

Professional Development, Mindset, and EdTech Systems Implementation

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Introduction

In 1965, as Gordon Moore studied the semiconductors, he developed the theory that technology development will rapidly increase and double every year. (Mann, 2000) Gordon's theory of the rapid technology development would later become popularly known as Moore's Law and be widely accepted by many in the technology world. (Schaller, 1997) With Moore's law as context, the world that our students live in continues to modernize and evolve at a rapid pace. (Lytle, 2012; Heick, 2012) To keep up with innovation, we tend to find a revolving door of new educational technology (ET) programs, innovation, and initiatives implemented to improve K-12 education. (Heick, 2012)

As highlighted in Anthony Picciano's study of K-12 online learning programs, several major states such as, Michigan and New Jersey, continue to pass state-level policies that require greater use of online learning tools and teacher implementation of technology to improve K-12 education. (Picciano, 2008) Additionally, the education sector continues to realize significant institutional interest in the use of mobile and online technologies tools to teach students in new and innovative ways. (Cavus, Nadire & Dogan, 2009) Although the purpose or cause for these initiatives and interests may differ, they are all factors that fuel a continued influx of technology systems, designed to improve education. (Heick, 2012)

With the growing popularity of new ET systems, school officials in the United States (U.S.) are being asked to show the return on investment for these ET systems to justify their value. (Krueger, 2013; Johnson, 2011) This request is made in part because large sums of taxpayers' dollars are invested in education and therefore invested in ET systems. (Johnson, 2011) According to the National Center for Educational Statistics (NCES), the U.S. spends over \$611 billion, annually, to fund K-12 Education. (NCES, 2013) Of this annual expenditure, over \$5 billion is spent on various K-12 ET systems. (McCandles, 2015 & Kleiman, 2000) Furthermore, large sums of education funds are expensed on teacher professional developments to improve innovation, teaching practice, and student outcome in the classroom. (Sawchuk, 2010) NCES data shows that teacher professional development (PD) makes up

approximately \$25 billion in annual expenditure. This expenditure is higher than spending on food service, transportation, and student services in some case. (NCES, 2015)

Statement of the Problem

Heather Hill (2009) suggests that the system of teacher PD requires changes in order to better utilize limited financial resources. Hill (2009) and other authors suggest that the system of teacher PD found in many school districts is broken. Other researchers suggest that schools rarely know how much is actually being spent on teacher PD. (Sawchuk, 2010) The New Teacher Project (TNTP) conducted a study of over 10,000 teachers and found that schools that participated in the study spent an annual average of \$18,000 per teacher on PD with limited results. After analyzing teachers' classroom practice, student test scores, and evaluation ratings, TNTP and other studies have concluded that teacher PD programs were largely a waste of taxpayers' dollars. (Layton, 2015; Mader, 2015) While schools try to cut spending due to ineffective PDs, studies show that PDs and technical support, specific to ET, have decreased and lag behind the increasing spending on ET systems. (Schaffhauser, 2016) An increasing effect of less PD, is that more teachers and administrators report that they are ill prepared to implement ET in the classroom. (Lytle, 2015)

In addition to schools' lacking knowledge regarding the value of PD along with the decreasing use of PD, school officials also lack knowledge of the value of ET systems in the classroom. (Jenkinson, 2009) Additionally, decreased PD in ET could lead to ineffective use and implementation of technology in the classroom as teacher and administrators feel ill prepared. (Lytle, 2015) To further this point, Sally Johnstone and Russell Poulin (1990) studied the rise of investment in higher ET systems and the lack of tools that measured success of the ET systems. Johnstone and Poulin's studies suggest that higher education institutions did not have adequate systems in place to measure the return on investment to justify large sums of investment in ET systems. K-12 education currently faces a similar problem. That is, with increasingly large sums of taxpayer dollars being invested in ET, there is a lack of measurement of how successful these systems are in K-12 schools. (Krueger, 2013)

The problem this research project aims to address is multi-faceted. The first component of this problem is that there is a lack of measurement of successful ET implementation in the classroom as spending on ET continues to increase (Krueger 2013; Schaffhauser, 2016). Second, the high price of teacher PD, in areas such as ET, has produced little results and current decreasing use of PD equates to less training for teachers and administrators. Therefore, with the increasing investments in ET, higher expenses for teacher and administrator PD, along with decreasing use of PD, it can be strongly argued that there is a need to study how ET implementation in the classroom is affected by teachers and administrators exposure to PD.

