100,000 for the purchase of 320 Chromebooks and 10 computer carts. At the beginning of the second semester, 270 new Chromebooks were rolled out among 9 carts. Each core subject area now had access to 60 new Chromebooks and the non-core subject areas still having access to the 60 Desktops plus 30 new Chromebooks as well as the "old" Lenovo ThinkPad Laptops. To date the building has a nearly 2:1computer to student ratio and an additional $125,000 was spent in 2018 to increase Chromebooks and iPads across the district. The IPI-T data collection team coded 217 observations from January 2018 through April 2018 after increasing technology devices

nearly one per student at the high school. Analysis of the data showed only 95 observations were coded in which students were the users of technology. Based on this data, the researcher wondered why faculty was not taking advantage of the newly purchased devices and integrating technology into classroom instruction. She wondered if implementing the IPI-T process in its entirety would make a difference in technology use among teachers and students and if teachers would change their practice and offer learning activities that promoted higher-order, deeper thinking. Jerry Valentine, Professor at the University of Missouri, and graduate assistant Bryan Painter, created the Instructional Practices Inventory (IPI) in 1996. The IPI measures student cognitive engagement. In 2001, Valentine began to recognize the need to add a technology component to the measuring tool as schools were moving 1:1 with technology devices, resulting in the creation of the Instructional Practices Inventory – Technology (IPI-T). As defined within Valentine's Instructional Practices Inventory - Technology (IPI-T), each category coded describes the level of student engagement and are referred to as:

6. Student Active Engaged Learning
5. Student Verbal Learning Conversations
4. Teacher-led Instruction
3. Student Work with Teacher Engaged
2. Student Work with Teacher Not Engaged
1. Student Disengagement

It is important to note that the categories are not a hierarchy but rather "six distinct ways to categorize student engagement" (Valentine, 2017, p. 2). According to Valentine (2012c), Categories 5 and 6 are coded when students are observed participating in higher-order, deeper thinking activities such as decision making from analysis, collaboration among peers, and creative and innovative thinking. Categories 2, 3, and 4 include lower-order, surface activities such as basic fact finding, recall and memorization, and simple understanding (Workshop handouts, p. 2). The researcher of this study is a member of the Instructional Practices Inventory-Technology data collection team in rural, Southern Iowa school district. The first set of codes was collected within the high school as a pilot of the measurement tool January 2018, shortly after the purchase of Chromebooks. After 217 observations of 27 high school classrooms, 95 observations were coded as students using technology and 59 observations were coded as teachers using technology. When observed using technology, students were engaged in lower-order, surface thinking activities 70.4% of the time. Coding took place four

times during the school year 2017-18. The researcher noticed technology use by the teacher decreased slightly, increasing student use of technology, but disengagement increased dramatically as did the integration of activities that fall within Categories 4, 3, and 2 on the IPI-T. This is not surprising as the researcher and the IPI-T data collection team did not implement the IPI-T process with fidelity. Valentine (2012b) stated, "The greater the implementation integrity to these strategies, the greater the likelihood the school will see positive academic results from their use of the IPI" (p. 1). Missing from the process during the 2017-18 pilot of the IPI-T was the implementation of faculty collaboration sessions. The sessions provide faculty with time to study the data after each data collection, engage faculty in reflecting about the data, create collaborative learning experiences to build new knowledge, and allows faculty voice in establishing annual cognitive engagement goals.

