

How User Experience Impacts Cognitive Behavior and ET System Implementation

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Problem

Research and Development (R&D) can be considered a major component to an organization's innovative and competitive advantage, regardless of the business sector the organization is in. R&D can range from large-scale productions in a fortune 500 companies, to small-scale efforts in a small non-profit organization or school. Regardless of scale, R&D generally requires monetary investments, human resources, and time. The goal of R&D is to develop solutions to problems and/or new solutions to further compete. In education, R&D can be used to development a more robust 21st century curriculum that involves the use of iPads or a 1-to-1 laptop imitative to engage students and improve learning outcomes. The next logical progression from R&D is implementation. Each year, United States (U.S.) companies and schools continue to spend millions of dollars on technology R&D and implementation, although there are persistent and troubling gaps between the value of the technology and effective use. (Barton & Kraus, 1985) Studying how the teachers, as the main user of educational technology (ET), impact implementation and future use of ET could be a viable solution to this problem.

Background Information

Overall U.S. spending in 2017 is estimated to be 6.9 trillion dollars, with pension, healthcare and education accounting for more than 57% of the expenses. Education is the third highest expense in the U.S. with over 1 trillion dollars. Spending on K-12 education steadily accounts for the largest portion of education spending, according to The U.S. Office or Management and Budget (www.gpo.gov, 2017) Across the U.S. large sums of taxpayer dollars are used to implement new technologies in K-12 schools. (Al-Zaidiyeen, Mei & Fook, 2010) Public schools comprise a majority of K-12 educational institutions. Therefore, taxpayers' dollars bare much of the burden to fund the increasing cost of ET implementation in K-12 public schools (NCES, 2013; Johnson, 2011)

In the U.S., spending on ET is estimated to be over \$6.7 billion, with K-12 education consuming over \$5 billion of the total expense. (Mccandles, 2015 & Kleiman, 2000) Additionally,

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U.S. private sector investment in ET continues to move in an upward trend, with expenses estimated to reach over \$2.5 billion annually. (Wan & McNally, 2015) While data show that ET expense will continue to rise at a steady pace (NASBO, 2015), the need to understand, assess, and measure the success and impact of these educational technologies is a growing topic. (Johnstone, 2010) An important question to this growing topic is how teachers' impact the success of ET systems in the classroom and therefore impact investment in education. (Zhao, 1999; Lu & Overbaugh, 2009; Johnstone, 2010)

Literature Review

Implementation of ET systems has been studied in various formats with wide ranging data and scope. (Helms, 2016) Similarly, there have been numerous studies carried out on the effects of cognitive behaviors and intended outcomes. (Mindsetkit.org, 2015) Additionally, there have been multiple studies conducted related to, identifying teachers' impact on ET use in the classroom, teachers' attitudes and perspectives towards ET, cost of ET, and factors that promote the development of successful ET systems. For example, Jerad Cox (2013) studied desire of teachers to improve their classroom environment through innovation. This study discussed the topic of teachers having control over ET innovation and their attitudes toward implementing ET systems. Although this study focused on teachers, attitudes, and ET integration in the classroom, it did not specifically focus on teacher's cognitive behavior and how mindsets affect teachers' effective implementation of ET system in the classroom.

Naser Jamil Al-Zaidiyeen (2010) conducted a closely aligned studied of teacher's attitudes towards the use of Information and Communication Technologies (ICT) in the classroom. The study surveyed over 650 teachers across the country, Jordan, by random selection. Teachers in the study were asked various questions to reveal their perspectives and attitudes towards ICT. Data collected during this study, was used to determine a correlation between teachers' attitudes regarding ICT in the classroom and use. Al-Zaidiyeen's findings suggested that there is a positive relationship between

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teachers' attitudes towards ICT and its use in the classroom. (Al-Zaidiyeen, Mei & Fook, 2010)

Other related studies to ET use in the classroom include; Yong Zhao's (1999), study of conditions for technology innovation; Ruiling Lu's (2009), study of schools and technology implementation in K-12 classrooms, and Abeera Rehmat's (2014), study of technology integration in a science classroom and pre-service teachers' perception of technology.

Additionally, studies that focus on the impact of finance, time, and users, as it relates to technology systems implementation, tend to be found in the corporate and business world, rather than the K-12 sector. For instance, Barton & Kraus (1985) describe a number of the challenges managers must overcome for a company to implement new technologies efficiently. In the article, "Implementing New Technology", the authors discussed the need to invest time in understanding the end-users to ensure effective system implementation and return on investment of technology. Furthermore, the Barton & Kraus discussed the need for managers to understand and plan for resistance to change to improve technology implementation. The corporate sector's focus on end-users and technology implementation suggests that end-users could be a key component to ensuring that K-12 schools better understand the value and effective use of ET systems.