Therefore, this study will address the multi-faceted problem of ET implementation in relation to teachers and administrators' exposure to PD. A sophisticate study such as this requires a design that goes beyond merely studying the correlation of variables and constants to derive greater meaning. Thus, an explanatory sequential mixed-method design will be used to first, collect quantitative data to measure the successful implementation of ET in relation to the number of PDs a teacher or administrator carries out. Second, the study will use a qualitative design as a followup to help explain the findings of the quantitative phase. (Creswell, 2013 p. 133)

Overview of Mixed Methods

According to John Crewsell (2013), the mixed-method (MM) approach research is distinct and relatively new in the social and human sciences as a distinct research approach. MM research is an approach to inquiry involving collecting both quantitative and qualitative data, integrating the two forms of data, and using distinct designs that may involve philosophical assumptions and theoretical frameworks. (Creswell, 2013 p. 4) Components of MM research can be found as earlier as 1959 in the social sciences with Campbell Fiske's introduction of triangulation of data to provide greater meaning. (Johnson, Onwuegbuzie & Turner, 2007) A most modern version of MM research originated around the late 1980s and early 1990s based on work from individuals in diverse fields such as evaluation, education, management, sociology, and health sciences. (Creswell, 2013)

Overtime MM has gone through several periods of development, including the formative stage, the philosophical debates, the procedural developments, and more recently reflective positions and expansion into different disciplines and into many countries throughout the world. (Creswell, 2013 p. 217) Researches have begun to use MMs because it allows them to: maximize the strengths of both quantitative and qualitative approaches and reduces limitations; access data collected through quantitative and qualitative approaches, and utilize a more complex approach to provide a more complete answer to a hypothesis or question. (Creswell, 2013 p. 218) Due to the multi-faceted problem of decreased ET PD and increasing spending on ET systems that leads increased ET implementation, an explanatory sequential MM design is most suitable to uncover deeper meaning and answers.

Purpose of the study

The purpose of this MM study is to uncover empirical data and gain a deeper understanding of how the mindset of teachers and administrators affect the successful implementation of ET systems in the classroom, in relation to the amount of ET PD and training they have received. By understanding these two components, this study hopes improved the value of ET PD as a necessary component to improving the successful implementation of ET in classroom. This study aims to provide education leaders with data that help improve the success-rate of ET systems and improve the value of ET PD. Improved success-rate will thereby improve school spending and save millions of dollars that can be reallocated to improve other areas of education.

Theoretical Framework

Following an explanatory sequential MM design, this study will follow a deductive framework and will be guided by a central theory. The central theory will be studied by a dominant quantitative design (QUANT) and followed by a qualitative design (qual) to gain deeper meaning. The Social Learning Theory (SLT) as it is used in the field of education, will guide the quantitative component of this study. At the heart of SLT, are self-efficacy and the impact of learning on a teacher's behavior. (Koch, 2007) Steven Watson (2013) describes self-efficacy as the belief a teacher has in her/his level to

success to carry out certain tasks in the classroom. According to Watson (2013), those with positive self-efficacy reflect cognitive and underlying skills that positively affect confidence, motivation, and willingness to innovate.

