RESEARCH AND DATA REGARDING THE USE OF TECHNOLOGY IN AN ELEMENTARY MATH CLASSROOM AND ITS IMPACT ON ACHIEVEMENT.

By

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ABSTRACT

The purpose of this study was to analyze the affects of technology in the elementary math classroom. This study included two separate fourth grade classrooms. Both classrooms used district provided curriculum for mathematics. One classroom used only district curriculum taught in the traditional manor. The other classroom used district curriculum in combination with technology enhanced instruction. The research was conducted using math scores from the state standardized test (MAP). The findings were analyzed through Microsoft Excel and A Statistical Program (ASP) software. Findings indicate that there is an increase in student achievement when technology is incorporated into the classroom. Further training in technology integration is warranted. Additionally, the district may want to look into the increase of current technology programs or the implementation of new technology programs for teachers and classrooms.
INTRODUCTION

Background, Issues and Concerns

There has been some debate about the effectiveness of technology in the classroom. The use of technology is sometimes inconsistent between classrooms and some believe that technology is used as a substitution for quality instruction. Some may wonder if instructional technology in an elementary classroom is actually beneficial. Others, believe that students today live in a technology rich world and keeping technology out of the classroom could slow or even stop the progression of student learning. Instruction should be considered relevant to students and technology helps to ensure that relevancy.

Practice under Investigation

The practice under investigation will be looking at test data from two different classes. One class will use technology to support learning in the math classroom. The second classroom will not use technology in the math classroom. The test data used will come from state standardized testing scores.
School Policy to be Informed by Study

This particular school district has twenty-one elementary schools. Only nine of these schools have technology within the classroom. If there is a significant difference in test scores, the integration of technology into the classroom should be thoroughly researched. Furthermore, proper training for teachers in classrooms with technology should be investigated as well.

Conceptual Underpinning

Children today live in a fast paced, technology driven world. Traditional instructional no longer meets the expectation of rigorous and relevant learning. Children are used to multi-tasking on a daily basis. It is not uncommon to see a child reading a book while listening to an MP3 player. The idea of multiple intelligences is still a factor in instruction, however, differentiation should also include instructional technology. It is important to address the needs of a twenty-first century learner. There is a theory that technology in the classroom would provide an opportunity to reach more students and allow for more remediation and enrichment on a daily basis.

Statement of the Problem

If technology in the classroom positively impacts student achievement, teachers need to know how to integrate technology into everyday instruction. Effective training
should be provided to teachers incorporating technology so they can use the tools to construct and transform learning. The alternative is to use technology as an alternative to quality instruction. Technology at that point becomes merely a digital worksheet.

Purpose of the Study

The purpose of the proposed study is to determine a change in student achievement when technology is integrated into instruction and practice in the area of mathematics.

Research Question

Is there a difference in student achievement between math classrooms with integrated technology and math classrooms without technology?

Null Hypothesis

There is no difference in student achievement between math classrooms with integrated technology and math classrooms without technology.

Anticipated Benefits of the Study
The anticipated benefits of this study will include increased student participation, achievement, and transfer of information. Additionally, students will reach higher levels of achievement on the math portion of the MAP test.

Definition of Terms

DESE- Department of Elementary and Secondary Education, service agency that works with educators, legislators, government agencies, community leaders and citizens to maintain a strong public education system.

MAP- Missouri Assessment Program- test given in the state of Missouri at the end of the academic year in grades 3-8.

Differentiation- The adjustment of instruction to fit the needs of different students.

Summary

A study was conducted to see if there was a change in student achievement when technology was integrated into the elementary math classroom. The increase in awareness regarding technology in classrooms and increased skills of 21st century learners suggests that technology in the classroom leads to increased participation, transfer of information and achievement. However, many will argue that simply increasing technology in the classroom is not enough. Teachers need to have training specifically regarding the technology and it’s benefits in the classroom. Additional
technology could lead to minimal benefit if teachers are not trained how to guide students towards application and transformation with the tools.
Review of Literature

Technology has been at the forefront of discussions in education for quite some time. The earliest initiatives in the U.S. began appearing in the mid-1990s, and the most visible sponsored initiative at that time was Microsoft’s Anytime, Anywhere Learning program. (Penuel, 2006). Teachers, parents, students, and administrators all seem to have their own opinion regarding the effectiveness of technology in the classroom and best practices. “Policy makers are eager to understand the ways in which technology use in schools is affecting student learning” (O’Dwyer, Russell, & Bebell, 2004, p.1). Districts throughout the country use different technology models and devices, leaving room for many results including all ranges of increased student achievement as well as stagnant movement academically. In a study by Penuel, teachers reported that the affects of technology in classrooms was surprising. The study focused on possible learning outcomes made possible with a one-to-one and theories used to implement the technology productively. The studies showed positive results and teachers reported a sense of surprise regarding the ability and performance of students when using technology. In the specific area of mathematics, many schools already use math games and software to increase fluency. Math games are regularly used as a method of practice. A study regarding math games and performance showed increased performance in mathematics. The study also showed an increased interest in mathematics and overall improvement in fact fluency. Rather than math being this thing that they have to do, the game motivates them, and math becomes something they want to do (Roscola, 2001). In this study, technology was not only used as a learning tool, but a motivator as well.

