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Middle school students' reactions to a 1:1 iPad initiative and a paperless curriculum

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Abstract In this study, 676 middle school students in grades 6, 7 and 8 were asked to complete a survey online, during class time, which asked them their opinions on using iPads in school. Responses to the survey questions were generally positive however comments written at the end were very critical of the initiative. Significant differences were found when comparing the responses of 6th, 7th and 8th grade students. Seventh grade students, who had been using the iPad since 6th grade, were significantly more positive than the 6th or 8th grade students. Also, the younger students in grade 6 were significantly more positive about using iPads than students in 8th grade. Gender differences were also found, with boys being more positive in their opinions than girls. Distraction and technical problems were among the problems students commented on, as well as eye strain from using the iPad for long periods of time. Increased engagement was evident from the high percentage of students who either agreed or strongly agreed with the statement that "the iPad makes learning more fun and interesting".

Keywords iPad · Learning · Student engagement · Grade · Age · Gender

1 Introduction

Using technology in schools to enhance learning in the classroom has reached a new level with the use of iPads and tablets. Administrators and policy makers are hoping that introducing iPads into their schools will increase student engagement and improve learning. In a survey of over 2,000 teachers across the United States, 92 % of teachers responded that digital technology is crucial to teaching and has an impact on learning (Brudno 2013). There seems to be a lot of "hype" for this new learning tool. However, some maintain that instead of enhancing learning, iPads are causing students to be

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distracted from work they should be doing (Miller 2012). Others claim that the iPad allows for more student-driven work, more collaboration and an exciting, different way to learn (Hoffman 2013).

This study examines how students perceive an initiative introduced to their school this year, which provided every student from grades 6 to 8 with an iPad. The initiative was piloted last year, with all 6th grade students receiving their own iPad to use.

1:1 iPad usage is being implemented in many school districts across the nation (Riley 2013) and is touted as a means to increase student engagement in the learning process.

The age and grade level of students has also been reported to effect perceptions of iPad usefulness. Crichton et al. (2012) reported that high school students were more critical of the devices and their usefulness. Keane et al. (2012) found that the 7th grade students were much more positive about the iPads compared to the 9th grade students.

This research addresses the questions: "What do students think about using iPads in school?"

"Is there a difference in attitudes about iPad use between grades?" Younger students' responses from the 6th grade are compared to the older 8th grade students. Seventh grade students, who have been using the iPad since 6th grade, are compared to the other two grades in terms of their responses. Sub-questions are: "Is there a difference in attitudes about iPad use between genders" and "Is there a difference in attitudes about iPad use between English Language Learners and native English speakers?"

2 Literature review

As our society uses technology more and more in our daily lives for social interactions, the challenge for educators is to guide students towards using iPads for educational purposes (Oliver and Goorke 2007). Before the advent of iPads, studies of one-to-one use of computers have shown that students' organization improved because all their notes for different subjects were easily available (Lei and Zhao 2008) Other empirical studies of 1:1 computer initiatives have shown increased student engagement, interest level and achievement (Bebell and O'Dwyer 2010). Critics of 1:1 computer use claim that computers have just replaced books, and have not changed education (Bebell and O'Dwyer 2010). Recently, the use of iPads have begun to replace the use of computers in 1:1 technology initiatives (Keane et al. 2012). Some research has shown that making iPads part of everyday pedagogy will motivate and enhance student learning (Kinash et al. 2012). Other research claims that there is a potential for iPads to distract students and allow for off-task behaviors, such as emailing friends or surfing the web (Hoffman 2013). Technical problems with the devices were also problematic for some. Further, if not trained properly, there is a possibility that teachers will use the devices merely to substitute for paper and pencil learning and keeping the classroom teacher centered rather than student centered (Attard and Northcote 2012). Hutchison et al. (2012) state that pedagogy must drive the use of technology in the classroom, not the other way around and said that "teachers should…select appropriate activity types and assessment strategies before making a final selection about which technology tool will be most useful".

