iPad Integration in the One-to-One Classroom

Sandra S. Bennett

Kennesaw State University
Introduction

Orientation to Topic

Our schools are increasingly motivated to improve the performance of students which is attributable to multiple factors. An example would be the implementation of Common Core and pressure from states and the private sector to have students prepared to contribute to a rapidly changing business world in the 21st Century. Technology integration is generally viewed as part of the critical mix in initiatives to prepare our students for this changing business world, and in recent years has received much more attention in our schools with hardware and software deployments along with teacher training. There is a popular belief that learning is enhanced through the use of technology, and for this reason, technology integration was mandated by U.S. federal legislation (2001) in conjunction with No Child Left Behind, which also contributed to this attention to technology implementation in classrooms across the country. In light of this current environment, the challenge is for educators to become technology literate themselves, teach digital literacy to their students, and effectively integrate technology into their classrooms.

In more recent years, with the emergence and popularity of iPad technology, there appears to be increasing interest in including this technology as a part of the integration of technology within our schools. Some of the literature stressed the importance of policy makers, school administrators and educators to assess the level of technology integration, and the authors cite the Level of Technology Integration (LoTi) assessment tool among others as beneficial for this purpose due to widespread use (Semih, Mustafa & Murat, 2010). On the LoTi scale, the highest attainable level (Level Six) involves students having unlimited access to technology during the school day. There appears to be an increasing interest in one-to-one ratio of students to technology devices, and the iPad has seemingly been growing in popularity. With its relatively low cost, ease
of use, portability, and diversity of capabilities and applications, the iPad has become a compelling choice (Miller, 2012).

**Purpose Statement**

The purpose of this study is to determine the overall effectiveness of the 1:1 iPad implementation in improving student performance while transforming instructional practice, as well as to further assess its impact on student engagement and motivation. As our school embarks on a pilot to test the 1:1 iPad implementation with all 6th graders, we have a tremendous opportunity to determine if the effectiveness of such a program is actually what is anticipated. This overall effectiveness will be based upon and determined by a methodical approach to collect data on student performance indicators as well as teacher and student feedback once completed.

**Research Questions**

This research seeks to answer these general questions:

1. What impact does a 1:1 iPad implementation have on our student performance?
2. Do our students view the use of the iPad in the classroom as a helpful tool in their learning?
3. Does iPad use in our classrooms increase student motivation to learn, or do they enjoy learning to a greater extent when using the iPad?
4. Based on their experiences in the 1:1 classroom, do our teachers view the iPad as a tool that makes a difference in student engagement?
5. Based on their experiences in the 1:1 classroom, do our teachers believe that iPad technology promotes critical thinking and enhances student learning?

The question above will guide my study on the 1:1 iPad implementation at Haynes Bridge Middle School. My hypothesis, based on my prior study and literature review, is that the iPad will
generally have a positive impact on student performance, and that the student and teacher perceptions of student engagement and interest levels will be positive.

**Importance of the Study**

Considering the enormous investment required for the 1:1 iPad implementation, particularly within a tight economy, it seems imperative to know if the investment truly makes a difference in student motivation and learning. This holds true in the Fulton County School District, and in the school in which the researcher teaches, Haynes Bridge Middle School. Other schools in our district, the Haynes Bridge Middle School community and the parents of our students will be watching with interest as we move forward with the pilot, and all stakeholders will likely be interested in seeing any data supporting its effectiveness. From a practical standpoint, it is critical to know if the benefits outweigh the cost, and should the notion of a 1:1 iPad program be expanded to include the remainder of our school, or beyond to other schools within the district.

