Mixed Method Study – The Digital Divide and its Impact on the Achievement Gap

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Introduction

Schools throughout the United States are promoting active learning in classrooms through curriculum revisions that integrate technology use in the content. Even though districts are promoting this initiative, many school districts still lack technology and the use of it throughout daily lessons in the classroom. A key distinction lies among minorities and students from low-income households in public schools in regards to the lack of technology and the use of it. Studies have shown that when compared, minority students owned fewer computers than those that come from households of the majority (Chisolm, 2001). The disparity in regards to access to technology amongst schools and students within a school is referred to as “digital divide”. The term “digital-use divide” has developed from the original term to describe classrooms throughout a school or whole schools who do not use technology throughout their lessons or the district curriculum does not integrate technology even though they have the technological devices.

As society consistently continues to evolve, technology and the use of it also continues to plays a vital role in our daily lives. Sadly, minorities and families from low-income households are the key members in our society who face the biggest impact of the digital divide (Chisholm & Carey, 2002; First & Hart, 2002).

Problem Statement

Pablo Freire (2002) believed that there is no such thing as an unbiased educational process. He believed that some educational systems continue to sustain a “caste” system where minorities and low-income families remain at the bottom and/or do not show progression as fast as families from majority households. The impact of the digital divide on the student achievement gap will be the central focus of this study. The term “achievement gap” refers to the major disparities in the academic performance and success of students amongst various groups. This study will also explore the influence of the school administration in an inner-city school on narrowing the digital divide.

Purpose

Students must be exposed to technology and be allowed to interact with it during their daily lessons, if schools want to improve teaching and learning in order to achieve academic success. In an attempt to promote this initiative, schools must revise their curriculum to reflect the integration of technology throughout the content areas to support teaching and learning in the classroom. The consistent use of technology in society clearly displays the need for students to have and use technology in schools in order to be prepared to compete in the global development of our world. It is very important for students to have the training and technological skills needed to rise to a higher socioeconomic status (Eisner, 1985). The amount of accessibility and technological usage is a key factor towards assuring that the learning process is effective. Until the digital divide is narrowed throughout public schools across the nation, minorities and students from low-income families will continue to demonstrate great disparities in the achievement gap towards academic success.

Research Questions

This study will seek to answer a combination of quantitative, qualitative, and mixed methods research questions:

**Quantitative**

1. To what extent do teachers realize that the “digital divide” exists?

**Sub Question**

1. What achievement patterns have occurred amongst assessment scores while technology was integrated into daily lessons for students inclusive of minorities and those from low-income households?

**Qualitative**

1. What is the relationship between the accessibility and use of technology in the classroom and student achievement?

**Mixed Methods**

1. How do themes mentioned by teachers and students assist in explaining why students are showing less growth and academic achievement when comparing students with limited to no access/use of technology to those with full accessibility/use?

Limitations

Within any study, researchers may encounter limitations within the study. Limitations are weaknesses, complications, or issues that may arise during the study. Possible limitations that may arise within this study is as follows:

**Researcher/Teacher Bias**

The researcher’s role as a Principal in the school district in which the research is being conducted allows for the possibility of bias within the study. A range of teacher experience, prejudice/biases in regards to over-assessing students, and individual perceptions of technology and the use of it can have an impact on the number of participants who actually respond to the study as well as how they actually interpret and approach the questions asked.

**Lack of Participants**

Due to the researcher’s role as a Principal in the school district in which the research is being conducted, teachers may be reluctant to participate in the study and or respond to questions in questionnaires/interviews with honesty and sincerity.

Delimitations

Researchers set boundaries to control the range of the study, which are referred to as delimitations. The district is currently placing a strong focus on student growth and academic achievement in grades (3-8) as determined by comparing assessment scores from the STAR Renaissance formative pre and post assessments in grades 3-8 as well as PARCC assessment scores. Since K-2 students do not get assessed on the STAR Renaissance formative pre and post assessments or PARCC assessments, these teachers will not be provided with surveys, questionnaires, or will they be interviewed.

Assumptions

Statements that are presumed to be true in research studies are called assumptions. There are several assumptions that are to be considered within this study. It can be assumed that the participants will respond to surveys, questionnaires, and interview questions with integrity and honesty. Another assumption that can be made is that all participants are experiencing the same problem and therefore are an appropriate sample for the study. Lastly, all selected participants have a true interest in the research being conducted in search of a solution and are not participating for other individual reasons motives.

