



Teachers' Use of the iPad in Classrooms and Their Attitudes toward Using It

Phu Vu, Ph.D.¹

Assistant professor at University of Nebraska, Kearney, USA

John McIntyre, Ph.D.²

Professor at Southern Illinois University, Carbondale, USA

Jude Cepero, PhD³

Assistant professor at University of Nebraska, Kearney, USA

Abstract: This is a mixed methods study combining the paradigms of quantitative and qualitative research to ensure maximum insight into how iPads were used in classrooms and teachers' attitudes toward using them. The findings showed that there were three practices of iPad use in the classroom. The most common roles the teachers took were lecturing and facilitating when they integrated iPads into their teaching while the most common class activity was "research." The most common level of class activities was "knowledge representation." According to the teachers, the use of the iPad in the classroom was somewhat useful (2.75 out of 5.00).

Keywords: *iPad, Tablet, Educational Technology, Technology Integration*

¹ Dr. Phu Vu is an assistant professor in instructional technology at University of Nebraska, Kearney. His research interests include online learning, educational technology, teacher education, and ESL online training. Email: vuph@unk.edu

² Dr. John McIntyre is a professor and the chair of the Department of Curriculum and Instruction. He serves as the Program Coordinator for both the Teacher Leadership and the Curriculum Studies specialty areas. His research interests are in teacher education, including school-university partnerships and teacher development. Email: johnm@siu.edu

³ Dr. Jude Cepero is an assistant professor and director of gifted education program at University of Nebraska, Kearney. Her research interests include gifted education, technology integration in education and differentiated instruction. Email: matyoceperja@unk.edu

Introduction

Technology innovations have always excited educators and the use of technology has always been a trend in the American educational system (Baker & O'Neil, 2003; Fletcher, 2003). Harris (2005) compared technology integration into classrooms as a "Trojan horse" for educational reform. The metaphor of the Trojan horse implies that embedded within new technology integration is a catalyst that will eventually bring about radical changes in education. In addition, the inclusion of technology into school is also expected to prepare young learners in a wide array of technologies. Technology can mold young learners into dynamic and informed "webizens" who are able to critically make judgments on information provided by media, books and journals, and can shape their lives as well as affect other people's lives in a positive way. With all these assumptions and expectations, policy makers and educational administrators since the mid 1980s have put technology as one of the top priorities in American educational policies. It is also noted that the term "*technology*" used in this study is narrowly referred to "*digital technology*", which, according to the New Zealand Commerce and Economics Teachers Association (2014), is used to describe the use of digital resources such as web 2.0 tools, digital media tools, programming tools and software applications to effectively find, analyze, create, communicate, and use information in a digital context.

Since the debut of its first generation in 2010, Apple's tablet, iPad, has been introduced into K-12 classrooms more widely and speedily than any other previous computing device such as desktops or laptops. It is even predicted that this gadget will soon replace not only traditional computers such as desktops and laptops but also textbooks in classrooms (Horrigan, 2009; Ochola, Stachowiak, Achrazoglou, & Bills, 2013). So far, there has not been any official report or statistics about the number of iPads in schools across the United States. However, according to Hu (2011), an escalating number of schools around the country were replacing desktops and textbooks with iPads, and utilizing Apple's latest device as an overall learning tool. For example, the Los Angeles Unified School District is reported to give every student in the nation's second-largest school district an iPad in the Fall semester 2013. The New York City public schools spent \$1.3 million purchasing more than 2,000 iPads while the Virginia Department of Education oversaw a \$150,000 iPad initiative. In addition, the number of approximately 5,400 educational applications designed specifically for the iPad also indicated the pervasiveness of this gadget in education. It seems that across the nation, there was a rush to include this latest technological device in schools. However, many educators and researchers questioned the rapid iPad integration into classrooms without due consideration of how this new device impacts on student learning (Walters & Baum, 2011). While more research about all aspects of iPad use in classroom is needed, this study examines an aspect of how teachers used the iPad in their classroom and their attitude toward using this device in their teaching.