**Definition of Terms**

In addressing definitions of concepts or terms, the first to consider is the tablet itself. The term “tablet” refers to a small, wireless computer contained in a single panel, as opposed to a desktop with a separate monitor, keyboard and processing unit. One distinguishing characteristic is its touch screen for input. The term “iPad” is a tablet computer designed and marketed by Apple Inc. It is a small (9.5” x 7.3”), light-weight device that serves as a platform for web access and content, audio-visual media including books, news, music and games. It provides many applications to create documents, spreadsheets, presentations, video and much more. With wireless capability wide-spread in today’s world, the iPad provides tremendous portability to be productive and stay connected.
The term “Apps” refers to the seemingly endless number of applications the iPad supports, many of which are excellent tools for use in the classroom, from organization applications, collaboration applications and those used to create products, such as Keynote, iMovie and GarageBand. The abbreviation “iOS” refers to the mobile operating system developed and distributed by Apple, Inc. The student and teacher iPads in the pilot will use iOS 7, which is the seventh version of this mobile operating system. Finally, the words “1:1 iPad” refers to a one-to-one ratio of iPad to student, meaning that each student will be issued an iPad.

Our school and district will be using the STAR Assessment instrument, a product of Renaissance Learning. STAR Assessments refers to an online assessment system to measure student achievement in reading and math. The term “STAR” is not an acronym, but rather identifies the company’s trademark to show leadership in educational development. The STAR assessment includes skills-based test items supporting the Georgia reading and math curriculums and provides easily accessible reports to analyze student progress. Renaissance Learning, the STAR Assessment developer, is a U.S. technology-based educational company which provides a variety of student assessment products for multiple audiences, including English Language Learners. The data from the STAR assessment in our school and district will be used as an integral part of this research and conveniently assessments will be conducted before and after the iPad implementation.

SurveyMonkey is a web-based survey tool which is claimed to be “powerful enough for professional researchers, yet easy enough for a survey novice”. Survey-Monkey is a U.S. company, headquartered on the West coast, with ten years’ survey experience. SurveyMonkey is often used in our school district, and most would say that the surveys are quick, easy and there is little or no cost involved. As a part of this research, student and teacher surveys will be conducted.
using SurveyMonkey prior to the implementation of the 1:1 iPad implementation and at the end of the school year.

**Literature Review**

Schools are increasingly motivated to improve the performance of students which is attributable to multiple factors. An example would be the implementation of Common Core and pressure from states and the private sector to have students prepared to contribute to a rapidly changing business world in the 21st Century. The literature review done in conjunction with this research has shown that technology integration is generally viewed as part of the critical mix in initiatives to prepare our students for this changing business world, and in recent years has received much more attention in our schools with hardware and software deployments along with teacher training. There appears to be a popular belief that learning is enhanced through the use of technology, and for this reason, technology integration was mandated by U.S. federal legislation (2001) in conjunction with No Child Left Behind, which also contributed to this attention to technology implementation in classrooms across the country. In light of this current environment, the challenge is for educators to become technology literate themselves, teach digital literacy to their students, and effectively integrate technology into their classrooms.

Furthermore, the literature review has shown that in more recent years, with the emergence and popularity of iPad technology, there appears to be increasing interest in including this as a part of the integration of technology within our schools. Some of the literature stressed the importance of policy makers, school administrators and educators to assess the level of technology integration, and the authors cite the Level of Technology Integration (LoTi) assessment tool among others as beneficial for this purpose do to widespread use (Semih, Mustafa & Murat, 2010). On the LoTi scale, the highest attainable level (Level Six) involves students having unlimited access to
technology during the school day. There appears to be an increasing interest in one-to-one ratio of students to technology devices, and the iPad has seemingly been growing in popularity. With its relatively low cost, ease of use, portability, and diversity of capabilities and applications, the iPad has become a compelling choice (Miller, 2012). Considering the enormous investment required for a one-to-one iPad implementation, however, particularly within a tight economy, it seems imperative to know if the investment truly makes difference in student motivation and learning.

The goal of this research is to assist in making that determination. Surprisingly there is not as much peer-reviewed literature on this topic as expected. However, in light of the newness of the technology, perhaps there has not been sufficient time for thorough study or conclusive findings. There has been research, however on similar technologies, for example other personal devices, and useful literature exists on the impact of technology on student performance. Fortunately, with the onset of this interest of iPads in education, additional research on the iPad’s impact is beginning, and there has been some literature published to report those findings.