In a study involving two schools at the 7th and 9th grade, Keane et al. (2012) found that the most important factors for the success of an iPad program was that the teachers be engaged, supportive and prepared to use the device. Teacher preparation and their level of engagement was found to be highly related to the level of student engagement.

Teachers need to work diligently to keep students working on track when using iPads in a 1:1 program (McKibbons 2016). Coaching specific strategies, such as arranging desks in a circle, facing out, with the teacher standing in the middle, will allow for greater visibility of all the iPad screens. This will help the teacher keep track of what the students are viewing on their screens, and reduce the amount of time spent playing games or checking social media (McKibbons 2016).

Students with disabilities, especially dysgraphia, benefited from using the tablets. Also, English language learners have benefited by using the iPad to look up words quickly and hear them pronounced correctly. They could also record themselves reading aloud in English and have the teacher listen to the recordings rather than have the student read out loud in class (Demski 2011).

The SAMR model (Substitution, Augmentation, Modification and Redefinition) first proposed by Puentedura (2013) provides guidance on how using technology, such as iPads, can be most beneficial in the classroom. He claims that at the lowest level, Substitution, there is no real advantage to having the technology and there is no change in teaching and learning. The next level, Augmentation, would use technology to perform common tasks, such as taking a quiz online rather than using pencil and paper, allowing for immediate feedback, and thus promoting student engagement. The next step, Modification, allows for a significant change in the function of the classroom. It is no longer completely teacher centered, and becomes more student centered. Students use the technology to create, critique and receive feedback on assignments. Finally, Redefinition is the level at which the classroom is student centered, and the technology is integral for allowing completion of tasks that would be impossible to complete without its use.

In order for teachers to take full advantage of iPads in the classroom, they must be fully trained and given ongoing technical and instructional support (Maninger and Holden 2009). If not familiar with iPads, teachers may just use them as a convenient substitute for paper and pencil. They maintain that support systems that offer professional development for integrating pedagogy with the internet and the massive variety of applications available to enhance student learning is essential for the success of this type of initiative.

Aside from student engagement in the learning process, the question remains; Does the use of iPads increase student academic achievement? Maninger and Holden (2009) in their study of a one to one initiative of fifth to eighth graders and their iPad use, could not definitively state whether academic achievement had improved, but they did state that improved communication between teachers and students via email had a direct effect on the quality of the students' work. The teachers made themselves available in the evenings to answer students' homework questions and also communicated more readily with the parents. They also found that when teachers emailed students about missed assignments, the make-up work was turned in significantly sooner. By allowing students to take their learning home with their iPad, homework was always completed in a timely fashion (Godzicki et al. 2013). Hoffman (2013) questioned students about how use of the iPad affected their grades. He found that half of the students self-

reported that the iPad negatively influenced their grades; one-third said it had a positive influence and the rest said there was no influence on their grades. The students who said their grades were negatively impacted by the iPad attributed this to the distractibility the iPads added, with social networking, games and entertainment being readily available.

Direct evidence of research showing students' academic achievement being correlated with using iPads was not found.

The effect of iPads on teachers and their perceived impacts on learning has also been reported. In a study of middle school students' use of iPads, Maninger and Holden (2009) reported that teachers were "overwhelmingly positive", saying that students' engagement, interest and involvement had improved, as had their classroom management. Word processing, communication and taking notes in class were the three most prevalent tasks the students used the iPad for. Going beyond these uses, such as online research, was also reported by the teachers This technology had an overall strengthening effect on the learning process.

A teacher's ability to integrate iPad usage into their lessons seems to be related to their generational characteristics and pedagogical and content knowledge, according to Crichton et al. (2012). Prensky's (2001), idea of "digital natives" being more likely to easily learn new technology than "digital immigrants", the older generations that did not grow up with technology, did not hold true in the study by Crichton et al. (2012). They found that the older teachers, the "digital immigrants" with more pedagogical experience, were able to integrate the new technology into their teaching with more success than their younger colleagues.