The Case for the iPad

Several reports indicated positive impact of the use of the iPad on teaching and learning performances in the mass media. In a debate about whether the iPad will revolutionize education in the journal of Learning and Leading with Technology, Walters (2011) reported three advantages of iPads with specific examples. According to the author, this gadget provided the teachers at his school with opportunities to transition from long-term projects which incorporated software-specific projects with a steep learning curve to smaller scales, apt-based learning tasks. Instead of spending many days on typical software programs, the teachers at his school were able to “test drive” and learn about the app “Writer’s Studio” for a unit on earthworm in second grade science classes in less than a day. Another benefit is that the iPad allowed the teachers to experiment with technology with ease. Finally, the iPad allowed for the portability and kinesthetic interactions that traditional desktop or laptop computers could not offer.

Also in the same year, Taborn (2011) reported the success of the pilot project to use the iPad in classrooms at Tower School in Marblehead, Massachusetts. The author did not provide information on how the pilot project was conducted and how many iPads were provided to students. However, according to the Tower's head of school, teachers in the pilot project responded incredibly well to the adoption of the new technology. He believed that the introduction of iPads was the beginning of the platform that really was going to bring the information revolution into the hands of elementary school students. The success of the pilot project led the school to start a 1:1 iPad program for students in grades 3 through 8 in the fall semester 2011.

The Case against the iPad

While advocates of iPads lauded their positive impact on the teaching and learning process, critics raised concerns that schools were rushing to invest in these expensive technological fads before their educational value were proven by research.

In response to Walters' (2011) view in the debate about whether the iPad will revolutionize education in the journal of Learning and Leading with Technology, Baum (2011) gave many concerns about the current enthusiasm of the iPad. According to him, he witnessed too many things that were going to revolutionize education: programmed learning, computers, the Internet, interactive whiteboards, and laptops. They all became popular and made some things possible or easier than before. However, the classroom practice and teaching approach were almost the same as they were 50 or 100 years ago.

Taking a different perspective to raise concerns about the use of the iPad in education, Ben (2011) pointed out several downfalls of the iPad in education environment. The slow finger-typing actually made written course work more difficult. These fancy tablets were great for enjoying media and allowed learners to share readings. However, teachers could not use them to mark up material on the fly and show changes to learners in response to their questions, a type of interactivity that was a major thrust in pedagogy. According to Ben, when the University of Notre Dame tested iPads in a management class, its students reported that the finger-based

interface on its glassy surface was not good for taking class notes and didn't get them to mark up readings. Therefore, in their online final exam, 39 of the 40 students put away their iPads in favor of a laptop, because of concerns that the tablet might not save their material.

In summary, since its recent debut on the market, published studies on the impact of iPads on K-12 education were hardly available in any mainstream journal. Several successful and unsuccessful stories of pilot projects of iPads at a specific school or school district were introduced in the mass media. This practice brought about the paucity of clear evidence on iPads' impacts on education. In addition, most of the pilot projects or programs at these schools involved a specific intervention with a clear beginning and ending. However, the introduction of iPads involved the selection of apps, curricula adjustment and teacher/student training. This is an ongoing process without a clear starting or closing point. Evidences of their effectiveness will, therefore, have to be based on various non-experimental environments.

Methodology

This is a mixed methods study combining the paradigms of quantitative and qualitative research to ensure maximum insight into how iPads are used. We believe that a mixed methods design is essential to best address the research problems of this study. According to Johnson and Onwuegbuzie (2004), a mixed method approach combines quantitative and qualitative research techniques, methods, approaches, concepts, or language into a single study, which offers the researcher a better understanding of the problem than if either dataset is used alone. In this study, the mixed methods design included two distinct phases: the quantitative phase followed by the qualitative phase. In the first phase, the researchers collected and analyzed the quantitative data from classroom observations. The second phase consisted of collecting and analyzing the qualitative data to help explain, or elaborate on, the quantitative results. The second phase's qualitative component was built on the first phase's quantitative component. Both phases were connected in the intermediate stage of the study. The rationale for this approach was that the quantitative data and its' resultant analysis provided a general understanding of the research problem. The qualitative data and its' analysis refined and clarified the quantitative results by examining in more depth the participants' (Creswell, 2003).