The literature reviewed related to a one-to-one ratio of students to technology devices showed that while the impact on student achievement has been modest according to some reports (Bebell & O’Dwyer, 2010), there appears to have been significant positive impact in others (Pilgrim, Bledsoe & Reily, 2012). Overall there appears to be a predominance of opinion that a one-to-one technology implementation in our classrooms maximizes student engagement and learning. Findings reveal greater use of research-based instruction, greater teacher confidence to integrate technology, and students demonstrating 21st century knowledge and skills (Lowther, Inan, Ross & Stahl, 2012).

Another study showed that digital literacy had been positively impacted (Hutchison, Beschorner & Schmidt-Crawford, 2012). In this study, students used digital, interactive books on the iPad to support individual comprehension and engage struggling readers. The iPad has
numerous downloadable books that allowed the students to read while listening to another voice (referred to as “Siri”) read. The iPad also allowed the students to further interact by recording their voices reading and replying them with the text. Students learned to digitally communicate with other readers in the class via digital sticky notes left in the book.

In a separate study conducted by McClanahan, Williams, Kennedy and Tate (2013), comparisons in pre- and post-assessments showed a student with Attention Deficit Hyperactivity Disorder (ADHD) showed that within six weeks the student had improved one full grade level in reading ability. Less tangible results from observations showed he had become metacognitive in his reading (expressing what he needed to do to “make it make sense”), which illustrated understanding that reading should result in constructed meaning. The student demonstrated taking control of personal improvement strategies as iPad tools (inserts) to assist were initiated. Observations showed an improved confidence level and more positive attitude toward the reading and learning in general.

One position paper (Pilgrim, Bledsoe & Reily, 2012), describe how the iPad technology and other related technologies provide constant access to internet resources and allow extensive communication and collaboration, which are 21st Century skills. Additionally, studies focusing on how students with different learning styles use instructional technology found the technology to enrich those learning styles (Kothaneth, Robinson & Amelink, 2012). One study reports “transformations” occurring as students use the technology to collaborate as they reference face-to-face iPad video conferencing and cite several iPad applications that engage students, provide immediate feedback, and allow students virtual experience in the absence of real-world discovery opportunities (Pilgrim, Bledsoe & Reily, 2012).

A recent study in which student perceptions on iPad use were researched reported that overall students agreed that the iPad contributed to their learning and engagement (Miller, 2012).
However, that same study reported student feedback that the iPad can be a distraction as there are temptations to “get lost” in their iPad or wanting to play with the apps or browser searching and not focusing on the work. Overall students responded positively to the use of the iPad, but the results provide caution. In another study, student surveys showed favorable outcomes in which researchers attributed to the active learning of the participants (Robinson, 2011).

Teacher perceptions have also been researched with respect to iPad implementation within our schools. In interviews conducted with Delta Kappa Gamma members and other educational leaders (Novello, 2012), it was concluded that teachers embraced the iPad early because of its user-friendliness, immediate and unlimited access to information, its size, cost and battery life. The teachers reported favorable results using the iPad in classrooms for not only as an informational and organizational resource, but as a creation tool as well.

While the literature shows teachers as generally positive about the use of the iPads, teacher readiness is not always as apparent. The findings indicate some uncertainly toward performance expectations (Ifenthaler & Schweinbenz, 2012). With the fast pace nature of technological change, it makes it difficult to keep up with what makes the technology effective in the classroom (Peluso, 2012). Teacher training seems imperative prior to any implementation of iPads in the classroom, as well as mandatory, routine training and support to ensure success. Isman (2012) discussed the need to “educate the educator” in light of this very fast development of technology around the world. Teacher training would need to include basic functioning of the hardware and infrastructure, such as web access and storage, as well as best practice with respect to software and applications’ usage. Teacher interviews indicated that there is agreement for the need for upfront, ongoing and routine training in conjunction with an iPad implementation (Novello, 2012).