Deficiencies in the Evidence

Barriers that prevent the integration of technology by classroom teachers have identified and thoroughly documented in the existing literature, (Ertmer, 1999; Hew & Brush, 2007; Kopcha, 2012). According to the Barrier to Technology Model, external and internal barriers influence the integration of technology in teacher's classrooms (Ertmer, 1999; Ertmer and Ottenbreit-Leftwich, 2010; Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012). First-order barriers are known as resource barriers (e.g., access to technology devices, availability of technical support, and sufficient time allowance to prepare for technology-integrated instruction) and institutional barriers (e.g., administrator's priority and school-wide plan for technology integration) (Hew & Brush, 2007; Kopcha, 2012; Vongkulluksn, Xie, & Bowman, 2018). Recognized as the "most proximal determinant of technology integration" (Vongkulluksn, et al., 2018) is among the second-order barriers, teachers' value beliefs regarding the importance of technology for learning (Ertmer, 1999; Ertmer and Ottenbreit-Leftwich, 2010; Ertmer et al., 2012). According to Vongkulluksn et al. (2018), "Teachers' value beliefs about technology refer to the extent to which teachers believe that technology can help fulfill instructional goals they identified as most important for their students" (p. 71). Organizations such as the U.S. Department of Education, International Society for Technology Education (ISTE), and the Partnership for 21st Century Learning (P21) provide regulations, standards, or a framework that simply states that there is a need for ongoing professional development for faculty. Vongkulluksn, et al. (2018), suggested that "teachers'

value beliefs towards technology to be highly predictive of the quantity and quality of technology integration" (p. 71). It is important to use technologies to enhance learning experiences in different school settings and environments (Davis, Preston, & Sahin, 2009; Karahan & Roehrig, 2016; Perdana, Jumadi, & Rosana, 2019; Sahin, 2007). There are few studies, if any, available that suggests a particular strategy or plan that indeed targets teachers' value beliefs and provides teachers with the skills necessary to increase student cognitive engagement when technology is integrated into their learning environment.

Audience

Initially faculty within the target school district will benefit from this study. It is hypothesized faculty will see an increase in student cognitive engagement. as well as higher-order deeper thinking with a reduction in disengagement, positively influencing student academic achievement. In addition, students will demonstrate having the necessary skills for success in the twenty-first century. The goal is to present research-based data for school board members to have a better understanding of technology use and how the recent expenditure of technology has impacted classroom practices and student engagement.

Setting of the Study

This study takes place in a rural, high-poverty school district in Southern Iowa. Total student population in the district is 1,426. The district is home to five school buildings: a preschool, one building for all students in grades kindergarten through first, one building for all students in second through fifth grade, a junior high made up of grades six through eight, and the high school where students in grades nine through twelve attend. Students and faculty from the high school, grades 9-12 are the focus of this research. Enrollment at the target high school is just over 400 students in grades 9-12 and close to 30 certified faculty members. A typical school day begins at 8:10 a.m. and ends at 3:20 p.m. and is made up of eight periods in a day. Core courses include a variety of offerings in the following subjects: Math, Science, Social Studies, and English Language Arts (ELA). The majority of the non-core courses is part of the Career Technical Education (CTE) program and includes metals, welding, art, agriculture courses, and business education.

Researcher's Role

The researcher is an employee of Iowa Public Television (IPTV) with the title of Teacher Ambassador (TA). The role of the TA is to support educators through community building and professional development opportunities. As a former classroom teacher, my position as a TA was brought onto the IPTV staff with the goal to improve learning outcomes for all children – especially those who need the most help. In order to help students, it's critical that we support educators, who play a critical role in their learning. To best serve educators the Teacher Ambassador was embedded full-time in targeted school district. Teachers in this rural community report feeling isolated and have limited access to digital resources, technology, and professional development opportunities to gain the knowledge and skills to integrate technology in a way that encourages student use of technology and increases student cognitive engagement.

Purpose of the Study

The purpose of this explanatory-sequential mixed method study was to assess the impact of the IPI-T process on technology use and student cognitive engagement. The goal was to implement all strategies, including faculty collaborative sessions four times per year to support teacher implementation of new technology to increase higher-order, deeper thinking by students and increase student use of technology. The impact was measured by comparing quantitative IPI-T data codes of those faculty that participated in the intervention group with baseline data prior to the implementation of the faculty collaborative study sessions. Data collected during the quantitative phase was the emphasis of this study. Qualitative data was gathered from one participant from each core and non-core area, a total of eight participants. Each were asked to answer questions on a web-based questionnaire during the final faculty collaborative session. After identifying themes, the qualitative data was analyzed for themes and then because the data was collected in sequence, findings were associated with the quantitative results of the IPI-T to determine how and why the data converged. In addition, the researcher used the qualitative data to explore key results found when collecting quantitative data that lead to the acceptance or rejection of the null hypothesis.