Participants

In this study, we utilized a convenience sample of 21 elementary and secondary teachers from three different school districts. Seven teachers were from a public school that had 50 iPads; eight teachers were from another public school that had 25 iPads; and six teachers were from a private school that had 32 iPads. All of those schools had the iPad reservation regulation based on the first-come-first-served policy. Teachers could check out one or up to 30 iPads for their daily classroom use, depending on their teaching needs. According to 15 teachers at two public schools, they were not required to use iPads in their classroom. In another word, integrating iPads into teaching was voluntary. The schools bought the iPads and made them available for the teachers to

use. However, according to six teachers at a private school, although the school did not provide any official requirements about the use of iPad in classroom, they understood that they were expected to integrate the iPads into their teaching because the school principal regularly checked the iPad check-out logs.

All 21 participating teachers reported that they did not receive any formal iPad training before they used it in their classroom. According to seven teachers in the same public school, except a formal training session provided by an Apple sales representative, they did not receive any formal training in iPad use. They had to resort to different sources to educate themselves about how to use the iPad in the classroom. Six other teachers at a private school reported that they did not have any training program or workshop before using it. They all did attend a "tech camp" in the summer to learn how to integrate a variety of technology into classroom. This "tech camp" did not cover the iPad use and it was before the iPad was introduced into their school, so according to these teachers, the "tech camp" was not considered as a formal iPad training. They managed to learn how to use it by searching information on the Internet or asked colleagues for help. Eight teachers at another public school attended an iPad-integrated course provided by a professor at a university and learned how to integrate the iPad into their teaching from that course.

Instrumentation

The ISTE Classroom Observation Tool (ICOT®) was used as the quantitative component of this study. According to information available on ISTE's website, this tool was developed by staff and consultants in the Education Leadership Department of the International Society for Technology in Education (ISTE) to provide a set of questions to guide classroom observations of a number of key components of technology integration (ISTE, 2013). Specifically, the tool had different focuses including the educational setting in which the observation occurred, types of learners' interactions in the classroom, teachers' roles, learning activities, the National Educational Technology Standards (NETS) created by ISTE, and a three-minute chart (during each three-minute period, the researchers would check if the iPad was being used by learners and/or teachers). ISTE states that ICOT covers the recognized standards for learning, teaching, and leading in the digital age and were widely recognized and adopted worldwide. The six standards areas introduced in ISTE website are 1) technology operations and concepts, 2) planning and designing learning environments and experiences, 3) teaching, learning and the curriculum, 4) assessment and evaluation, 5) productivity and professional practice, and 6) social, ethical, legal, and human issues.

In addition to areas covered in ISTE's Classroom Observation Tool (ICOT®), we also included "Student Engagement" and "Cognitive Abilities" into the observation form. These two categories were introduced in the ALTEC Classroom Observation Form designed by Hare, Rowland and Stanley (2009). Specifically, in the "Student Engagement" category, there are five levels of student engagements:

1. 0 students off task
2. 1-3 students off task

3. 4-6 students off task
4. 7-10 students off task
5. > 10 students off task

In the "Cognitive Abilities", there were also four Bloom's Taxonomy-based levels:

1. *Receipt of Knowledge* (For example, students listen to a lecture from the teacher, or students watch an audio-visual presentation, or students sitting and listening to instructions.)
2. *Applied Procedural* (For example, students completing a task in which they are applying some type of knowledge or skill they have learned after instructions are given.)
3. *Know. Representation* (For example, students summarize an article they have read online.)
4. *Know. Construction* (For example, students explain why there may be differences in information they have read online, or students are using media to portray information in a new or original way.)
5. *Other*

For the qualitative component of this study, the interview protocol was the instrument. This interview protocol was developed before conducting the interviews, and the questions were used as guided conversation. The order of questions and information addressed before each interview were specified in advance, but we defined the sequence and wording of the questions during the interview. Minimization of researcher bias was done through careful, detailed, and thorough documentation of all interviews.

Validity and Reliability

Validity and reliability in a mixed study involves the triangulation of different data sources. We used the ISTE Classroom Observation Tool (ICOT®) to collect objective data from classroom observations and to triangulate with data in the interviews. The triangulation process of collecting information from different sources using a variety of methods reduced the risk that conclusions would reflect systematic biases and allowed a broader understanding of the study's issues. The comparison of data gathered supported the triangulation process and therefore enhanced internal validity. Efforts to control any threats to theoretical validity were also conducted by collecting and drawing attention to any discrepant data or alternative explanations.