Michael Garet (2001) and colleagues conducted a study to identify what makes PD effective. Garet's study indicated three core features of PD that teachers say produced significant results. These key features were, 1) providing activities that are aligned with what teachers should practice, 2) the ability for attendees to participate with others, and 3) increasing duration of PD in the specific area. (Garet, et al., 2001) Garet's (2001) key features reinforces the premise of the SLT set by Albert Bandura (1997) that new patterns of behavior can be acquired through direct experience or observing the behavior of others. Therefore, it can be argued that those with decreasing contact hours of ET PD, as presented in the statement of problem section, are less likely to implement ET in the classroom.

Research Questions

Quantitative (QUAN) Question and Hypothesis

The quantitative research questions that will guide this study is, can a significant difference be found in successful implementation of ET between teachers and administrators who participate in more hours of ET PD and those that participate in less ET PD. The hypothesis of the quantitative design will be based on the premise of SLT, that habits are formed through training. (Bandura, 1977) The study will hypothesize that teachers and administrators who participate in more hours of ET PD are more likely to implement successful ET in the classroom than those who participate in less ET PD. The null hypothesis of this study is, there is no significant difference in the successful implementation of ET in the classroom between teacher and administer who participate in more ET PD and those that participate in less.

The variables of the quantitative phase of this study will be as follows:

- **Independent Variable:** teachers and administrators amount of ET PD and training
- **Dependent Variable:** teachers and administrators experience successful implementation of ET in the classroom

Qualitative (qual) Research Questions

With the findings of the quantitative (QUAN) as a prerequisite, the qualitative research question to be studied in the second phase, will be, how does the mindset of teachers and administrators who have participated in varying amounts of ET PD, impact the implementation of ET in the classroom? To achieve this target, throughout this research study, selected teachers will be observed and asked various questions to uncover possible themes, trends, ideas, feelings and answers regarding the overarching and sub-questions found in *Appendix A*:

Statement of Resources

A number of resources will be needed to conduct this explanatory sequential MM study. These resources include, but are not limited to; surveys to administer to responders; statistical analysis software to analyze quantitative data; participants, to gather QUAN and qual responses; coding software, to develop meaning of data through the construction of groupings, categories, and patterns, and a research professor, who will serve as an external auditor of the entire project to ensure validity. (**Saldaña, 2015; Creswell, 2013 p.202**) Additional resources may also include, Survey Monkey, Skype, Google Apps, email, mailings and other supplies and systems to conduct this study. A detailed budget can be found in *Appendix B*.

Methodology

The intent of this explanatory sequential MM study is to use qualitative interviews with open-ended questions to explore and make sense of the quantitative findings from phase one. (Creswell, 2013 p. 234) The quantitative component of the study will be used to generalize a population of K-12 public schools. The qualitative component of the studies will be used to gain a more in-depth perspective of the research. (Creswell, 2013 p. 219) An outline of the explanatory sequential MM study can be found in *Appendix C*.

Data Collection

The first phase (QUAN) of this study will begin with a quantitative phase. Surveys are especially useful when a study is being conducted to describe the behavior of a large group. (Wyse, 2012) Therefore, a survey is best for the first phase because it will provide quantitative descriptions of trends, attitudes, or opinions of a K-12 education population by studying a sample of that population and drawing inferences. (Creswell, 2013) The first phase of this study aims to draw assumptions for all public K-12 schools in the United States. NCES (2015) reports that there are 98,328 elementary, middle and secondary public schools in the U.S. Based on this population size, a confidence level of 95%, and a confidence interval of 8, a sample size of 150 individuals will need to be surveyed to effectively draw a conclusion for 98,328 schools. The target participants of the QUAN phase of the study will be composed of 100 teachers and 50 administrators.