Literature Review

The impact that accessibility and use of technology in education has on student achievement will be the focus of this literature review. An analysis between the accessibility/use of technology amongst minority students and those from low-income families, and student achievement will be the core of this review.

Studies have shown that access and the effective use of technology plays a vital role on academic student achievement. Current state assessment along with formative/summative assessments throughout the school district are administered on an online-based platform. Teachers strive to teach students the content knowledge needed to meet or exceed the expectations, but students must also have the technological skills needed to respond using the interactive technological features. The overall school academic performance report is comprised of all of the Individual student academic performance scores to determine if the school is high or low performing.

**Digital Divide**

The digital divide to include the “digital use-divide” has been the topic of many discussions in education for years. Technology consistently remains to be an integral part of society and our schools, but the divide in accessibility and use of technology continues to be seen. There have been studies that have concluded in students with greater accessibility and use of technology coming from affluent backgrounds when compared to minorities and students from low-income homes. The discrepancy in internet access is clear in what is referred to as the “homework gap”. This is the gap between school-age children who have access to high-speed internet at home and those who do not. Five million school-age children do not have access to internet connection at home, with low-income households accounting for a disproportionate amount (Anderson, 2017). This divide gives wealthier students the upper hand while placing additional limitations on schools with high poverty rates.

**Achievement Gap**

The term “achievement gap” refers to large continuous differences in academic performance amongst various groups of students to include race, gender, and socioeconomic status towards reaching academic success. Throughout the years of 1990 and 2015, The National Center for Educational Statistics reported White fourth and 8th-graders scoring higher on average in math and reading scores than students of Black and Hispanic descent.

According to a government study based on the National Assessment of Educational Progress in 2011, Washington, D.C. public schools holds the largest achievement gap between black and white students among the nation’s major urban educational systems. It also has the widest achievement gap between White and Hispanic students in comparison to other large educational systems and the national average (Layton, 2011).

**Accessibility to Technology**

Showing growth in student achievement requires students to be provided with motivation to learn and a foundation of basic skills. Technology assists students in sparking imaginations and authentically engaging them in lessons, which creates a positive impact on their lives. Students who have access to technology to conduct research and organize their information will most likely use this information later in life. Technology use amongst students also builds self-esteem, confidence, and allows students to take more pride in their work (Costley, 2014).

Students of all backgrounds can make serious gains in their academic performance and technological readiness if provided with the applicable technology used throughout the curriculum. The biggest challenges that schools whose enrollment is comprised mainly of disadvantaged students such as ethnic minorities and those from low-income households face is financial budgets, adequate teachers, and support services. The lack of accessibility and use of technology in the homes is another factor that adds on to this problem (Darling-Hammond, 2014).

**Use of Technology – Teaching & Learning**

Students today are considered digital natives, but upon arrival to school, students are told to put away their devices. Schools must seize the opportunities in integrating technology to make learning applicable for all teachers and students through the effective use of technology to build technological skills strengthen learning experiences (Dagget, 2014).

In 2014, a report titled Using Technology to Support At-Risk Students’ Learning was released which identified three components to determine the effective use of technology with students in urban schools:

• Interactive lessons and activities designed for learning

• Exploration and creativity using technology

• Integrating technology and teachers effectively

The enhancement of exploration and creativity in lessons using technology gives students opportunities to divert from the traditional “Drill and Kill” strategy used when technology replaces teachers and students are expected to memorize information and are then assessed on it (Darling, Goldman, and Zielezinski, 2014).

Summary

Any attempts or approaches towards closing the achievement gap and narrowing the digital divide must include technology integration in the curriculum to promote active learning and the enhancement of lessons. The purpose of technology integration is not to replace the teacher in the classroom. Teachers hold special characteristics and traits that cannot be replaced by technology. Teachers provide students with a humanistic and emotional approach through positive and challenging events in the classrooms. Students may also find themselves in a time of struggle during a lesson or activity and teachers provide interventions in support of the technology being used.

Effective planning must occur prior to any school district making large financial budget allocations towards purchasing technology equipment without taking into consideration other key factors needed to support this initiative. Effective planning must incorporate an assessment of the current technological infrastructure, equipment, and proper professional development in support of teachers and students towards improving overall teaching and learning.

Methodology

**Introduction**

Student enrollment in public schools in urban neighborhoods are comprised of minority students and those from low-income families. Due to low academic performance, scores showing little to no growth these schools are consistently being identified as low-performing schools. Despite this reality, these schools continue to face a divide in both the accessibility and use/integration of technology. Low performing schools are required to develop intense School Improvement Plans (SIP). These plans require the creation of specific goals with performance targets for each underperforming content area and require budget allocations aligned to each goal.