In the first two classroom observations, we instructed a colleague on how to use the instrument to keep track of what happened in the classroom and asked her to come into the classroom with the main researcher to observe the classrooms, using the provided instrument. At the end of the observations, we both compared the instruments to see if there was any data difference between the two of us. In the first observation, we had three differences in the "Three Minutes Chart" while in the second observation we had two differences in the "Cognitive Abilities" category. We later determined that the reason there was a difference in those data was that we misunderstood the detailed guidelines in those categories. By conducting this crosscheck, the reliability and validity of the study increased.

In addition, upon completing the analysis for all 21 interview transcripts, we randomly selected five written transcripts to analyze and sent them to the participants, asking for signed verification of content accuracy for those interviews. Those participants also were asked to rewrite, clarify, or make notes on either the transcripts or analyses if further clarifications were needed. By having participants verify the content within the analysis, validity of our interpretations was strengthened and cross-checked. This strategy is known as member checking, which is a validity strategy used to establish the accuracy of findings by taking the final report or themes back to the participants and determining whether these participants feel that they are accurate (Creswell, 2003).

Data Analysis

For the quantitative data analysis, information in the ISTE classroom observation tool was quantified and inputted into an Excel spreadsheet. These data were divided into three main categories: demographic information and iPad use in the classroom. For the qualitative data, the analysis consisted of examining and categorizing to address the purpose of the study. We made use of NVIVO 10 to identify the "most frequent words" in those transcripts and then manually conducted the coding and theme analysis process. Data analysis did not always proceed in a linear manner but it was an ongoing search for general statements about relationships between categories of data. The transcripts were analyzed through the coding process including open coding, axial coding, and selective coding. Themes emerged from the coding were also compared to data observations to determine patterns.

Findings

Research Question 1. In What Ways do Teachers use iPads in the Classroom?

We combined data collected from classroom observations using the ISTE classroom observation tool and responses to the following sub-questions to answer research question #1.

- *How often did/do you use your iPad in your teaching?*
- *Can you describe the iPad educational activities that you utilized the most?*
- *What kinds of iPad activities do you think can be most useful in your teaching?*

Data from the classroom observations indicated three practices of iPad use in the classroom. The first practice was that the teachers delivered each iPad to each learner. This practice was available only in those schools that received state-funded grants to buy the iPad for both their teachers and students. Since none of the school districts in this study had enough money to provide each student with an iPad, they typically bought forty or fifty iPads for the whole school. If the teacher would like her or his students to use the iPads in the classroom, she or he would schedule them in advance and then would check out the iPads from the school office or school library. The second practice was similar to the first practice but the teacher checked out only five or six

iPads and distributed each iPad to groups of students in the classroom. The third practice was that only the teacher used the iPad to deliver the lesson in the classroom. In all cases, the teachers combined the iPad with other technology devices to show the content to the students on the project screen. Some of them connected the iPad to the projector while others put it on the Elmo.

We observed 112 activities or in-class assignments in the 21 classroom observations. As shown in Table 3 below, students taught by teachers using the iPad mainly worked either individually or as a whole class in those class activities or in-class assignments.

Table 3

Category 1: Student groupings

Individual work	Pair work	Small groups	Whole class	Other
40	11	9	52	0

Among the 112 activities or in-class assignments, the most common roles the teachers took were lecturing and facilitating. The teachers delivered the lectures or instructions for the assignments and facilitating their students by walking around the classroom offering individual support. Discussion was the least common role the teachers took in the classroom as shown below.

Table 4

Category 2: Teacher roles

Lecturing	Interacting direction	Discussion	Facilitating/coaching	Modeling	Other
35	14	9	29	25	0

As shown in Table 5, the most common activity or in-class assignment when the teachers used the iPad in the classroom was "*research*". The teachers asked the students to use the iPad to search for information in the internet to write a report, to collect data for an assignment or to present in front of the class. The least common activity was "*Creating presentations*". This activity only occurred in grades six, seven and eight.