Although the studies discussed touch on teacher's attitude and perspectives regarding ET systems, not all studies focused on whether the ET systems use in the classroom were implemented as successfully. Additionally, the studies covered a diverse scope and business sectors while failing to acutely discuss the impact of teachers' cognitive behaviors and ET systems in the classroom. Furthermore, a number of studies that focused on teachers' perceptions or attitudes are quantitative and do not consider common psychosocial themes across participants. This review of literature, along with deep searches for qualitative studies that focused specifically on how teachers' cognitive behaviors impact the implementation of ET systems in the classroom, produced limited content. This suggests that there is a gap in literature specific to the combination of the two central topics this study aims to understand.

Purpose of the Study

Understanding user's experience, requirements, and needs as they relate to the needs of a school or organization are important pre-requisites to R&D, implementation, and adoption. This qualitative study will focus on cognitive human aspects of ET system implementation and adoption to understand the impact of users' mindset with regards to ET system implementation. Studies show that humans tend to have a higher capacity to remember and focus on negative experience, rather than positive experiences. This phenomenon, in turn, affects future experiences. (William, 2014) Many scientific studies have been carried out to document the negativity bias theory. The negativity bias is the tendency for humans to pay more attention, or give more weight to negative experiences over neutral or positive experiences. Even when negative experiences are inconsequential, humans tend to focus on the negative. (Loranger, 2016) Studies show that negativity bias can manifest itself in many forms, such as user's experience on a website, use of instructional practices, and interaction with ET. Negativity bias presence a significant area of focus as it pertains to ET systems implementation, as teachers tend to be key drivers for effective use of ET in the classroom. Therefore, this study will acutely focus on how users' experiences impact the adoption and implementation of ET to arm both administrators and ET companies with critical information to improve ET implementation.

Research Questions

This qualitative research study aims to understand what cognitive human behaviors are created by human experiences and how users' experiences impact the adoption and implementation ET. The following research questions will guide this qualitative study:

1. How does a user's experience impact behavior towards adoption and implementation of ET in the classroom?
 - a. How does past experiences with ET systems affect a teacher's use of new technology systems and implementation?

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- b. What themes relate to successes and challenges to implementation and use of technology in the classroom?
- c. How does a teacher's perception of ET change with experience in the classroom?
- d. What role to does teacher understanding and information about ET play in teacher perception of ET?

Methodology

Purpose

Quantitative and qualitative studies are two of the most widely used research methods. For the purposes of this study, it is important to understand the differences of these two methods. A quantitative method is a process of inquiry that uses variables, measurements, and statistical examinations to test a theory. A qualitative method does not rely on proving theories, understanding variables, or conducting experiments. Rather, qualitative methods allow a theory or explanation to develop through, interviews, artifacts, and/or observations. (Neuman, 2002 & Creswell, 2013) Unlike qualitative methods, quantitative methods aim test a theory. According to Martin Marshall, qualitative research studies aims to provide illumination and understanding of complex psychosocial issues. Additionally, Marshall state that qualitative studies are most useful for answering humanistic 'why?' and 'how?' questions. (Marshall, 1996) The central question in the study is how does a user's cognitive behavior, as shaped by experience, impact adoption and implementation of ET? The key component of this central question is, "how". The term "how" expresses the desire to understand. Therefore, a qualitative research method is the most appropriate method for to conduct this this study.

Approach

This qualitative study will focus on psychosocial aspects of teachers and ET systems implementation to uncover important themes, trends, and characteristics related to teachers' use and adoption of ET. Therefore, this study will utilize a phenomenology research approach.

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Phenomenology is a qualitative research approach that emphasizes a focus on people's subjective experiences and interpretations of the world. The root desire of phenomenologists is to understand how the world appears to others. (Williams, 2006) Understanding how ET appears to teachers could provide critical information to administrators and ET businesses to ensure more effective ET system implementation. The targeted audience of this study will consist of K-12 teachers, school administrators, and ET businesses.

Sampling

The population that this study focuses on is comprised K-12 public school teachers in U.S. Teachers within this population have diverse backgrounds and experiences. Teachers within the U.S. population may teach in urban or suburban districts, serve students with disabilities, have taught less than one year in the classroom, or have more that ten years of teaching experience. Given geographical, financial, and time constraints, this study will limit its research to teachers in New York and New Jersey schools. To ensure identification and selection of information-rich cases, purposeful sampling of teachers will be taken from available schools within New York and New Jersey. According to Creswell and Plano Clark (2011), purposeful sampling involves identifying and selecting individuals or groups of individuals that are especially knowledgeable about or experienced with a phenomenon of interest. Given that teachers within this population have characteristics, such as years of experience, settings, and subject, that can be determined, purposefully selecting participants will provide in-depth information to ensure a breadth of understanding. (Palinkas, et al., 2013) The purposeful selection criteria for participants will include teachers that have less than one year of teaching experience, have three to five years of teaching experience, have more than ten years of teaching experience, teach in an urban environment, teach in a suburban environment, use technology often, do not use technology often, and teach students with special needs. The cohort of participants will be purposefully selected to ensure that at least two participants meet one of the criteria.