Effective iPad pedagogy will result in revolutionizing instruction, as opposed to simply using an iPad to do what has been done in the past. Training and support will likely positively
impact this effective iPad pedagogy. It must be noted, however, that ineffective teaching practices may not be improved by simply providing the technology. Teacher training, support, administrative feedback and coaching for improved teacher performance are needed with or without iPad implementation. The use of the iPad may increase teacher motivation, however, to identify best practices using the device, and iPad training will provide the ideas and encouragement to do so. As some of the literature pointed out, care must be taken to not place too much attention on iPad applications, but rather the focus should be on transforming the learning and increasing student performance (Hutchison, Beschorner & Schmidt-Crawford, 2012). They suggest that teachers first determine learning goals and make pedagogical decisions with regard to what must be taught, and then determine the most appropriate activity and assessment strategy. Hutchison et. al. (2012) further go on to say teachers need to ensure that the technology is used to enhance the curricular goals and support student learning in a transformative way as opposed to a goal to simply integrate technology.

An additional important consideration is the infrastructure support. In addition to the training requirements already discussed, findings show some concerns around the need to sync and share information (Crichton, Pegler & White, 2012). For example, there were challenges observed around how students would submit assignments from their devices, and how to work collaboratively on projects hosted on multiple devices. There must be some thought as to how and where to upload projects such as podcasts or video for sharing and for assessment. Additional infrastructure concerns include ensuring a wireless network is in place to support the multiple devices and having a digital commons, or a central location where all the apps, content and device management can be organized and stored (Crichton et.al., 2012). Additionally, the devices provide teachers greater independence at selecting applications and performing updates, and guidelines
should be considered. Also, teachers must understand the procedures for solving problems and who to report them to (Ifenthaler & Schweinbenz, 2011).

A final, major infrastructure concern is internet safety and digital citizenship. With an iPad implementation, student internet safety and privacy is of upmost concern given the additional access to the internet. Restrictions must be placed on the devices, and mandatory initial and ongoing training in web safety and digital citizenship must be provided to teachers and students, and this information routinely provided to parents. Teachers must monitor the use of the devices carefully during the school day, and encourage parents to do the same.

In closing, the literature review has shown that there appears to be significant positive benefits to a one-to-one iPad implementation; however there are considerations that must be addressed. While there have been reports of improved performance and a general positive teacher and student attitude toward using the devices, teacher pedagogy remains a key driving factor, along with the infrastructure support of those devices.

Methodology Design

Overview of Research Design

The study will take place for one full school semester and the sample selection will be 33 – 40% of the sixth grade class or approximately seventy-three students and all of the teachers as well as the sixth grade support staff. The design will include use of the STARS assessment, as discussed in the Definitions of Terms above, with the intent being to contrast student performance before and after iPad implementation. Additionally, a survey will be used at the end of the semester to gather data on student and teacher beliefs and perceptions with respect to the implementation.
School-wide STARS assessment is being administered three times this school year, the first at the start of the year, the second at the end of the first semester, and the final at the end of the year. The data from the second assessment will be used in conjunction with this research, and compared to the final assessment. While it is understood that any favorable improvements will not solely be attributable to the iPad implementation, the assessment data will provide useful information as to performance gains with the iPads compared with the past achievement without iPads.

The iPads should be distributed early in the second semester, in the mid to late January time-frame. Below provides a step-by-step plan of the design:

Step 1 – Collect mid-year STARS assessment on student performance in the January time-frame
Step 2-- iPad roll out to all 6th grade students (6th grade teachers received them earlier in the year)
Step 3 – At the end of the semester (early May, 2014) survey students and teachers on their beliefs and perceptions
Step 4 – At the end of the semester (May, 2014) collect data from the final STARS assessment.
Step 5 – Total data and complete analysis (end of May, 2013).

Participants

The leadership in our district, Fulton County Schools, has accepted our school’s proposal to participate in a pilot on 1:1 iPad implementation, and this will begin in one grade level. The decision was made by our principle and technology committee to target the sixth grade for this implementation. The rational was that the devices and the skills in their use would carry with them through their three years in middle school. The sixth grade would therefore be the sample participating in the 1:1 iPad pilot, and there are currently 209 students.
All sixth grade students have and will be participating in the school-wide STAR assessments which assess reading and math performance. Other grade levels are participating in these assessments as well in schools throughout our district. The upcoming STARS assessment results from the sixth grade, however, will be part of this study, and will be contrasted with results at the end of the year. While names are available, for the purposes of this study they will not be included or identified in any way, and nor will any specific teacher student groups be identified.

