Increasing ROI With Successful K-12 Educational Systems: A Quantitative Research Proposal

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Introduction

Many school officials in the United States are being asked to show the return on investment for educational technology systems (Krueger, 2013). Funding for K-12 education is more than 25% of taxpayers' dollars and is the largest consumption of overall national expenditure by a wide margin (Policy Basic, 2015). According to National Center for Educational Statistics, the United States spends over $611 billion, annually, to fund K-12 Education (NCES, 2013). While the overall cost of K-12 education is extremely high, data show that State expenditure on K-12 education will continue to rise by approximately 5% annually (NASBO, 2015). Furthermore, educational technology expenditure is estimated to be over $6.7 billion, with K-12 education consuming over 80% of the total expense (Mccandles, 2015 & Kleiman, 2000). With these staggering numbers, a common questions being asked, is if there is value being recouped from the investment of taxpayer's dollars in educational technology systems (Krueger, 2013).

Statement of the Problem

It may seem as though numbers as simply being presented in the absence of meaning. However, the significance of these monetary figures show that large sums of taxpayer dollars are used to implement new high-cost educational innovation (Johnson, 2011). Sally Johnstone and Russell Poulin (1990) studied the rise of investment in higher education technology systems and the lack of systems that measured success of the technology systems. Johnstone and Poulin's studies suggest that higher education institutions did not have adequate systems in place to the measure the return on investment or value to justify large sums of investment in educational technology systems. The problem this research proposal seeks to address is similar to that studied by Johnstone and Poulin. The problem is, although there are large sums of money being invested in educational technology, there is a lack of measurement of how successful these systems are in U.S. schools (Krueger, 2013).

Purpose of The Study

Attaining the intended goal of a technology system is a prerequisite to recouping and increasing the return on investment (Parker, 2014). Robert Goatham's studied the failure of the 2012 United States' automated census projected in 2012. Goatham's report concluded that although the project was not highly complicated, it failed due to lack of attention to user requirements and weak management support. Goatham suggested that weak management support was a result of ineffective communication with management, improper governance and control. (Goatham, 2012) Johnstone (2010) stated that a critical variable that affects the success of educational technology system is the requirements of people using the system. To strengthen the importance of user requirements, a study of software projects showed that deficient user requirements are one of the biggest causes of project failure (Hofman & Lehner, 2001). In conjunction with user requirements, management support is suggested as one of the top three keys to technology system success (Dorsey, 2010). Therefore, the purpose of this quantitative study is to determine the degree to which user requirements and management support, promote successful development of K-12 educational technology systems and achievement of high return on investment.

Theory

Ultimately, successful systems improve the use of technology and therefore, improve the use and return on investment of billions of taxpayers' dollars (Johnson, 2011). Yong Zhao (2002) and Dorsey (2010) respective research studies theorize that clear user requirements and management support are likely the most salient factors to developing successful K-12 educational technology systems. Yong Zhao's theory regarding the importance of user requirement was developed after he studied various conditions for classroom technology innovation. Zhao's study identified multiple salient factors that improve technology use in the classroom. However, user

requirement was identified as the most critical factor in Zhao's study (Zhao, 2002). In a study of why system projects fail, Dorsey (2010) identified ten possible reasons. However, of these ten reasons, Dorsey identified management support as the number one reason for systems project failure. Therefore, with these two studies as a foundation, this quantitative research study will combine Zhao and Dorsey's theories to study the degree to which user requirements and management support impact the success of educational technology systems.

Literature Review

A plethora of search results suggests that various studies have been carried out to identify important elements related to the successful K-12 educational systems in various forms and literatures (Lu, 2009; Nasir, 2011; Zhao, 1999). However, unlike the theory presented in this study, current and past researchers have not specifically focused on K-12 educational technology, user requirements and management support. For example, although Alexander J. Romiszowski carried out a study that focused on factors leading to successful or unsuccessful educational technology innovation, the authors' study was broad (Romiszowski, 2004). Similarly, Ruiling Lu examined multiple factors that related to improving teachers use of instructional technology in the classroom (Lu & Overbaugh, 2009). Furthermore, corporations such as IBM and KPMG have conducted search studies identify board factors and serious problems across multiple business sectors that affect information technology (IT) project success. (The Standish Group, 1994; Why Projects Fail, 2016) However, unlike these three studies, this study aims to focus specifically on the degree to which user requirements and management impact the success of educational technology systems to import the return on investment of tax dollars.