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Instruments

One of the most important components for conducting this qualitative study is gaining access to teachers in the classroom. To gain access to these teachers, it will be critical to identify various schools and seeking approval from gatekeepers, such as principals and various administrators. (Creswell, 2013 p. 187) This study will target at least ten purposefully selected teachers, in New York and New Jersey Publics schools. Each teacher will be asked to participate in two to three, forty to sixty-minute interviews. The first round of interviews will consist of pre-determined open-ended questions, as described in *Appendix II*. Detailed notes and recordings will be taken during the interview process, followed by coding to develop themes or partners for analysis. The second round of interviews will consist of open-ended questions derived from themes and patterns found during the first round of interviews, coding and analysis. The second round will follow the same data collection, coding, and analysis process as the first. If further questions or gaps in information remain or new questions arise after round two, a third round of interviews will be carried out. The aim of this iterative interview process is to reach a saturation point where no new information is being uncovered. (DePaulo, 2000)

IRB & Consent

This qualitative study will ensure that all applicable research procedures and guidelines for the protection of human participants, as set forth by the New Jersey City University (NJCU) Institutional Review Board and Code of Federal Regulations, 45 CFR 46.101b), are maintained by gaining IRB approval prior to conducting research. Before conducting research, an IRB application will be developed and submitted to the NJCU IRB committee. The IRB application will ensure that; the rights and welfare of participants are safeguarded; all foreseeable risks are mitigated, justified, and outlined; benefits of the research outweigh any risks; participants are protected; protocols are created to obtain informed consent through adequate and appropriate means from participants, and conduct of activities are reviewed at timely intervals. (NJCU IRB, 2016) In addition, the researcher

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must acknowledge that potential bias and participant influences may occur when research is carried out in an environment in which the researcher holds a position of authority. Therefore, to mitigate potential bias and participant influences created through the researcher's authority, participants from researcher's place of employment will not be used. Taking these steps will ensure that reliable data is collected during the study in an ethical manner. (Creswell, 2013)

Resources

To successfully carry out this qualitative study, a number of resources will be needed. These resources include, but are not limited to; interview participants, to gather responses and information; 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, Skype, Google Apps, email, mailings, and other supplies and systems to administer this study.

Conclusion

Humans inherently tend to focus of negative experience than positive experiences. These experiences in turn, impact the mindset one might have towards future experiences. (William, 2014) Large sums of money, time, and effort are spent annually to fund ET system implementation. (Krueger, 2013 p.2) While schools continue to spend millions of dollars on ET implementation, there continues to be persistent gaps between the value of the ET and effective use. (Barton & Kraus, 1985) School administrators, teachers, and ET businesses should be armed with the knowledge ET users to ensure that their time, efforts, and funds are used wisely to successfully implement ET systems. (Krueger, 2013 p.2-3) This qualitative study aims to provide educational stakeholders and ET businesses with invaluable psychosocial knowledge that could be the link to the implementation puzzle by uncovering the ways in which a user's experience impact ET adoption and implementation.

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Appendix I: Timeline for Completion

The following table shows a timeline for completing this study:

Date	Tasks
November 2016	Write proposal and form research committee
December 2016	Develop IRB application and gain approval
January 2017	Identify research sites and contact gatekeepers for approval
February 2017	Solicit participants and Begin round one interviews, gather data, code data, analyze, and write report
March 2017	Begin round two interviews, gather data and analyze, and write report
April 2017	Begin round three interviews (if needed) gather data, and write report
May 2017	Writing report/dissertation based on finding
June 2017	Finalize report based on findings, present findings, defend position

Appendix II: Research Questions

1. Ice-breaker: So tell me a little about yourself.
2. Could you describe educational technology, its importance, and value in education?
3. How would you describe your experiences using technology in the classroom thus far in your teaching career?
4. Can you describe your most vivid educational technology experience while teaching in the classroom?
5. Can you describe two technology systems that you have successfully used in your classroom and to explain why and how they were successful?
6. Why do you think technology fails in your classroom?

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7. Can you describe the characteristics of a colleague that you believe uses technology in the classroom successfully and why?
8. What can you identify from your experience or training as important factors to successful use of technology in the classroom?
9. How would you describe your mindset towards implementing technology systems in your classroom during your first year of teaching, compared to where you currently are in your career? If you are a first-year teacher, compare your pre-service teaching year to where you are now.
10. Can you describe two technology systems that have failed in your classroom and can you explain why and how they failed?

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[Programs/Policies, Compliance and Application Packets/2016-2-9-IRB Procedures Guidelines.pdf](#)

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