The age and grade level of the student has also been reported to effect perceptions of iPad usefulness. Crichton et al. (2012) reported that high school students were more critical of the devices and their usefulness. They were resentful of the school imposing the requirement that they must use the iPads instead of textbooks. Keane et al. (2012) found that the 7th grade students were much more positive about the iPads motivating them to learn compared to the 9th grade students. The younger students were twice as likely to do their homework on the iPad compared to the older students. Gender differences in confidence using technology have also been found in past studies, with males having a more positive attitude about the use of technology than females (Yau and Fong 2012).

Communicating with parents and having their support is also important for the success of this type of initiative (Rodriguez et al. 2014). School-home communication and collaboration improves the possibility of the parents assisting their child with homework on the iPad. This would necessitate that parents be trained to use the iPads as well as the teachers. Rodriguez, et.al, suggested that it would be effective to include parents in professional development and training opportunities, which would in turn foster collaboration.

3 Background and methodology

Students in grades 6, 7 and 8, in a suburban middle school in Western New York, were asked to complete a survey about their opinions on using iPads in their school. A letter

of consent was mailed home to the parents several weeks before administering the survey and parents were asked to respond only if they decided to 'opt' their child out of taking it. Only one parent chose this option. The survey was completed on line and teachers were asked to use class time to allow all students to complete the survey. The principal of the school also asked the teachers to have the students complete the survey within a time period of 1 week to allow for flexibility. The survey was taken in the spring of the school year, 8 months after being introduced to the 6th and 8th grade students and 1 year plus 8 months for the 7th grade students. The survey had a total of 14 items on a Likert type scale with an opportunity for the students to write comments at the end (see Appendix A). Demographic information was collected at the end of the survey. The survey was validated and approved by the school principal and another colleague. The Cronbach's Alpha was used to test the reliability and was found to be .544. This is less than the alpha value of 0.7, which is the standard for well-established measures. There were 676 responses, out of a total enrollment of 747 students. The principal of the school stated that some teachers did not have time to allow students to take the survey because of the State's standardized testing.

The school has 335 students who receive either free or reduced lunch (280 free, 55 reduced) and there are 81 full time teachers. The majority of the students are classified as White, (506) and 178 are classified as Black. There are 31 Asians and 26 Hispanic students.

As stated in the Introduction, this research will answer the following questions:

"What do students think about using iPads in school?"
"Is there a difference in attitudes about iPad use between grades?"
"Is there a difference in attitudes about iPad use between genders?"
"Is there a difference in attitudes about iPad use between English Language Learners and native English speakers?"

4 Results

The students were asked to respond on a scale of 1–4, with 1 meaning strongly disagree, 2 meaning disagree, 3 meaning agree and 4 meaning strongly agree. The following shows the results of all the students responses mixed together and does not distinguish between the 6th, 7th, and 8th grades responders. The general satisfaction of the students regarding iPad use is evidenced by the high percentage of agreement with positive statements such as "I feel like I can learn better using an iPad", (69 %) "I am more productive using the iPad" (69 %) and "The iPad makes learning more fun and interesting" (77 %). However, there seems to be some negativity as evidenced by strong positive responses to the statement "I miss using paper for some assignments" (63 %) and almost 60 % *disagreeing* with the statement "I would rather learn with the iPad than with paper in print".

When asked "Do you like using the school's iPads", 73 % of the students responded positively and only 27 % said they did not. The majority of students, 72 %, said that they were not easily distracted when using the iPad and 84 % said that their teachers knew how to use the iPad effectively in the classroom.