Definition of Terms

Educational Technology

Educational technology is defined as, "The study and ethical practice of facilitating learning and improving performance by creating, using, and managing appropriate technological processes and resources" (Januszewski & Molenda, 2013, p. 1). This research study focused on the types of technology often used in today's educational or classroom setting such as interactive whiteboards, iPads, Chromebooks, cellular devices, digital cameras, and the Internet to name a few.

Generation Z

Generation Z, also referred to as digital natives, include persons born after 1995 and are known as the first generation to be born into a "globally (Internet) connected world and therefore 'live and breathe' technology" (Cilliers, 2017; Grail Research, 2011; Rothman, 2016). Students observed within the targeted high school are considered to be a part of Generation Z.

Generation Alpha

Generation Alpha are children born after 2010, entering preschools and kindergarten. These children are following Generation Z and make up about 30% of the global population, increasing nearly 2.5 million every week. Furthermore, children belonging to Generation Alpha are considered the most technologically literate group to enter the classroom yet (Culala, 2016 & McCrindle 2018). It is imperative teachers gain the skills necessary to meet the needs of our children entering classrooms today.

Student Cognitive Engagement

According to Fred Newmann, (as cited by Voke, 2002) author of the 1992 book *Student Engagement and Achievement in American Secondary Schools*, engaged students make a "psychological investment in learning. They try hard to learn what school offers. They take pride not simply in earning the formal indicators of success (grades), but in understanding the

material and incorporating or internalizing it in their lives" (pp. 2–3). The IPI-T process measures student cognitive engagement when using technology and is the focus of the data presented to faculty during the collaborative sessions (Valentine, 2012c, p. 2).

Higher-order Thinking

Higher-order thinking activities are said to "challenge the student to interpret, analyze, or manipulate information" (Lewis & Smith, 1993).

Lower-order Thinking

Lower-order thinking activities "demand only routine or mechanical application of previously acquired information such as listing information previously memorized and inserting numbers into previously learned formulas" (Lewis & Smith, 1993). A balance of higher-order/deeper thinking and lower-order surface thinking is necessary to promote an increase in student achievement (Valentine, 2012c, p. 2).

Instructional Practices Inventory Categories

Instructional Practices Inventory Categories are represented numerically (see Appendix A). Each category describes the level of student engagement and are referred to as:

6. Student Active Engaged Learning
5. Student Verbal Learning Conversations
4. Teacher-led Instruction
3. Student Work with Teacher Engaged
2. Student Work with Teacher Not Engaged
1. Student Disengagement

The IPI and the IPI-T both utilize each of the six categories. It is important to note that the categories are not considered a hierarchy but rather "six distinct ways to categorize student engagement" (Valentine, 2017). Categories 6 and 5 include learning activities that fall within the higher-order, deeper thinking spectrum of Bloom's Taxonomy and Bloom's Digital Taxonomy such as analysis and creating while Categories 4, 3, and 2 include lower-order, surface thinking activities such as recalling simple facts and googling for answers.

Categories of Technology Use

Categories of technology use include the following eight categories: (a) Word Processing; (b) Math Computations; (c) Media Development; (d) Information Search; (e) Collaboration Among Individuals; (f) Experience-Based Immersion Learning; (g) Interactive/Presentation Technology; (h) Other (Valentine, 2012c). These eight categories are used to document or code how technology is being used for learning and is similar to the coding process for collecting IPI data. However, during the IPI-T process, the individual collecting the data "documents the total number of students and the numbers using and not using technology and makes two IPI engagement codes, one for all students and one for 'only the tech students'" (Valentine, 2015).

Summary

Chapter one included a statement of the problem along with a description of the setting in which this study took place. The purpose of this embedded quasi-experimental mixed method study was to assess the impact of the IPI-T process on technology use and student cognitive engagement. The goal was to implement all strategies, including faculty collaborative sessions four times per year to support teacher implementation of new technology to increase higher-order, deeper thinking by students and increase student use of technology.

Citation

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