The School Improvement Plan (SIP) is developed based on a data analysis of the academic performance reports of the school. All factors that may have contributed to the school’s performance will be analyzed including all assessments at all grade levels. Internal school data across grade levels and content areas are also analyzed prior to the development of the plan. Effective school improvement plans are reviewed cyclically and school administrators are trained to make clear accurate judgements (Arnold, 2017).

Urban schools continue to face a divide in terms of accessibility and use of technology despite the development of school improvement plans, simply because technology is not made a priority. According to the National Center for Education Statistics report (2010) on Teachers’ Use of Educational Technology in U.S. Public Schools; results differed by low and high poverty concentration of the school for the percentage of teachers that reported their students used educational technology sometimes or often during classes to prepare written text (66 and 56 percent, respectively), learn or practice basic skills (61 and 83 percent, respectively), and develop and present multimedia presentations (47 and 36 percent, respectively).

Accessibility to technology along with its use and integration in the curriculum must be made a priority in order for students to have the best opportunities possible in reaching academic achievement. For students to stand a chance in today’s challenging and competitive global marketplace the achievement gap amongst minority students and those from low-income homes must be closed and the digital divide must be narrowed.

Research Design

This study will use a mixed methods action 1 research design. The quantitative section of this study will look at student academic achievement data in terms of STAR Renaissance Reading and Math assessments through a pretest in the beginning of the year and a posttest at the end of the year at a K-8 public school in an urban district. This assessment is taken by all student in grades 3-8 via an online platform. The STAR Growth report identifies achievement along with growth scores. Achievement will identify if a student is performing below, above, or on grade-level. Growth shows the progress the student is makes over a specific period. The STAR Growth Report provides the researcher to visualize the difference between two testing sessions. Test scores that contribute to the student growth percentile will also be highlighted in this report. The researcher will compare the percentage of students who are at or above grade level in Reading and Math for two groups of students as per the pre and posttest. One group of students will have full access and use of technology throughout all content areas, while the other group will have limited to no access and use of technology. The data will allow the researcher to determine if accessibility and use of technology affects student academic achievement.

During this study, the researcher will also conduct four student interviews and four teacher interviews (one representative from grades 3-6). The interviews will focus on teachers' perceptions on whether students' access to technology in the classroom affects student academic achievement and whether achievement patterns have occurred amongst assessment scores while technology was integrated into daily lessons. This method will be used to quickly collect and analyze data and strive to implement changes based upon the findings to narrow digital divide and close the student achievement gap.

Population & Sample

The quantitative section of this study will look at the percentage of students who are at or above grade level in Reading and Math in grades 3-6 as per student academic achievement data on the STAR Renaissance Reading and Math assessments. Due to the large number of sections in each grade level, each group will be comprised of one class per grade level in grades 3-6 (approximately 27 students out of 190 total in each grade). Due to the limited number of technological devices that are shared throughout the grade level, I only chose one class per grade level to assure that they will have maximal accessibility and usage to the devices. For the 2018-2019 school year, the school will convert to a K-8 school, which will create more of a divide within the school.

Researcher’s Position

The researcher in this study serves the role as a Principal in an urban school district aiming to identify the digital divide within a K-8 public school. An analyzation of the teacher’s perception on how student academic achievement is impacted due to the digital divide will also take place within this study. A detailed inventory of the school’s technology devices, academic performance reports, and training provided to teachers on the use of technology in daily lessons throughout the content areas will all be areas of strong interests for the researcher.

An assumption that may be encountered within this study is the teacher’s perception of the use of technology throughout their daily lessons. Some teachers assume that they are integrating technology effectively because they use laptops or other devices within their lessons. Simply using a laptop or any other technological device in a lesson can be considered “substitution” as per the SAMR model.

The SAMR Model is a taxonomy model that categorizes four levels of technology integration in the classroom. "SAMR" is the acronym for Substitution, Augmentation, Modification, and Redefinition. The SAMR model provides a common language throughout all content areas so that teachers strive to support students envisioning complex concepts.