Table 5

Category 3: Learning activities

1	Creating presentations	3
2	Research	28
3	Information analysis	14
4	Writing	19
5	Test taking	0
6	Drill and practice	20
7	Simulations	11
8	Teacher lecturing while students listening	17
	Total	112

We categorized 112 activities and in-class assignments in Table 5 into four categories based on the cognitive domain on the Bloom's Taxonomy. As seen in Table 6 below, the most common level of activities or in-class assignments was "*knowledge representation*" equivalent of "*comprehension*" level on the Bloom's Taxonomy. For example, in one of the classes we observed, teachers asked students to work in groups of five to look for online resources about dinosaurs, using the iPads. After approximately 10 minutes, one representative in each group presented what his or her group found about the dinosaurs. The teacher helped the students connect the iPad with the smart board to project the iPad screen onto the smart board's screen so that every students in the class could see. We categorized this in-class assignment as "*Knowledge representation*" level on the Bloom's Taxonomy.

Table 6

Category 4: Cognitive Abilities

1	Receipt of Knowledge <i>Students listen to a lecture from the teacher, or students watch an audio-visual presentation, or students sitting and listening to instructions.</i>	17
2	Applied procedural <i>Students completing a task in which they are applying some type of knowledge or skill they have learned after instructions are given.</i>	31
3	Knowledge representation <i>Students summarize an article they have read online.</i>	47
4	Knowledge construction <i>Students explain why there may be differences in information they have read online, or students are using media to portray information in a new or original way.</i>	17
	Total	112

Category 5: iPad in use in classroom

Since there were three types of iPad use in the classroom in this study: one-iPad-for-each- student classrooms, one-iPad-for- all- students classrooms, and one-iPad-for-each- group classrooms, we presented separate observation data in the category of iPad in use between those classrooms. As presented in Figures 1, 2 and 3 below, there was not much difference in the total time of iPad use by the teachers between those three types of classrooms. However, there was a huge difference in the total time of iPad used by students between those types of classrooms. The more iPads in the classroom, the more time students spent with them.

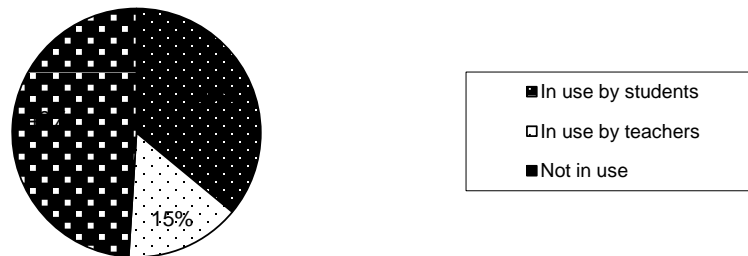


Figure 1. Average total time of iPad in use in one iPad-for-each- student classrooms

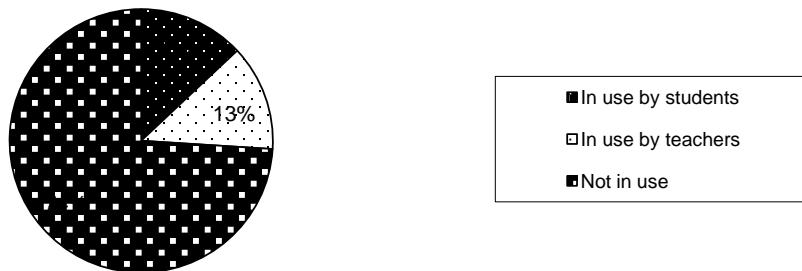


Figure 2. Average total time of iPad in use in one iPad-for-all- student classrooms

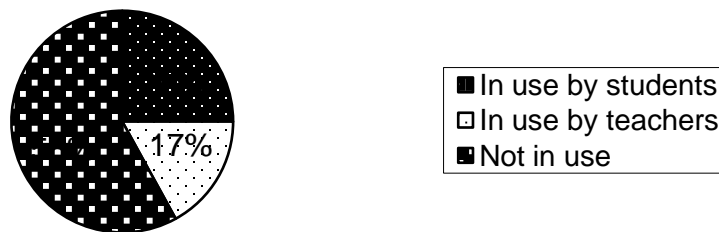


Figure 3. Average total time of iPad in use in one- iPad-for-each group classrooms

Responses to the sub-questions in the interviews also revealed many interesting findings related to the research question of "*In What Ways do Teachers Use iPads in the Classroom?*"

