

Running Head: Effects of Adopting a 1:1 Initiative

*A STUDY ON THE EFFECTS OF IMPLEMENTING A 1:1 INITIATIVE ON STUDENT  
ACHEIVMENT BASED ON ACT SCORES*

By

JEFF ARMSTRONG

Submitted to

The Educational Leadership Faculty

Northwest Missouri State University Missouri

Department of Educational Leadership

College of Education and Human Services

Maryville, MO 64468

Submitted in Fulfillment for the Requirements for

61-683 Research Paper

Fall 2014

December 12<sup>th</sup> 2014

### Abstract

The purpose of this study was to determine if a relationship exists between adopting a 1:1 initiative and student achievement. The study group used for the research consisted of high school students from a Midwestern school for the years 2009-2014. Composite ACT scores were used to analyze whether there was a difference between student achievement before and after implementing a 1:1 initiative. The study also looked at the percentage of students whose ACT scores were at or above the national average for the years in question. Findings reveal that there is no significant difference on student ACT scores before and after the implementation of the initiative.

## INTRODUCTION

### *Background*

A Midwestern school district began a program in January 2012 called Project Connect. Project Connect: Advancing Learning Through Technology is the district's 1:1 initiative that puts a laptop or tablet in the hands of every student in the district. For the pilot program, high school and middle school students were all given MacBooks. Fourth, fifth and sixth graders at neighboring elementary schools were all given iPad tablets. Since the initial pilot program, the Board of Education voted to expand the program to other schools in the school district. (Project Connect, 2012)

### *Practice under investigation*

The practice under investigation is the effectiveness of Project Connect that gives laptops to high school students in the district.

### *School policy to be informed by study*

The policy to be informed by the study is the district's continued expansion of Project Connect.

### *Conceptual underpinning*

For the purposes of the research it's important to look at how students learn and retain information. The Dual Coding Theory looks at the phenomenon in which information in different media is stored, manipulated and recalled (Alty, 2002). In the classroom there are two different ways that information is presented to students. In the visual modality there are printed words and images and in the auditory modality there are spoken words and sound events (Alty, 2002). As students are presented with information,

the mind stores the information in two different systems; verbal representations and mental images (Thomas, 2014). When a word invokes an associated image two separate but linked memory traces are laid down, one in each of the memory stores (Thomas, 2014). “Obviously the chances that a memory will be retained and retrieved are much greater if it is stored in two distinct functional locations rather than in just one” (Thomas, 2014, para. 2).

This theory is very important to proponents of 1:1 learning because students who use laptops in the classroom can immerse themselves in a wider variety of instructional media. “They are watching films that make science and math concepts come to life and explain things in a way that reaches many learners” (Cohen, 2012, p. 16).

### *Statement of the problem*

With the increased costs of technology in the classroom, it’s important for educators at the district and school level to make informed decisions about implementing programs such as 1:1 computing in their schools. Providing computers to every student in a school is a major undertaking and requires planning, training and proper implementation to be successful. Educators must be able to measure these initiatives and their effects on student achievement.

### *Purpose of the study*

The purpose of this study is to evaluate whether or not 1:1 initiatives have an effect on student achievement.

### *Research questions*

*RQ1:* Does implementing a 1:1 initiative have an impact on student achievement?

*RQ2:* Is there a difference in standardized test scores between students that have access to their own computer and students that do not have access to their own computer?

*Null hypotheses.*

Ho: There is not a difference in standardized test scores between students that have access to their own computer and students that do not have access to their own computer.

*Anticipated benefits of the study*

The study was conducted to benefit schools and school districts that are looking to implement a 1:1 initiative.

*Definition of terms*

1:1 – One computer per student in a school.

ACT – American College Testing – A standardized test that assesses college readiness.

ASP – A Statistical Package - Provides a comprehensive set of data management, statistical, graphic, and computational routines.

DESE - Missouri Department of Secondary and Elementary Education

DSST – Denver School of Science and Technology

*Summary*

This study was conducted to see if there is a correlation between implementing 1:1 initiatives and student achievement. The study looks at high school students in a Midwestern school district. Students all received MacBooks in the fall of 2012. The study takes into account the three school years prior to the implementation and the subsequent three school years where laptops were provided to students. The data used for the study was retrieved from the DESE website and looks at composite ACT scores and the percentage of student's ACT scores that were at or above the national average.

## REVIEW OF LITERATURE

Many schools across the country are flocking to the concept of 1:1 learning, which puts laptops in the hands of every student and teacher in a school (Bryant, 2006). These initiatives address the issue of a lack of regular, sustainable access to technology for students, but also come with the challenges of realizing its benefits (Topper & Lancaster, 2013). In times of reduced funding in many schools, 1:1 initiatives represent a significant investment in technology and stakeholders need to realize the benefits before adopting these programs (Topper & Lancaster, 2013). When done right, these initiatives can transform classrooms into a collaborative, innovative space, but when done poorly, can crash and burn leaving teachers unsure how to use the technology and students bored in their seats (Sheehy, 2014).

