The effects of Ipad use on student achievement in the United States

By: Ed Researcher: ed_researcher@yahoo.com, who wishes to remain otherwise unknown.

Abstract:

In 2011, the first wave of schools in the United States began using the Ipad to create a one-to-one learning environment for students. Two years later, it has become possible to examine the effect Ipad integration has had on student learning as measured by state tests over multiple years. This study looks at eight one-to-one schools in four states and compares their test performance against state averages for the two years before and after the Ipad was introduced. Results show that the proficiency rate increased less than state averages on 19 of the 22 tests examined (86%). In other words, evidence from these schools does not support the conclusion that the introduction of Ipads raises proficiency rates.

I Introduction:

We are living through the Ipad revolution. According to media sources, Apple has sold millions of these devices to schools in the United States and over 600 school districts are now experimenting with a one-to-one environment using the Ipad. This has certainly been a boon for Apple, but it is less clear what the effects will be on student achievement.

Several studies suggest that Ipads improve student learning. Surveys have shown that both teachers are students believe that the Ipad are effective learning tools (Pearson, 2012; Rossing, Miller, Cecil, & Stamper, 2012). It has been claimed, for example, that the iPad can improve student engagement. Connecting Ipad use with student achievement, however, has been more difficult.

Several studies have compared the performance of classes that used the Ipad with other classes (Carr, 2012; Jaciw, Toby, & Ma, 2012; Pegrum, Oakley, & Faulkner, 2013; Sheppard, 2011). Results have been mixed. This research approach seems promising, but the excitement of being selected to test out a new device may have provided motivation to both teachers and students to devote additional effort to these particular classes. In addition, this method restricts the sample size by requiring Ipad-equipped classes to run alongside classes without Ipads that are otherwise similar.

A better research method would be to examine student achievement data from schools that have made the switch to one-to-one environments. How has this change affected student achievement as measured by standardized tests? The first-wave of one-to-one schools embarked on their Ipad experiments in fall of 2011. Two years later, it has become possible to analyze student performance using test data from multiple years.

Not all schools adopt the Ipad in order to raise student test scores. Administrators sometimes claim other motives such as "empowering students" or "preparing them for the future". Whether or not these goals are achieved, it may be impossible to say. But as hundreds more school districts across the country decide whether or not to make the substantial investment required to create a one-to-one environment, data on student achievement, now that it has become available, should be welcomed into the decision-making process.

II Method:

For this study, media sources were searched for schools that had purchased iPads for most or all of their students starting in the 2011-2012 academic year. The search was then limited to public high schools with published student test scores. In the end, schools from four districts across the nation were selected.

This study was limited to high schools for two main reasons: 1) It was anticipated that high school students would be more self-directed in their use of the Ipad. While elementary school students might spend most of their time running teacher-selected educational apps, high school students would be more likely to use the device for note-taking, research, and writing. It is not the purpose of this study to evaluate the educational value of individual apps or to answer specific questions as "Is it possible to teach reading with an Ipad?" Rather, it was the goal of this study to measure the global effect of one-to-one learning with the Ipad on student achievement across the curriculum.

2) The standardized tests for high school students show whether or not these students have gained the knowledge and skills that their K-12 school experience was designed to provide. Tests at other grade levels, on the other hand, provide data about how much progress is being made towards this ultimate goal. In other words, the high school tests give the best information about whether or not Ipads are helping our schools systems achieve their stated goals.

Participants: This study examined data from students in eight high schools in four different states. Altogether, over 10,000 students attended the one-to-one high schools in this study.

Table 1: Participating one-to-one schools

School	State	Enrollment
Burlington High School	MA	1,129
Gilbert High School	SC	910
Lexington High School	SC	2,855
Pelion High School	SC	719
Shorewood High School	WA	1,469
White Knoll High School	SC	1,918
Zeeland East High School	MI	1,071
Zeeland West High School	MI	733

In general only students at one grade take the tests used in this study every year. Some students retake the tests multiple times in order to achieve a passing score. The No Child Left Behind Act of 2001 played a large role in facilitating this study. The law required each state to design a test for student proficiency and publish the results along with state averages.