Comments from the students were much more negative than the answers to the survey questions. The main complaints were that the iPads would break down, the internet would crash or the devices would not be charged, making it impossible to hand in work, which resulted in a "zero" for an assignment. Also, a lot of class time had to be spent making sure the iPads were working. Other students felt it was a major distraction and that there were too many kids playing games in class that went unnoticed by the teacher. There were many complaints that too much time on the iPad resulted in bad headaches and burning and tired eyes.

> Sometimes I have a lot of homework in my iPad so after a while my eyes start to burn and I'm really tired.

Another complaint was that if a student broke their iPad, the parents were responsible for replacing it. One student wrote "you can't break a notebook". A "waste of money" was another common observation, as well as "I hate the iPads and all my friends do too". Substitute teachers who did not know "what was going on" were perceived as a problem. Many students complained that their grades have come down and that too many students were cheating using the iPads and not getting caught. Students missing paper to write assignments, especially in math class, was another major issue.

On the positive side, some students indicated that it was easier to communicate with teachers and easier to find answers using the internet. Researching topics was easier and faster for some. Another plus was "we don't have to carry a whole bunch of books around" and that papers can get lost, but with the iPad, "everything is in one place". Another student commented that "I write sloppy sometimes and it is much easier for me to type". Other students commented that learning with the iPad was fun, they loved using it and they could check their grades anytime.

Despite these positive comments, overall, there were many more negative comments about iPads from the students. Sprankles (2013) recommended that during the first year of implementation of a new technology into a school that to avoid crisis a team should be organized to monitor and respond to negative comments "before they spiral out of control".

The means of the responses to each item were divided into the answers given by the 6th, 7th and 8th grade students and an ANOVA (Analysis of Variance) was applied using SPSS, (Statistical Package for Social Sciences) to determine if differences existed in the responses. Using the Bonferroni Post Hoc test, it was found that there were significant differences in a number of areas, with the "experienced" 7th grade students, who had been using the iPads since sixth grade, significantly more positive in their responses than students in the other grades. The 7th grade students, who were into their second year of using the iPad, had significantly higher means ($p < .05$) on items 1, 2, 3, 4, 5, 9, 10 and 11 and significantly lower means ($p < .05$) on items 6, 7 and 8.

The 8th grade students were less positive about the iPads than the younger 6th grade students with significant differences ($p < .05$) on items 1, 2, 3, 4, 5, 9, 10 and 11 and significantly lower means ($p < .05$) on items 6, 7 and 8.

To determine if differences existed between genders a t-test for Independent samples was applied to each question with the independent variable being gender. In all there

were 345 males and 331 females. Significant differences were found ($p < .05$) between males and females in item 1, "I feel l can learn better using an iPad. The boys answered more positively than the girls in this statement. There was also a significant difference ($p < .05$) in item 2, "My grades have improved since using the iPad", with the boys being more in agreement with this statement than the girls. Another significant difference ($p < .05$) was found in item 4, "I am more productive using the iPad" and again, the boys were more in agreement with this statement. The girls significantly agreed more ($p < .05$) with the statement in item 6, "I miss using paper for some assignments".

Boys responded significantly higher again than girls ($p < .05$) in item 11, "Given a choice, I would rather learn with the iPad than with paper in print". Finally, boys were more likely to use the iPad to web surf than girls ($p < .05$). This confirms other studies' findings that males tend to be more positive than females about using technology to learn (Yau and Fong 2012).

There were 616 English speakers and 59 ELL students responding to the survey. When comparing native English speakers to English language learners, there were only two significant differences found. The first significant difference ($p < .05$) was in item 1, "I feel like I can learn better using an iPad", with the ELL responding more positively to this statement. The second significant difference ($p < .05$) was in item 7, "I am easily distracted using the iPad in class", with the English speakers more in agreement with this statement than the ELL students.