There are numerous reports regarding the positive benefit that technology can
have within the classroom. However, there should also be caution regarding the importance of effective uses of technology. Technology should be used to create more meaningful learning experiences. Technology should also be used to support creativity and critical thinking (Murphy, 2003). There are multiple aspects to the successful integration of technology into the classroom. Necessary requirements for successful integration include constant teacher support. Initial professional development before the implementation of technology is crucial. Continued professional development is also important as technology and available resources are constantly changing. Constant teacher support is necessary (Eristi, Kurt, and Dindar, 2012). It is also necessary to adjust classroom management to meet the increased management needs that technology brings (Kemker, Barron, and Harmes, 2007). Teachers and students need to be well versed in digital citizenship and proper procedures for technology. These management issues and procedures should be in place before technology is ever introduced to students. It is important for teachers and students to think of classroom technology as tools to increase the productivity of instructional processes and lead to the transformation of thought. This initial and ongoing training and development should be well thought out and executed in order to be as impactful as possible in regards to student achievement (Murphy, 2003).
RESEARCH METHODS

Research Design

A quantitative study was conducted to see if there was increased achievement in a classroom that integrated technology into everyday instruction. The independent variable being tested was technology integration, while the dependent variable tested was district level benchmark assessments in both communication arts and mathematics. If the difference is found to be significant, teachers should find ways to integrate technology into instruction.

Study Group Description

Two separate fourth grade classrooms were used in this study. One classroom did not have technology while the other did. Both classrooms had similar instruction as mandated by district curriculum. The population of both of the classrooms were similar. Both schools were Title I buildings, indicating that they both have a high percentage of free and reduced lunch. Both buildings were in between 59% and 60% free and reduced lunch. Both buildings have a growing English Language Learner population. Both classrooms have close to an equal split between boys and girls.
Data Collection and Instrumentation

Student MAP test data from the 2012-2013 academic year was used to identify raw scores of students in both classrooms. The data was acquired through a data management system used in the district. Only Math scores from the 2012-2013 MAP test were used.

Statistical Analysis Methods

A t-test was conducted to find if there is a significant difference in test scores when technology was integrated into daily instruction. The source was broken into two categories: with technology and without technology. The mean, mean D, t-test, df, and p-value were concluded from this test. The Alpha level was set at 0.10 to test the null hypothesis: The integration of technology in classroom instruction and practice does not make a difference in student achievement.
FINDINGS

A t-test was conducted to determine whether there was a difference in student achievement when technology is integrated in the classroom. Math scores from the 2012-2013 MAP test were used in this study. The following tables and graphs will depict the organized findings based on the raw data found on the district data website in 2013.

There is only one year of data because technology is only available in certain grade levels currently. There are only math scores from the MAP test because English Language Arts instruction is different in each classroom and therefore would not be a constant.

Figure 1

<table>
<thead>
<tr>
<th>Source</th>
<th>Mean</th>
<th>S^2</th>
<th>Mean D</th>
<th>t-Test</th>
<th>df</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology (n=23)</td>
<td>659.3</td>
<td>1138.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditional (n=24)</td>
<td>625.75</td>
<td>392.7</td>
<td>33.6</td>
<td>4.17</td>
<td>45</td>
<td>0.0001</td>
</tr>
</tbody>
</table>

Note: Significant when p = < 0.10.

Two fourth grade classrooms were selected for a study to determine if there is a difference in student achievement when technology is incorporated into the classroom. The data collected from the data housing website used by the district contained the raw MAP scores for each student in the area of Mathematics. The mean score of students in the Technology rich classroom was 659.3 and the mean score of the students in the traditional classroom was 625.75. The Mean D, or difference between the two scores was 33.6. The t-test result was 4.17 and the df was 45. The null hypothesis states that there is no difference in student achievement between classrooms with integrated technology and classrooms without technology. This null hypothesis was rejected because the p-value,
0.0001, is lower than the alpha level, 0.10. This shows that there is a difference in student achievement between classrooms with integrated technology and classrooms without. The fourth grade classroom with integrated technology performed better on the MAP test in the area of mathematics.

Figure 2

The mean of the students’ 2013 Math MAP scores from the classroom with integrated technology was 659.30. The bar graph shows that the mean score of students in the traditional classroom was significantly lower with a mean score of 625.75.
Conclusions and Recommendations

The outcomes reported from this study show that classrooms with integrated technology currently have higher achievement on Math Portion of the MAP test. The findings show that there is a difference in student achievement between classrooms with integrated technology and classrooms without technology. The mean score of students in the Technology rich classroom was 659.3 and the mean score of the students in the traditional classroom was 625.75. The Mean D, or difference between the two scores was 33.6. The t-test result was 4.17 and the df was 45. The null hypothesis states that there is no difference in student achievement between classrooms with integrated technology and classrooms without technology. The null hypothesis was rejected.

The concept that 21st century learners require 21st century techniques is supported by these research findings. Students need to be engaged in learning that is relevant to their fast paced, technology rich lives. The benefits of technology integration include, remediation, enrichment and differentiation. Additionally, technology allows students to transform learning into meaningful products.

Instruction should be differentiated to include not only the multiple intelligences and learning styles, but also the technology needs of learners today. The inclusion of technology proves to be beneficial in the classroom and should be used to enhance and transform learning. It should be treated as a supplement to current classroom instruction.

After concluding this study there are some further studies that should be conducted. Further research should be conducted to find the difference in standardized test scores between classrooms without technology, classrooms with the availability of
technology, and classrooms with technology incorporated by a teacher receiving quality professional development regarding the transformation of learning with technology. This additional research could also address technology in other subject areas.
References