Table 2: Tests used to measure student proficiency

State	Test(s)	Grade	Subjects
MA	MCAS	grade 10	English, Math, Science / Tech
MI	MME	grade 11	Reading, Writing, Math, Science
WA	EOC and HSPE	grade 10	Reading, Writing, Math
SC	HSAP	grade 10	English, Math

http://profiles.doe.mass.edu/search/search.aspx?leftNavId=11241
https://www.mischooldata.org/DistrictSchoolProfiles/AssessmentResults/Mme/MmePerformanceSummary.aspx
http://reportcard.ospi.k12.wa.us/Summary.aspx?groupLevel=District&schoolId=1&reportLevel=State&year=2012-13
http://ed.sc.gov/data/hsap/index.cfm

Data was collected for the school year ending in 2010 through the school year ending in 2013. This meant that two years of data was collected both before and after the Ipad was

introduced. The only test for which this was not the case was the End of Course (EOC) math test in Washington State. Data from this test was not available for Shorewood High for the year ending in 2010. Also, two EOC tests are given in Washington, one for students studying algebra and another for geometry. The results of these two tests were averaged together for this study.

Test data for the two years preceding and proceeding Ipad implementation is shown in Table 3. Proficiency rates decreased on about half (12 of 22) of the tests examined and rose on the others (10 of 22). Two schools saw their proficiency rates increase, two saw their scores decrease, and the other four schools had mixed results. From this data alone, it would be difficult to make any sweeping conclusions about any effects the Ipad may have on student learning.

Table 3: Proficiency rates on state tests before and after Ipads

School	Test Subject	Average proficiency rate 2010-2011	Average proficiency rate 2012-2013	Change
Burlington High School (MA)	English	89.0	96.0	7.0
	Math	89.0	88.5	-0.5
	Science / Tech	74.5	76.5	2.0
Gilbert High School (SC)	English	56.6	65.3	8.7
	Math	54.7	61.9	7.3
Lexington High (SC)	English	79.0	77.1	-1.9
	Math	81.1	77.4	-3.7
Pelion High School (SC)	English	48.7	43.7	-5.0
	Math	51.4	41.4	-10.0
Shorewood High School (WA)	Reading	89.7	85.7	-4.0
	Writing	89.8	88.1	-1.7
	Combined Math	79.7	88.1	8.3
White Knoll High (SC)	English	59.8	66.4	6.6
	Math	58.1	59.3	1.3
Zeeland East High School (MI)	Reading	63.4	61.0	-2.4
	Writing	56.0	56.5	0.5

	Math	45.4	42.0	-3.4
	Science	36.4	35.0	-1.4
Zeeland West High School (MI)	Reading	61.9	62.5	0.6
	Writing	53.4	55.0	1.6
	Math	47.1	45.0	-2.1
	Science	37.9	37.5	-0.4

A clearer picture of the Ipad's effect on student learning can be found by comparing the scores at these eight schools against statewide averages. In other words, statewide averages can be used as a control group against which the performance of the one-to-one schools can be measured. As shown in Table 4, proficiency rates rose statewide on most of the tests (11 of 12) over the four years for which data was collected.

Table 4: Statewide proficiency rates

School	Test Subject	Average proficiency rate 2010-2011	Average proficiency rate 2012-2013	Change
Massachusetts	English	81.0	89.5	8.5
	Math	76.0	79.0	3.0
	Science / Tech	66.0	70.0	4.0
Michigan	Reading	53.4	55.0	1.7
	Writing	45.3	49.0	3.7
	Math	26.3	29.0	2.7
	Science	24.9	26.0	1.2
South Carolina	English	57.4	59.4	2.0
	Math	51.4	53.6	2.3
Washington	Reading	80.8	82.4	1.7
	Writing	86.2	85.2	-1.0
	Combined Math	64.1	76.0	11.9

By comparing the data in Tables 3 and 4, we notice that the one-to-one schools generally had higher proficiency rates than state averages both before and after introducing the Ipads. But a

closer look at the data shows that the increase in student proficiency at the one-to-one schools was, overall, lower than statewide averages.