**Data Sources/ Instrumentation/ Procedures**

The research will include the use of the STARS assessment to determine overall sixth grade performance data in the areas of reading and mathematics. This data will be examined and used for comparison as the study looks closely at the results prior to implementation and again at the conclusion of the second semester. Additionally, a cross-sectional survey design to evaluate the 1:1 iPad program from a teacher and student perspective. The survey instrument will be designed to assist the researcher and those viewing the data in determining teacher and student beliefs and attitudes with respect to their use of the iPads and the extent to which they believe iPads have contributed to student learning. SurveyMonkey will be the instrument of choice as it is web-based, and is easy to create and use. The survey will be designed to take approximately 10 minutes to complete in order to be as non-disruptive to the school instruction time as possible.

The STAR Assessment has been administered in our school once earlier in the year to all students, and will be administered two additional times: mid-year (winter), prior to the issuance of iPads, and at the end of the year. These assessments conveniently coincide with the study, and the data can be analyzed to support the objectives of the study. The assessments will involve 100% of the sixth grade students assessing their performance in reading and math, so the research will be able to analyze student growth in those areas. While this anticipated growth will not solely be
attributable to the iPad, it will be useful in comparison with data when the iPad was not a part of the instruction, and a sense of its effectiveness can hopefully be determined. The STARS reading and math assessment instruments each consist of 34 multiple choice questions, and take an average of 20 – 30 minutes to complete.

The survey would be quantitative in design to include all closed-ended questions and using a Likert scale with pre-set response options. As Creswell (2012) points out, closed-ended questions enable the researcher to code responses, assign a numeric values and analyze the data. While open-ended questions can provide additional insight, there are drawbacks in coding and analysis, according to Creswell (p. 387). An additional benefit to using closed ended questions is the time that it takes to administer the survey, and, as stated previously the goal is to have it not take more than 10 minutes for students and teachers complete. With this in mind the surveys should be kept short, with a maximum of 15 questions, understanding some time for thinking and consideration will be needed. The questions should address perceived learning and perceived levels of engagement and motivation. Once students and teachers are given time to complete the SurveyMonkey survey, online survey results are also immediately made available with the designing teacher’s secure log-in information. Results may be shared electronically or shared in printed format.

The collection of data for students participating in the STARS assessments is quick and accessible and anonymously completed online by all administrators and teachers given the school code to access. It may be broken down by grade level, school or subgroup, and for the purposes of this study, grade level data will be used. Individual student responses will not be examined as a part of this study and there will not be subgroupings such as gender, race or disability for the purposes of this research.
Reliability/ Validity or Credibility

There will be a random sampling of the sixth grade student body and teachers, and those will receive the URL link for the created survey. In determining the sample size, factors will be considered. The sample size needs to be as large as possible to minimize sampling error yet small enough to have minimal impact on the instructional time. The sample size planned at this point is between 33 - 40% of the sixth grade student body, which is equivalent to approximately seventy-three students. According to the sample size calculator sponsored by Creative Research Systems (http://www.surveysystem.com/sscalc.htm#one), this sample size would provide a 95% confidence level or margin of error of eight. The current plan is that all eleven sixth grade teachers would participate in the survey.

The STARS assessment instruments are designed by survey specialists in the highly regarded Renaissance Learning, Inc. Reportedly there are millions of tests taken around the country each year, resulting in one of the largest student-response databases available. Using this data the statistics that measure student growth or learning progression are developed. Reading and Math assessment questions are said to be skill-based and aligned to state and Common Core standards. All assessments are taken online with secure logins for the district and school. The web-based design provides quick (“immediate”) results as well. The Renaissance, Inc. dashboard gives teachers an overview of student performance by grade level, school, or subgroup and reportedly the results are detailed and easy-to-interpret in charts and graphs.