The key sequence of this study is that the qualitative data collection builds directly on the quantitative results. The key to the second phase, qualitative phase, will be to identify the important results from the quantitative phase to further explore. (Creswell, 2013 p. 224) After identifying the key quantitative results, various participants from the survey participants will be requested to participate in a follow-up interview. During the interview process, the selected participants will be asked a specific series of open-ended questions. The open-ended questions can be found in the *Appendix D*. To ensure ethical control, participants' names will be withheld from final documentation. Additionally, the participants' approval will be gained before publishing any responses. (Creswell, 2013 p.208) Prior to conducting the qualitative (second) phase of this study, all necessary steps will be taken to obtain permission from the Institutional Review Board. (Creswell, 2013 p.187)

Data Analysis and Interpretation

According to Creswell (2013), the quantitative and the qualitative data are analyzed separately in a mixed-method approach. Therefore, once the data are collected in the quantitative phase (two), it will be analyzed and interpreted using statistical tools, such as SPSS, to generalize the population. The data will be analyzed to determine if there is any significance between the amount of ET PD and the success-rate of

ET in the classroom. Once quantitative data are collected, it will be used to generate specific qualitative questions to be used during the qualitative phase. (Creswell, 2013 p. 224) During the data analysis of the qualitative phase, all data will first be transcribed, then coded to form categories and finally, analyzed to identify themes. (Creswell, 2013 p. 194) The themes found will be used to interrupt the finding from the quantitative section to provide deeper meaning.

Data Validation and Other Considerations

To increase the validity of this study, data collected during the quantitative phase will be thoroughly checked to ensure that all options are considered for follow-up during the qualitative phase. (Creswell, 2013) To ensure that the qualitative phase is free from bias towards a single group, each selected participant from phase one will satisfy some unique attribute found in the overall quantitative sample set. Additionally, strict qualitative procedures will be followed to ensure consistency and reliability during data collection. To further promote validity, a selected professor who has knowledge of the field will review the data.

There are also considerations that must be taken into account to ensure a successful study is carried out. For instance, it may be difficult during the quantitative phase to reach the target number of samples in a short timeframe. Therefore, to capture as many respondents as possible, the survey will be longitudinal and administered over multiple months. Additionally, since the qualitative phase follows the quantitative section, the length of the project tends to be longer and should be incorporated during the planning phase. (Creswell, 2013 p. 232)

Conclusion

Large sums of money, time, and effort are expended to fund and implement ET systems. (Krueger, 2013 p.2) Given the increases in ET and decreases in PD (Schaffhauser, 2016), teacher and administrators are less confident and ultimately less likely to implementing ET in the classroom. (Lytle, 2012) This study aims to gather empirical data and gain a deeper understanding of how the mindset of teachers and administrators affect the successful implementation of ET systems in relation to the amount

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of ET PD they received. Through this study, teachers and administrators will be armed with knowledge of the value of ET and how to best improve ET implementation. Furthermore, with data collected and analyzed during this study, time, effort, and resources can be better utilized to improve PD and educator preparedness to successfully implement ET systems in the classroom. (Krueger, 2013 p.2-3)