5 Discussion and limitations

The results from this study provide evidence that the amount of time students have been using their iPads influences their opinion of their usefulness. The 7th grade students, who have had their iPads for the longest period of time (over a year and a half) responded significantly more positively than the 6th or 8th grade students, who were a year behind in their adjustment. It seems that the more familiar they are with the technology, the more comfortable they become with it. According to the results of this study, once students have accepted the change and mastered the steep learning curve of using the iPad, their attitudes become more positive. The students and teachers have had a chance to develop strategies for using the device instead of paper and pencil.

Of course, other variables that cannot be controlled for may have affected the results. The amount of training the teachers received and the level of engagement that the teachers displayed could well have impacted the students' responses. The teachers of the 7th grade cohort could be especially enthusiastic about and well prepared to use the devices compared to the teachers of the 6th and 8th grade teams. Another variable that could have affected the results is the type of student in the 7th grade compared to the other two grades, or the amount of training on the iPad they had as the pilot group in 6th grade. Also, the reliability of the survey instrument could be questioned. The use of a parametric measure, such as the t-test, on the data is justified on the assumption that the population is normally distributed, which is another limitation.

There was still a lot of negativity amongst all of the students about using the iPad *exclusively for all subjects* and having a paperless curriculum. This was especially true for certain subjects, such as Math, as indicated by the comments students wrote at the end of the survey.

This study also confirmed what Crichton et al. (2012) found in their research; that the age and grade level of the student seemed to effect perceptions of iPad usefulness. The 8th grade students were significantly less positive and more critical of the iPads than the 6th grade students. Again, this result could be affected by other variables, such as teacher engagement and training, type of student and their background and training.

Gender differences in the responses to the survey suggest that the middle school boys were more positive about using iPads than the girls. There were significant differences in 6 of the 12 items on the survey, indicating that the girls may be having a more difficult time adjusting to the technology than the boys. There were two areas that suggest ELL students may find the iPad a more useful learning tool than the English students; learning better on the iPad and being less distracted.

One final observation that has not been addressed in any previous study was the effect of using iPads over long periods of time on students' eyes. This was an unanticipated result that emerged in the students' comments at the end of the survey. There were numerous comments about eyes burning, twitching and becoming strained as well as headaches after working on the iPad all day and then doing homework at night. The glare from the devices was made worse by the teachers turning off the classroom lights, according to some student's comments.

6 Conclusions and future research

This study suggests that improving student engagement and learning with iPads cannot be accomplished in a short period of time. Students need time to make the adjustment to using this type of technology and it might take several years to do this. During this learning curve, students need to have good technical support and encouragement. Further, girls may need extra support making the transition to the iPad from paper and pencil. The distractions caused by 'game aps' needs to be minimized, possibly by not allowing them at all, or having teachers closely monitor students' activities.

In addition, the transition to using iPads *only* and not using paper and pencil *at all* was shown by this study to be a difficult one. A combination of *some* work in *some* subjects being done with paper and pencil and other classes only using the iPad might help with this transition. Further studies should explore which subjects might benefit most from the iPad, and which might be better off using a combination of iPads and paper and pencil. Also, the benefits of iPad use for ELL students should be further explored.

Another future study could examine more closely the difference that age and grade makes on acceptance of the iPad as a learning tool and a follow up study of the current 6th grade students when they are in 8th grade would be appropriate.

Finally, the issue of eye strain caused by excessive use of the iPad needs to be explored. Breaks from staring at an iPad screen for long periods of time might be in order the same way employees working at a computer are encouraged to take breaks during the day to avoid eye strain.

Appendix A

Survey Questions and Answers in Percentages
N = 676 Sixth Grade: 199 students Seventh Grade: 218 students Eighth Grade: 259 students.