Proposed Analysis

The STAR Assessments are multiple choice skill-base questions. For example, in the math assessment students are given a problem to solve with four possible answer choices. Their questions are protected, and there were no sample questions available to share in this report. The
survey questions in SurveyMonkey will be designed using a Likert scale. Questions may be found in the Appendices of this proposal. Sample question items and possible responses are below:

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The iPad made my learning more enjoyable.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2. The iPad helped me learn</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

The Analyze section of SurveyMonkey shows a summary of the results and there are bar graph or table representations of the data provided. The data may be exported in various formats, and data can be shared without giving direct account access. The survey designer can select options to calculate a response averages. However, the tool does not perform advanced statistics like standard deviations.

If the user upgrades to a “Professional” SurveyMonkey account for a monthly fee, the data can be exported into a spreadsheet and the user can either perform their own analysis in Excel or take the data into other statistical programs. For the purposes of this research project, I have determined if this level of statistical analysis is required. At this time, there is no plan to upgrade. An alternative is to use the survey feature of Google Drive which has no expense associated with it. The survey will not be administered until the end of the second semester; therefore there will be time to look at this option more closely for consideration.
References


Appendices

Copy of the Survey I -- For Students

These questions are proposed, and may be changed with input from the school’s technology committee and 6th grade teachers and staff as the time approaches to administer the survey.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The use of the iPad motivated me to learn course material more so than without it.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2. My attention to the various classroom tasks and activities was greater using the iPad.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3. The iPad helped me learn course content</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>4. The iPad made my learning more enjoyable.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5. I participated more in class during iPad activities than during activities that did not use the iPad.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>6. It seemed easier to work in a group using an iPad than in other group activities without it.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>7. The iPad helped me apply course content to solve problems.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>8. The iPad helped me connect with the teacher.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>9. The iPad helped me connect with my classmates (such as for group work).</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>10. The iPad helped to develop my confidence with school work.</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>
11. The iPad helped me design projects to extend my learning beyond the essentials. | 5 | 4 | 3 | 2 | 1
12. The iPad helped me design projects to extend my creativity. | 5 | 4 | 3 | 2 | 1
13. The iPad provided a way for me to better understand what is happening in the world. | 5 | 4 | 3 | 2 | 1
14. My reading skills seem to improve as I used the iPad and its applications to practice. | 5 | 4 | 3 | 2 | 1
15. Math concepts seem easier to understand having used the iPad math apps to practice. | 5 | 4 | 3 | 2 | 1

Copy of the Survey II - For Teachers

These questions are proposed, and may be changed with input from the school’s technology committee and 6th grade teachers and staff as the time approaches to administer the survey.

<table>
<thead>
<tr>
<th>1. The use of the iPad seemed to motivate my students to learn course material more so than without it.</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

| 2. The attention of students to the various classroom tasks and activities was greater using the iPad. | 5 | 4 | 3 | 2 | 1 |

| 3. The iPad helped my students learn course content | 5 | 4 | 3 | 2 | 1 |

| 4. The iPad seemed to make learning more enjoyable for my students. | 5 | 4 | 3 | 2 | 1 |

| 5. My students participated more in class during iPad activities than during activities that did not use the iPad. | 5 | 4 | 3 | 2 | 1 |
6. It seemed easier for my students to work in groups using an iPad than in other group activities without it.  

7. The iPad helped my students apply course content to solve problems.  

8. The iPad helped my students connect with me.  

9. The iPad seemed to help students connect with their classmates (such as for group work).  

10. The iPad seemed to help develop the confidence of my students with school work.  

11. The iPad helped students design projects to extend their learning beyond the essentials.  

12. The iPad helped students design projects to extend their creativity.  

13. The iPad provided a way for students to better understand what is happening in the world.  

14. Reading skills seem to improve as my students use the iPad and its applications to practice.  

15. Math concepts seem easier for my students to understand having used the iPad math apps to practice.