Significance of The Study

The 1994 Chaos Report by The Standish Group sparked great conversation about the financial impact of IT project success (Eveleens & Verhoef, 2010). The Chaos Report stated that

84% of IT projects were relatively unsuccessful based on data retrieved from a survey of over 8,280 IT projects (The Standish Group, 1994). These staggering failure rates, teamed with high dollar figures invested in K-12 educational technology systems, paints a vivid picture of the massive financial impact failed IT projects can have on schools and financial resources (Eveleens & Verhoef, 2010). If successful, this proposed study will provide education leaders and policy makers at the School, Local and State level with specific focus area that will help improve the success-rate of educational technology systems. Improved success-rate will thereby improve school spending and save millions of dollars that can be reallocated to further educate students.

Research Questions

This study will focus on two research questions, using a 1-10 scale for measurement.

- RQ_1: Based on the ranking of responders, to what degree does clarity and planning of user requirements impact the success of an educational technology project
- RQ_2: Based on the ranking of responders, to what degree does strong management support impact the success of an educational technology project?

Hypothesis and Variables

The hypothesis for the is, projects stand a greater chance of being successful when: clear goals of an educational technology systems are defined, based on the user requirements, and the proposed system is strongly supported by local and state leadership officials. A detail list of the research questions, hypothesis and alternative hypothesis are presented in *Appendix A*.

To apply and test the theory derived from Zhao (2002) and Dorsey (2010), the degree to which user requirements are identified, understood and planned for, along with the degree to which management supports the educational technology system, will serve as independent variables. Additionally, if Zhao (2002) and Dorsey (2010) theory hold true, a high degree of both independent variables will positively produce successful K-12 educational technology system and

maximizing the use of taxpayers' dollars. Therefore, the degree to which an educational technology system is successful will be the dependent variable.

Research Design, Approach and Philosophy

To conduct this study, a quantitative correlational design will be used to collect data, test the hypothesis and draw inferences. General, quantitative research studies use correlation techniques to infer associations among variables of interest (Mitchell, 1985). In this study, two variables are presented. Additionally, the study is expected to test the hypothesis presented by analyzing specific data. Therefore, this study will be guided by a postpositive worldview, as the study is empirical in nature (Creswell, 2013, p. 6). Postpositivists hold a deterministic philosophy in which it is believed that specific treatments to independent variables determine the outcome of dependent variables (Creswell, 2013, p. 7). The assumption that educational technology projects stand a greater chance of being successful when clearly defined goals and strong management support is present, will be tested throughout this research study. As guided by a postpositive worldview, data collected during this research study will be rationally analyzed using statistical measurement to prove or refute the hypothesis of this study (Creswell, 2013, p. 7).

Research Methods

To gather data for this research study an online survey will be used as the instrument. Surveys are especially useful when a study is being conducted to describe the behavior of a large group. Therefore, a survey is best for this study 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 National Center for Educational Statistics reports that there are 98,328 elementary, middle and secondary public schools in the United States (NCES, 2015). Based on a population size of 98,328 schools, a confidence level of 95% and a confidence interval of +/-8, a sample size of 150 individuals will be surveyed to

effectively represent and draw a conclusion for the population in the study. The target participants in the study will be composed of 50% teachers, 25% technology managers and 25% school administrators.

To reach 150 responders and overcome geographic limitations, the survey instrument will be administered in an online format. Furthermore, utilizing an online survey will reduce cost of collecting, aggregating and analyzing the data (Blackstone, 2012). It is anticipated that reaching 150 responders may be difficult because participants' fail complete or rejection the survey. Therefore, to capture as many respondents as possible, the survey will be longitudinal and administered over multiple months. All questions in the survey will be directly related to the research questions to accurately draw inferences and correlate the independent variables to the dependent variable. (Creswell, 2013) Additionally, all survey questions will be developed by the researcher and therefore will not violate possible copyright.

Conclusion

The education sector must catch up to the private sector by gathering and assessing data related to successful of IT systems. Local, State and Federal education officials may stand a better chance of maximizing educational budget when armed with accurate financial data. If Zhao (2002) and Dorsey (2010) theory is proven correct through this empirical research study, clear user requirements and strong management support of a educational technology systems will be key focus areas of future educational technology managers and education officials.

Appendix A: Research Question & Hypothesis

Research Questions 1:

Based on the ranking of responders, to what degree does clarity and planning of user requirements impact the successful of an educational technology project?

$H1_{A:}$ There is a significant difference between the successful and unsuccessful K-12 educational technology systems when user requirements are clearly defined and planned for.

$H1_{O:}$ There is no significant difference between the successful and unsuccessful K-12 educational technology systems when user requirements are clearly defined and planned for.