There are many things to consider before adopting a 1:1 initiative. Simply providing a laptop to students will not automatically elicit gains or improvement in learning (Holcomb, 2009). Successful 1:1 initiatives go beyond the technology itself; they must also include professional development, training and support (Holcomb, 2009). One of the first things that needs to be accomplished before adopting a 1:1 initiative is the buy-in of administrators and teachers (Stidham, 2008). Not all teachers will be enthused about the new initiative, but if a school has teachers who are highly enthused a contagion will ignite (Stidham, 2009).

Many states across the country are adopting their own 1:1 initiatives. These initiatives include Florida's Leveraging Laptops, Maine's Learning Technology Initiative, North Carolina's 1:1 Learning Technology Initiative, Michigan's Freedom to

Learn, Pennsylvania's Classrooms for the Future, Texas' Immersion Pilot, and Virginia's Teaching and Learning Initiative (Argueta, Huff, Tingen, & Corn, 2011). One school in particular that has had enormous success with their initiative is the Denver School of Science and Technology. DSST was the first public charter school in Denver to implement a 1:1 initiative thanks to a \$1 million dollar gift from Hewlett-Packard (Zucker, 2009). One reason that 1:1 initiatives are so important in today's schools is to close the digital divide among students. The term digital divide refers to the disparity between students with access to computers, compared to others who lack access (Zucker & Hug, 2007). A good reason for policymakers to support 1:1 initiatives is to level the playing field so that all students have access to technology and the information accessible by using them (Zucker & Hug, 2007).

There was clearly a digital divide for students before they began attending DSST. Among those who identify themselves as Hispanic, 50% report that they rarely or never used computers before they attended DSST. The corresponding figure for African American students is 40%. Only 25% of the Caucasian students report that they rarely or never used computers before coming to DSST. These figures may not be surprising, but they support the importance of a laptop program in a public, ethnically diverse school serving large numbers of underrepresented students as a way to overcome the digital divide (Zucker & Hug, 2007, p. 12).

Student test scores are among the highest in the state and every senior was accepted to a four-year college or university, which is extremely rare considering the



average graduation rate in Denver is 52% (Zucker, 2009). The majority of students at DSST (65%) say that laptops have had a positive impact on how much they learn in school (Zucker & Hug, 2007). Students also report that using laptops positively influenced how well they work with other students, how interested they are in school and their grades (Zucker & Hug, 2007). Teachers at DSST agreed that the laptop program and related technology is very important for students and the depth of their understanding of the curriculum (Zucker & Hug, 2007). The 1:1 initiative at DSST has also affected the teacher's instructional practices. Two-thirds of teachers report that they rely less on textbooks because of the laptops and more than 85 percent of teachers say they agree or strongly agree that it is easier to meet the varying needs of students (Zucker & Hug, 2007). DSST teachers also say that the initiative has allowed them to spend more time teaching students individually, encouraged their students to think more creatively and increased student opportunity to apply their knowledge (Zucker & Hug, 2007).

Other schools around the country are having similar success stories championing 1:1 learning in schools. Sydnye Cohen, a Library Media Specialist at Brookfield High School in Connecticut, sees 1:1 computing as a way to free students from paper, pencil and textbooks, and to put information at their fingertips (2012). Students are watching films that make science and math concepts come to life and explain things in a way that reaches many learners (Cohen, 2012). Cohen goes on to say that Brookfield High School is not tied to the devices, they are tied to teaching and learning and what works best for helping their students and teachers consume and use information in this digital world (2012).

Students and teachers in Baxter Springs, Kansas are also benefitting from their 1:1 program. One teacher saw that before implementing their 1:1 program, students would waste time in class (Stidham, 2008). Now when they have 10 minutes at the end of class, they open their laptops and work, which has led to much better assignments (Stidham, 2008).

Compared to their non-laptop counterparts, students with individual computers spend more time involved in collaborative work, participate in more project-based instruction, produce writing of higher quality and length, improve research analysis skills and spend more time doing homework on computers (Gulek & Demirtas, 2005).

With all the success stories of 1:1 programs in schools across the country, students, teachers and administrators have to remember that laptops are tools that have a time and a place in education. Laptops are not magic boxes (Zucker & Hug, 2007). “It is the support system, the school goals, the digital resources that teachers and students use, and other factors that enable the laptops to be used as powerful tools” (Zucker & Hug, 2007 p. 10).