1. I feel like I can learn better using an iPad.

1	**85**	12.6%
2	**124**	18.3%
3	**299**	44.2%
4	**169**	25%

2. My grades have improved since using the iPad.

1	**110**	16.2%
2	**186**	27.5%
3	**281**	41.5%
4	**100**	14.8%

3. It was easy for me to learn how to use the iPad.

1	**43**	6.4%
2	**51**	7.5%
3	**161**	23.8%
4	**422**	62.3%

4. I am more productive using the iPad.

1	**90**	13.3%
2	**121**	17.9%
3	**268**	39.6%
4	**198**	29.2%

5. The iPad makes learning more fun and interesting.

1	**85**	12.6%
2	**70**	10.3%
3	**222**	32.8%
4	**300**	44.3%

6. I miss using paper for some assignments.

1	**143**	21.1%
2	**112**	16.5%
3	**160**	23.6%
4	**262**	38.7%

7. I am easily distracted using the iPad in class.

1	**238**	35.2%
2	**250**	36.9%
3	**101**	14.9%
4	**88**	13%

8. It is easy to cheat using the iPad.

1	**269**	39.7%
2	**194**	28.7%
3	**120**	17.7%
4	**94**	13.9%

9. The iPad has had a positive effect on my behavior.

1	**74**	10.9%
2	**128**	18.9%
3	**308**	45.5%
4	**167**	24.7%

10. My teachers know how to use the iPad effectively in the classroom.

1	**38**	5.6%
2	**74**	10.9%
3	**330**	48.7%
4	**235**	34.7%

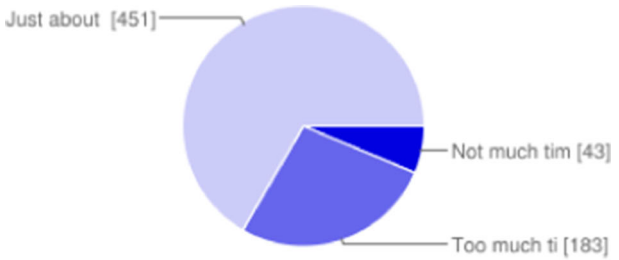
11. Given a choice, I would rather learn with the iPad than with paper in print.

1	**158**	23.3%
2	**127**	18.8%
3	**172**	25.4%
4	**220**	32.5%

12. I use the iPad for non-academic things while in class, like going on Safari for web surfing.

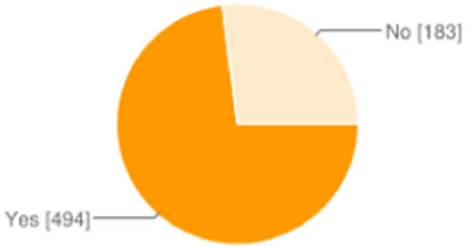
1	**289**	42.7%
2	**236**	34.9%
3	**97**	14.3%
4	**55**	8.1%

13. How much classroom time is spent using the iPad?



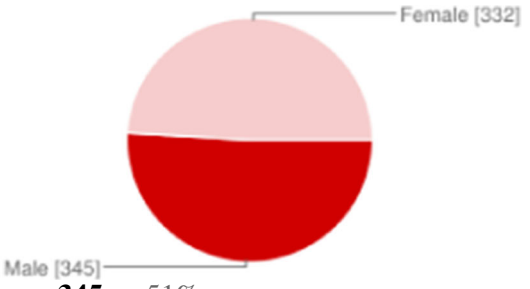
Not much time at all.	**43**	6.4%
Too much time.	**183**	27%
Just about the right amount of time.	**451**	66.6%

14. Do you like using the school's iPads?



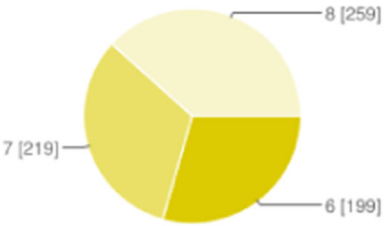
Yes	**494**	73%
No	**183**	27%

15. I am:



Male	**345**	51%
Female	**332**	49%

16. I am in grade:



6	**199**	29.4%
7	**219**	32.3%
8	**259**	38.3%

17. My first language is English.

Yes	**617**	91.3%
No	**59**	8.7%

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