In the first sub-question "*How often did/do you use your iPad in your teaching?*" responses were categorized into two separate categories: "*Sometimes used*" and "*Often used*". In the "*Sometimes used*" category, the frequency of iPad use by the teachers in the classroom ranged from one or two times a month to several times during a whole semester. This category was dominant in the teachers at public schools in which 11 out of 15 teachers said that they sometimes used the iPad in the classroom. Two teachers even confessed that they did not have any plan to use the iPad in the classroom during the semester, but because we asked for voluntary research participation, they attempted doing so. The category "*often used*" was common in teachers at a private school. In this category, the frequency of iPad use by the teachers in the classroom was one or two times weekly during a whole semester. Before

conducting the classroom observations and interviews with these private school teachers, we had an informal meeting with the school principal to ask for school entrance permission. The principal introduced us to all teachers in the school and gave us an iPad check-out schedule for the whole semester. This schedule helped validate the teachers' responses about the frequency of iPad use in the classroom by the private school teachers.

Since there were two extreme practices of iPad use among the teachers, especially between teachers in public schools and teachers in a private school, we added one more question into the interview to understand why some of them used the iPad frequently (almost every week) while others sometimes used them (one or two times/semester). It was noteworthy that in the principals' opinions all of the teachers in this study were technology-oriented teachers in their school. According to the teachers who sometimes used the iPad in their teaching, there were many obstacles to iPad usage in the classroom. Campbell said that she did not have an iPad at home so she did not know what app could be used for specific lessons. Kim offered another reason why she did not use the iPad so often,

"My kids have to do Brainchild [an online learning program for students from grade one to eight] almost every week and taking all of them down to the computer lab to take Brainchild is a lot easier than doing it on the iPad"

At the other end of the continuum, when asked why he used the iPad in the classroom every week, Eric said it was fun to try new technology even though his classroom already had such technology as an Elmo, a TV and a desktop computer. In addition, before the school year started the principal introduced the iPad to the teachers and asked the librarian to keep a record of iPad use among them. Similarly, Alice stated that her school expected the teachers to use new technology in the classroom, so every teacher integrated the iPad into their teaching in this way or that way every week. In line with Alice's opinion, Anna explained,

"Using technology in the classroom is our school's expectation. You know, we are a small school and [...] You know, he [the principal] is kind of technology oriented."

The second sub-question of *"Can you describe educational activities by which you utilized the iPad the most?"* provided further information of how teachers used the iPad in the classroom. Three dominant activities mentioned the most from teachers' responses were *"lesson introduction"*, *"lesson demonstration"* and *"lesson-related information searching."* Vivien mainly used the iPad at the beginning of the lesson to get students involved by playing an app related to the lesson. Sometimes, the app was not really relevant to the lesson, but it could work as a warm-up. Reed mentioned that the iPad had several interesting apps useful for demonstrations. For instance, he used the *"Rat Dissection"* app to help students get a feel for dissecting a rat in a virtual lab. Having students use the iPad to search for information about the lesson and write about it was also a good way to integrate the iPad into teaching, according to Kim. This finding was actually in line with what we found in the classroom observations. As presented in Table 4 *"Learning Activities,"* the most common learning activity in the classroom was *"researching."*

In summary, data from classroom observations and responses to sub-questions provided an overall picture of the ways iPads were used in the classroom. There were three practices of iPad use in the classroom. The first practice was that the teachers

delivered each iPad to each learner. The second practice was similar to the first practice but the teacher checked out only five or six iPads and distributed each iPad to each group in the classroom. The third practice was that only the teacher used the iPad to deliver the lesson in the classroom. In all cases, the teachers combined the iPad with other technology devices to show the content to the students on the project screen.

Another aspect of how teachers used the iPads was that the most common roles the teachers took were lecturing and facilitating when they integrated the iPad into their teaching while the most common activity or in-class assignment was "research." The most common level of activities or in-class assignments was "knowledge representation;" the equivalent of the "comprehension" level on Bloom's Taxonomy. In terms of time of iPad use, there was not much difference in the total time of iPad use by the teachers in those three types of classrooms. Finally, there were two trends or categories regarding the frequency of iPad use in the classroom. In the "Sometimes used" category, the frequency of iPad use by the teachers in the classroom ranged from one or two times a month to several times during a whole semester. This category was dominant with public school teachers. The category "often used" was common practice in teachers at a private school.