## RESEARCH METHODS

### *Research Design*

Standardized test scores and school demographic data was collected using the Missouri Department of Secondary and Elementary Education website. The study looks at composite ACT scores and percentage of students at or above the national ACT average for three years prior to adopting a 1:1 initiative and three years after. The independent variables for the study are the year's students did not have access to laptops and the last three years that they did have access. The dependent variables for the study are the composite ACT scores collected for the six years of the study and the percentage of students at or above the ACT national average.

### *Study Group*

The groups under investigation for the study were students that were enrolled at a Midwestern high school from 2009-2014. The average number of enrolled students over a six-year period was 871. A further examination of the student demographics by ethnicity reveal that .58% of students were Asian, 6.15% African American, 4.98% Hispanic, .62% Indian and 87.32% White.

### *Data Collection and Instrumentation*

School data was collected using the Missouri Department of Secondary and Elementary Education website. The data used for the study was composite ACT scores and the percentage of students at or above the ACT national average. The years used for the study were the three years prior to implementing the initiative and the subsequent

three years that computers were given to students.

*Statistical Analysis Methods*

A Statistical Package was used to calculate the statistical data for the study. Two T-Tests were performed, one comparing Composite ACT scores and the other comparing percentage of students at or above the ACT national average. Microsoft Excel was also used to prepare data for calculation.

## FINDINGS

Two separate T-Tests were performed to see if there was a difference in student achievement when the school adopted their 1:1 initiative in 2012. The first T-Test (Table 1) measures composite ACT scores before and after the implementation of the initiative. The second T-Test (Table 2) measures the percentage of students ACT scores that were at or above the national average.

T-Test Analysis Results for BHS Students Composite ACT Scores

Table 1					
Source	Mean	Mean D	T-Test	DF	P-Value
Pre 1:1 Initiative(871)	19.47				
Post 1:1 Initiative(871)	19.27	0.2	0.37	4	0.73

Note: Significant when  $p \leq 0.25$

Composite ACT scores from 2009 -2014 were compared to see if there was a significant difference in student achievement after implementing a 1:1 initiative in 2012. The mean score for students prior to the initiative was 19.47 and the mean score for students after the initiative was 19.27. The Mean D for the two groups was 0.2. The result of the T-Test was 0.37 and the DF was 4. The null hypothesis states that there is not a difference in standardized test scores between students that have access to their own computer and students that do not have access to their own computer. The p value for table 1 was 0.73. Since the alpha number for the T-Test was set to 0.25 we must not

reject the null hypothesis. Therefore, there is not a significant difference between composite ACT scores for the years before the initiative and after.

#### T-Test Analysis Results for Percentage of BHS Students At or Above National Average

Source	Mean	Mean D	T-Test	DF	P-Value
Pre 1:1 Initiative(871)	21.87				
Post 1:1 Initiative(871)	23.97	-2.1	-0.81	4	0.46

Note: Significant when  $p \leq 0.25$

Percentage of students at or above the national average from 2009 -2014 were also compared to see if there was a significant difference in student achievement after implementing a 1:1 initiative in 2012. The mean percentage for students prior to the initiative was 21.87 and the mean percentage for students after the initiative was 23.97. The Mean D for the two groups was -2.1. The result of the T-Test was -0.81 and the DF was 4. The null hypothesis states that there is not a difference in standardized test scores between students that have access to their own computer and students that do not have access to their own computer. The p value for table 2 was 0.46. Since the alpha number for the T-Test was set to 0.25 we must not reject the null hypothesis. Therefore, there is not a significant difference between the percentage of students at or above the ACT national average for the years before the initiative and after.

## CONCLUSIONS AND RECOMMENDATIONS

The null hypothesis for this study states that there is not a difference in standardized test scores between students that have access to their own computer and students that do not have access to their own computer. After looking at the findings for the study, the calculations show that there was not a significant difference between the ACT scores of students before implementing the initiative and the subsequent years where laptops were made available to students. Student's composite ACT scores for the years following the initiative went down from 19.47 to 19.27. When students ACT scores were compared to the national average, there was a 2.1 point increase after the initiative. This means that we must not reject the null hypothesis. In the case of the school under investigation, there is no data to support that implementing a 1:1 initiative had any effect on student achievement.

The Dual Coding Theory implies that students who learn using computers should have a higher level of retention thus improving their overall achievement. For the purpose of the study, how teachers and students used the laptops were not taken into account

There are many other factors in measuring student achievement that were not taken into account for the study. Student achievement cannot solely be based off of standardized test scores. Educators must also look at individual student achievement and motivation as well as classroom grades.

It's recommended that teachers and administrators continue to study the effectiveness of 1:1 learning in their classrooms. Since this is a relatively new initiative,

there is not enough data to get an expanded look to see if these programs have an impact on student achievement.



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