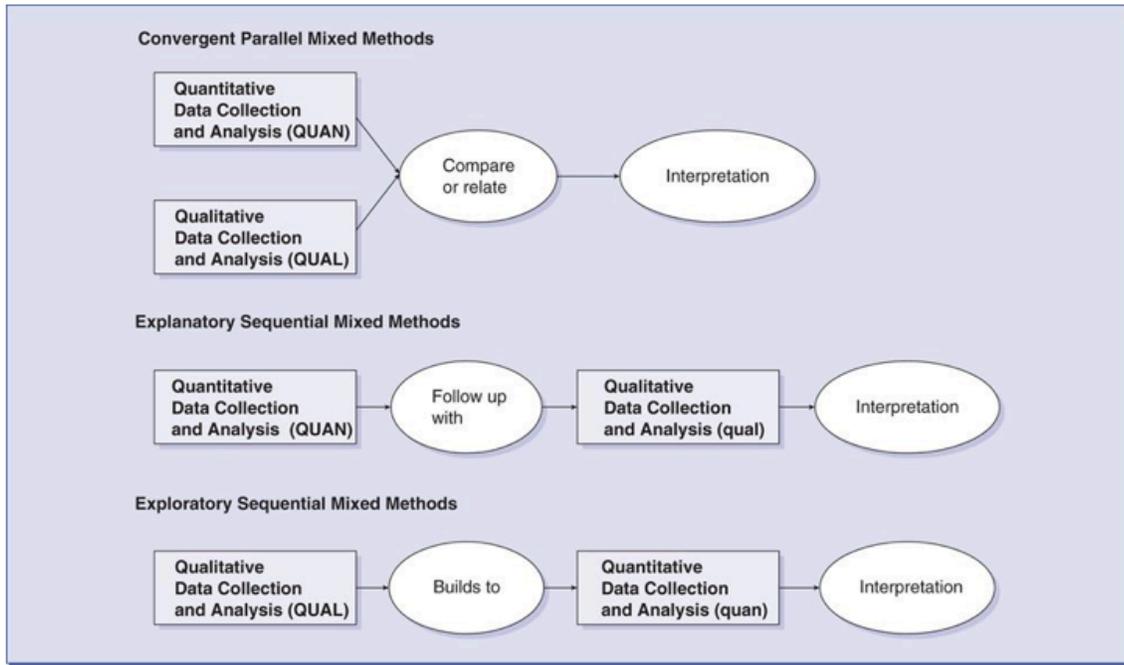
Appendix A: Research Questions

- I. How does the mindset of a teacher impact successful implementation of ET systems in the classroom?
 - a. How does a teacher experience of PD affect their perception of ET in the classroom?
 - b. How does past experiences of failed, ET systems affect teacher's use of new technology systems and implementation?
 - c. What factors contribute to the successes and challenges to teachers integrating ET systems in the classroom?
 - d. How does a teacher's perspective of ET systems change over time?
 - e. How does a teacher's understanding of ET systems affect his or her use and implementation of the ET systems in the classroom?

Appendix B: Budget: Statement of Resources

Item Line	Duration/Quantity	Estimate Cost
Statistical Software	Unlimited	\$200
Sample size calculator	Unlimited	04
Survey Monkey	Unlimited	\$0
Skype Account	Unlimited	\$0.00
Google Apps Account	Unlimited	\$0.00
Email account for emailing	Unlimited	\$0.00
Coding Software	1 Year	\$100.00-\$200.00
Travel	10 schools x 30 miles (300 miles)	\$50.00
Professor	1 Year	\$0.00
Notebook and Pens	5	\$10
Participants Incentives	10 Gifts card \$20.00	\$200.00
Video Recording	1 Year	\$100.00
Voice Recording	1 Year	\$40
Phone Usage	1 Year	\$100
Food and Beverages	1 Year	\$100
Miscellaneous	1 Year	\$200
Total	1 Year Project Timeline	\$1200

Appendix C: Design Flow Chart



Source: (Creswell, 2013)

Appendix D: Qualitative Research Protocol

Observations

- Each teacher will be notified prior to being observed.
- Each observation will last approximately 30 minutes
- The research must ensure that he or she is in not way impacting the lesson with the recording device or his or her position in the room.
- Each observation will record the entire lesson.
- In the event of disruption to the lesson for unforeseen reasons, the observation must be rescheduled to capture a complete lesson.

Interviews (Creswell, 2013 p.194)

- Each teacher will be notified prior to being interviewed.
- Each interview section will be digitally recorded and transcribed immediately by the researcher
- The date, place, interviewer and interviewee will be recorded during each interview.
- The interviewer will start with an ice-breaker and
- The interviewer will ask each interviewee the same series of open-ended questions as prescribed by this research study.
- During the interview process the research shall also take notes include, facial expression, body language and thoughts

Coding and Analysis (Creswell, 2013, p. 195-196)

- Video, audio and written data will be coded using a qualitative coding software such as ATLAS.ti, QDAP, NVivo or the like

- Data analysis will progress as follows: Raw data, organizing and preparing the data, reading through all the data, coding the data in 5 consistent themes or descriptions, grouping themes and descriptions, and determining meaning.

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