Research Question 2. What are the Attitudes of the Teachers toward Utilizing iPads in their Teaching after a Year or a Semester?

To find the answer to this research question, we included two sub-questions in the interview. The first sub-question was "On the scale from 1 to 5 (1 is the least useful and 5 is the most useful), how would you rate the usefulness of the iPad in your teaching? Also explain your choice" The mean for this question was 2.75, which indicated that according to the teachers in this study, the use of the iPad in the classroom was somewhat useful. Vivien explained,

"It is a great help. Its mobility and camera make it useful in recording club activities, outdoor classroom documentation and quick look-ups. Other than my projector and digital microscope, it is my most used aid."

At the other end of the continuum, on the scale of 1, Eric clarified, "I am comfortable with the equipment in my classroom right now. I can do search, PPT presentation, video with the Elmo, so the iPad is not really helpful. It has many useful apps to integrate into the lesson, but other than that, it is not a revolution."

The researchers noted that those teachers who selected the scale of 1 or 2 were those who had only one iPad in the classroom while those teachers who selected the scale of 4 or 5 were those who delivered each iPad to each learner or each iPads to each group in the classroom.

The second sub-question asked the teachers if a colleague from another school asked them about using the iPad in teaching whether they would recommend it to him or her. Twenty-one out of twenty- one participating teachers in this study confirmed that they would recommend their colleague trying the iPad. Laura commented,

"It's worth trying, especially for those who teach science. There are a lot of excellent apps to integrate into the teaching. [...] Yes, it took time to prepare but the kids would love to play with the apps to learn and explore."

Explaining why she strongly recommended her colleague to use the iPad in the classroom, Mirriam said that sooner or later big-sized technologies in the classroom such as TV and desktop computers would be replaced by small-sized devices like the iPad with more powerful features. Teachers could use the iPad to play video clips, search information on the Internet and more importantly, they helped to illustrate concepts and allowed students to interact utilizing apps.

In summary, responses to two sub-questions provided an overall answer to the research question of teachers' attitudes towards using the iPad in the classroom. First, according to them, the use of the iPad in the classroom was somewhat useful (2.75 out of 5.00). Finally, although as shown in the first sub-question, not all teachers agreed that the use of the iPad was useful in their classroom, they all indicated that they would recommend their colleagues using it in their classroom. We did not expect the fact that many teachers found the use of the iPads in their classroom not useful. Therefore, in the interviews we did not ask them to explain why they would recommend their colleagues using the iPad even though they did not find it useful. There is one possible explanation for this contradiction. Those teachers who rated the use of the iPad in their classroom least useful were those who had only one iPad in the classroom. Probably they realized that the use of only one iPad in the classroom was not useful. If more iPads had been offered to their class, they would have found the use of the iPad more useful. Probably because of this thought and their acknowledgement of the potential of the iPad integration in the classroom, they would still recommend the iPads to their colleagues.

Discussions

There were three practices of iPad use in the classroom: each iPad to each learner, each iPad to each group in the classroom, and only the teacher using the iPad. In all cases, the teachers combined the iPad with other technological devices to show the content to the students on the projector screen. These practices of iPad use in the classroom really reflected the creativity and flexibility of the teachers in their effort to integrate new technology into their teaching. We did not ask the participants about which approach to the use of the iPad was the most effective. However, data from the average total time of iPad use in classroom showed that there was a huge difference in the total time of iPad use by the students between those types of classrooms. The more iPads students had in the classroom, the more time they spent with the iPads.

Data from classroom observations also indicated that current teaching practice was largely a teacher-centered approach in which learners' roles were mainly information receivers, and the teacher's role was an information deliver. This practice was different from what researchers and educators talked about as the complementary relationship between technology use in the classroom and constructivism. For example, Nanjappa and Grant (2003) asserted that there was a complementary relationship

between computer technologies and constructivism and that the implementation of each one benefited the other. Likewise, Matzen and Edmunds (2007) found in their study that teachers who integrated technology into their teaching were viewed more as constructivists. We did not know how much of a teacher-centered approach those participating teachers embraced before they integrated the iPad into their teaching. One possible hypothesis for this was that the teachers already may have changed a lot from very teacher-centered approach to less teacher-centered approach. Palak and Walls (2009) introduced another possible explanation. In their study, they reported that teachers in technology-rich schools continued to use technology in ways that supported their already existing teacher-centered instructional practices. In other words, they did not change their teaching approach with the technology integration into the classroom.