Table 5: Effect of Ipad implementation on student proficiency compared to state averages

School	Test Subject	Comparison to state averages before Ipads	Comparison to state averages after Ipads	Change
Burlington High School (MA)	English	8.0	6.5	-1.5
	Math	13.0	9.5	-3.5
	Science / Tech	8.5	6.5	-2.0
Gilbert High School (SC)	English	-0.8	5.9	6.7
	Math	3.3	8.3	5.0
Lexington High (SC)	English	21.6	17.7	-3.9
	Math	29.7	23.8	-6.0
Pelion High School (SC)	English	-8.8	-15.8	-7.0
	Math	0.0	-12.2	-12.2
Shorewood High School (WA)	Reading	8.9	3.3	-5.7
	Writing	3.6	2.9	-0.7
	Combined Math	15.6	12.0	-3.6
White Knoll High (SC)	English	2.4	7.0	4.6
	Math	6.7	5.7	-1.0
Zeeland East High School (MI)	Reading	10.0	6.0	-4.0
	Writing	10.7	7.5	-3.2
	Math	19.1	13.0	-6.1
	Science	11.6	9.0	-2.6
Zeeland West High School (MI)	Reading	8.6	7.5	-1.1
	Writing	8.1	6.0	-2.1
	Math	20.8	16.0	-4.8
	Science	13.1	11.5	-1.6

The one-to-one schools lost ground compared to state averages on 19 of the 22 tests (86%) considered. One notable exception is Gilbert High where tests scores have shown considerable growth since the introduction of the Ipad. Also, White Knoll High has seen an improvement in its English scores compared to South Carolina averages. In all other cases, however, the schools in this study have seen their test scores either drop back towards state averages or, in the case of Pelion High, drop further below state averages. Although it would be a stretch to conclude that the Ipad has been a detriment to student learning at these schools, we can state confidently that this multi-year study offers no evidence that one-to-one technology raised student achievement as measured on statewide tests.

IV. Discussion:

The most straight-forward criticism of this study's methodology revolves around its use of state average proficiency rates. The schools in this study scored on average about 10 percentage points higher than state averages before implementing the Ipads. The rest of the state had more room to grow. It should therefore not be surprising that, four years later, these schools are no longer outperforming the rest of their states as much as they used to.

This criticism seems especially relevant for three schools – Burlington High, Shorewood High and Lexington High – where the average proficiency rate was nearly 85% on all tests during the time the study was conducted. But Table 3 shows that the raw proficiency rates – those not compared to state averages – fell for 5 of the 8 tests examined at those schools after introduction of the Ipads. Even if scores at these three schools were not expected to rise much, they should at least not have fallen.

At the other five schools in the study, the average overall proficiency rate was lower (about 55%) indicating even more room for improvement – improvement that the Ipad was unable to deliver. If a district has the goal of reaching a 100% proficiency rate on state tests, this study does not support adopting the Ipad to help reach that goal. Future research could be performed to uncover why Ipad use at Gilbert High was so much more effective at raising test scores than it was at the other seven schools in this study.

V. Works Cited

Carr, J. (2012). Does Math Achievement h'APP'en when iPads and Game-Based Learning are Incorporated into Fifth-Grade Mathematics Instruction?.*Journal of Information Technology Education: Research*, *11*(1), 269-286.

Jaciw, A. P., Toby, M., & Ma, B. (2012). Conditions for the Effectiveness of a Tablet-Based Algebra Program. *Society for Research on Educational Effectiveness*.

Pearson Foundation. (2012). *Survey on students and tablets 2012*. Retrieved September 20, 2013, from http://pearsonfoundation.org/downloads/PF_Tablet_Survey_Summary_2012.pdf

Pegrum, M., Oakley, G., & Faulkner, R. (2013). Schools going mobile: A study of the adoption of mobile handheld technologies in Western Australian independent schools. *Australasian Journal of Educational Technology*, *29*(1).

Rossing, J. P., Miller, W. M., Cecil, A. K., & Stamper, S. E. (2012). iLearning: The Future of Higher Education? Student Perceptions on Learning with Mobile Tablets. *Journal of the Scholarship of Teaching and Learning*, *12*(2), 1-26.

Sheppard, D. (2011). Reading with iPads–the difference makes a difference.*Education Today*, *11*(3), 12-15.