Research Questions 2:

Based on the ranking of responders, to what degree does strong management support impact the success of an educational technology project?

$H2_{O:}$ There is a significant difference between the successful and unsuccessful K-12 educational technology systems when strong management support is present.

$H2_{O:}$ There is no significant difference between the successful implementation of K-12 educational technology systems when strong management support is present.

References

Blackstone, A. (Ed.). (2012). *Sociological inquiry principles: Qualitative and quantitative methods* (1st ed.) Flat World Education, Inc. Retrieved from http://2012books.lardbucket.org/books/sociological-inquiry-principles-qualitative-and-quantitative-methods/index.html

Creswell, J. W. (2013). *Research design: Qualitative, quantitative, and mixed methods approaches* Sage publications.

Dorsey, P. (2000). Top 10 reasons why systems projects fail. *Retrieved February, 10*, 2005. Retrieved fromhttp://rrsg.ee.uct.ac.za/courses/EEE4084F/Archive/2014/Assignments/Reading%20Assignments/Lect21-Dorsey_Top10ReasonsSystemsProjectsFail.pdf

Eveleens, J., & Verhoef, C. (2010). The rise and fall of the chaos report figures. *IEEE Software, 27*(1), 30-36. doi:http://draweb.njcu.edu:2078/10.1109/MS.2009.154

Facts and figures. (2016). Retrieved from http://calleam.com/WTPF/?page_id=1445

Goatham, R. (2012). Failed project case study – the united states 2010 decennial census – field data collection automation (FDCA) A project management case study by calleam consulting ltd. Retrieved from http://calleam.com/wp-content/uploads/US_Census_FDCA_Case_Study_V1.0.pdf

Hofmann, H. F., & Lehner, F. (2001). Requirements engineering as a success factor in software projects. *IEEE Software, 18*(4), 58.

Johnson, D. (2011). ***Stretching your technology dollar***. (No. 4).http://www.ascd.org/. Retrieved fromhttp://www.ascd.org/publications/educational-leadership/dec11/vol69/num04/Stretching-Your-Technology-Dollar.aspx#fn1

Johnstone, S. M., & Poulin, R. (03). Technology: So, how much do educational technologies really cost? *Change (New Rochelle, N.Y.), 34*(2), 21; 21-23; 23.

Kleiman, G. M. (2000). Myths and realities about technology in K-12 schools. *Leadership and the New Technologies, 14*(10), 1-8.

Lu, R., & Overbaugh, R. C. (2009). School environment and technology implementation in K-12 classrooms. *Computers in the Schools, 26*(2), 89-106. doi:10.1080/07380560902906096

MCCANDLESS, J. (2015,). **U.S. education institutions spend $6.6 billion on IT in 2015**. Retrieved fromhttp://www.centerdigitaled.com/higher-ed/US-Education-Institutions-Spend-66-Billion-on-IT-in-2015.html

Mitchell, T. R. (1985). An evaluation of the validity of correlational research conducted in organizations. *Academy of Management Review, 10*(2), 192-205.

NASBO: State expenditure report. (2015). (). 444 North Capitol Street NW Suite Washington, DC: National Association of State Budget Officers. Retrieved fromhttp://www.nasbo.org/sites/default/files/State%20Expenditure%20Report%20%28Fiscal%202013-2015%29S.pdf

Nasir, M. H. N., & Sahibuddin, S. (2011). Critical success factors for software projects: A comparative study. *Scientific Research and Essays, 6*(10), 2174-2186.

NCES. (2013). *U.S. department of education, national center for education statistics. (2015). digest of education statistics, 2013 (NCES 2015-011),chapter 2.* (No. 011).National Center for Education Statistics. Retrieved fromhttps://nces.ed.gov/fastfacts/display.asp?id=84

Policy basics: Where do our state tax dollars go?. (2015). Retrieved from http://www.cbpp.org/research/policy-basics-where-do-our-state-tax-dollars-go

Romiszowski, A. J. (2004). How's the e-learning baby? factors leading to success or failure of an educational technology innovation. *Educational Technology-Saddle Brook then Englewood Cliffs Nj-, 44*(1), 5-27.

The standish group: The CHAOS report (1994). (1994). (Report).The Standish Group Internaltional. Retrieved fromhttps://www.standishgroup.com/sample_research_files/chaos_report_1994.pdf

Why projects fail. (2016). Retrieved from http://calleam.com/WTPF/?page_id=2213

ZHAO, Y., SHELDON, S., & BYERS, J. L. (2002). Conditions for classroom technology innovations. *Teacher College, 104*(3)