Instrument

The main source of data collection will be teacher questionnaires, surveys, student/teacher interviews, an inventory of the school’s technology devices, and the percentage of students who are at or above grade level in Reading and Math as per student academic achievement data on the STAR Renaissance Reading and Math pre/post assessments. Randomly selected teachers and classes in each grade level will be provided with questionnaires via surveymonkey.com throughout the data collection process. A cross-sectional design will be used for the questionnaire survey and the data will be collected in the spring after the STAR Renaissance Reading and Math post assessments. This approach will be used to determine teacher and students beliefs on the digital divide, the ratio of devices to students, the accessibility and use of technology and its impact on student achievement (Creswell, 2015). The researcher will ask open-ended questions, listen, and record the responses of the participants through qualitative student/teacher survey interviews. The core of the survey will reflect the survey instrument created by the Metiri Group for the SETDA Profiling Educational Technology Integration (PETI) project (PETI, 2010).

Procedures

**Data Collection**

The researcher will collect data from this study directly through a technology-based platform as well as through teacher/student interviews. A survey questionnaire will be provided to teachers and students participating in this study through an on-line link. The researcher will send a formal letter requesting permission to conduct interviews along with a questionnaire that will be sent to the identified Principal of the school along with a detailed explanation of the study, and a copy of the questionnaire and surveys that will be used. Questionnaire and interview responses will be analyzed and coded to identify themes through the school in regards to the school’s accessibility/use of technology, inventory of technology devices along with its effect on student academic achievement in terms of the pre/post STAR Assessment. Table 1 below will provide clarity on the data collection process along with the participants:

|  |  |  |
| --- | --- | --- |
| Table 1 |  |  |
| *Mixed Methods Data Collection* |  |  |
| **Data Type** | **Data Collection Item** | **Participation/Respondent** |
| Quantitative | Pre/Post STAR Assessment Scores | Students in Grades 3-6 |
| Quantitative | Inventory of Technology Devices | School wide Inventory |
| Quantitative | Survey/Questionnaire | Teacher |
| Qualitative | Student Interviews | Students in Grades 3-6 |
| Qualitative | Teacher Interviews | Teacher |

Note: Table represents the type of data, collection items, and participants in a Mixed Methods study

**Data Analysis**

**Step I – Preparing Data for Analysis**

In the qualitative portion of the analysis, the researcher will be will looking at the pre and post student academic achievement data on the STAR Renaissance Reading and Math assessments for all students in grades 3-6 to determine the percentages of students who are at or above grade level in Reading and Math. An analysis will then be conducted to compare the students who had full access and use of technology to those who had limited to none in terms of students who are at or above grade level in Reading and Math. The quantitative portion of the analysis looked at the inventory data in terms of device to student ratio along with teacher/student questionnaire survey data in regards to perceptions on whether students' access to technology in the classroom affects student achievement.

**Step II – Simultaneous Processing**

All data was analyzed simultaneously throughout the study as the data collection was ongoing in order to identify connections and ideas between the disparity of devices throughout the school, the perceptions on whether students' access to technology in the classroom affects student achievement, responses to student/teacher interviews, and the pre/post STAR assessment data.

**Step III – Iterative Phases**

Data collection and analysis is conducted throughout the study simultaneously to fill gaps within the study that may arise in terms of the accessibility and use of technology throughout the content lessons.

**Step IV – Reading of Data**

Data will be read several times and an analysis is conducted each time in order to gain a better understanding of the responses from your participants.

**Step V- Approach**

There are various ways to analyze mixed methods data. The researchers will communicate with other educators to view their interpretation of the data results to develop an action plan.

**Step VI – Interpretive Research**

An analysis of concepts from teacher and student interviews were noted to identify themes. The themes are then narrowed down to identify which appear the most and the researcher will make a personal assessment to describe the themes that capture the main categories of information identified (Creswell, 2015, p. 237).

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Appendix

Letter for Consent to Conduct Survey

Consent Letter to Conduct Research

March 18, 2018

To Whom It May Concern:

My name is Manuel F. Negron and I am a Doctoral Candidate at New Jersey City University. I am writing to request permission to allow me to conduct a survey among the teaching staff in your school. My research is titled “Digital Divide in Urban Schools – The Role of the Principal in Narrowing the Divide and the Achievement Gap”. I will be conducting the survey to teachers amongst K-12 public schools.

The survey will take approximately 15 minutes and will not interfere with instructional time. It will be conducted before/after school, during lunch, or prep periods. Participation in this survey is voluntary and there are no known/anticipated risks associated with its participation. The data collected in this survey is strictly confidential and will be used for academic purposes only. The names of participants or of the school will not be disclosed in my research.

If you approve, please sign below giving me permission and consent to conduct this survey in your school. Your anticipated approval to conduct this survey is greatly appreciated and if you have any questions or concerns, please feel free to contact me at your earliest convenience.

Respectfully,

Mr. Manuel F. Negron

NJCU Doctoral Candidate