Data from the interviews also provided interesting findings on how the teachers used the iPad in classrooms. While the teachers at public schools used the iPad from one or two times a month to several times during a whole semester, teachers at a private school used the iPad on a weekly basis. It was noteworthy that all of those participating teachers were considered technology savvy in their school. According to the teachers who sometimes used the iPad in the classroom, there were hurdles to their effort of using iPad in classroom. By contrast, according to the teachers who often used the iPad in classroom, the expectation of the school leader was one of their driving forces. The reasons why teachers did or did not use the iPad in the classroom so often in this study were virtually in line with factors that affect effective use of technology in classrooms identified by Hew and Brush (2007). Those factors included: lack of technology (many teachers in this study did not have the iPad in their school, so they did not want to use it); lack of access to technology (many teachers could not get access to the Apple store to download and install apps for their teaching); lack of technical support (teachers had to manage to handle the iPad themselves without any technical support from school); leadership (teachers at a private school used the iPad more often than their peers because they knew their school administrators' expectation).

In contrast to their colleagues in public schools, teachers in a private school in this study used the iPad in their classroom on a weekly basis. Those teachers' responses indicated that one of the reasons they used the iPad so often in their classroom was the expectation of their school leader. This finding again confirmed many researchers and educators' emphasis on the role of school leaders in the teachers' technology integration into classroom (Fullan, 1996; Hallinger & Heck, 1996; Hoffman, 1996; Maurer & Davidson, 1998; Picciano, 1998; Hall & Hord, 2001; Otto & Albion, 2002; Schiller, 2003). For example, Otto and Albion (2002) pointed out that beliefs of school principals could influence the uptake of technology integration into their schools. In the same vein, Schiller (2003) concluded in his study that when educational technologies were integrated into the classroom as learning tools, and when teachers were required to incorporate technology into their teaching practices, principals who demonstrated their leadership and change facilitation were more likely to be successful in efforts to have teachers integrate technology into their teaching practices.

According to the teachers in this study, the use of the iPad in the classroom was somewhat useful. On a scale from 1 to 5 in which 1 is the least useful and 5 is the most useful, the mean is 2.75. This finding was rather different from what news and mass

media described as the fever of iPad integration into the classroom in American public schools. While the mass media cited teachers and educational administrators' excitement and enthusiasm about the usefulness of the iPad in the classroom, teachers in this study were not as highly enthusiastic. Although this finding was different from what the mass media reported, it echoed the findings of previous studies about teachers' attitudes toward technology integration in classroom (Wozney, Venkatesh, & Abrami, 2006; Banas, 2010; Dupagne & Krendl, 1992). It also is noteworthy that there also were two extreme poles among participating teachers in the study. While teachers who delivered each iPad to each student rated the usefulness of the iPad very high (4-5), teachers who used only one iPad in the classroom rated the usefulness of the iPad very low (1-2). This fact indicated that the perceptions of teachers on the usefulness of the iPad were likely to be based on how teachers used the iPad in their teaching practices. If this explanation is correct, then it will also explain the reason why research reports had different perceptions and attitudes of teachers toward the usefulness of technology in the classroom. It was interesting to realize that although not all teachers agreed that the iPad was really useful in their classroom, they all indicated that they would recommend their colleagues using it in their classroom. We could not find any studies from the literature to explain why there was such a conflict between what teachers perceived and what they recommended to their colleagues. Finally, the use of the iPad in classrooms is still relatively new to almost every country, especially in developing countries. This article will give useful insights into how the iPad were used so that educational administrators, educators, researchers and teachers around the world can have a clearer sense of how iPads are being used that may help them to consider more appropriate approaches for using the devices in their own setting.

References

- Baker, E. L., & O'Neil, H. F. (2003). Technological fluency: needed skills for the future. In O'Neil, H.F., & Perez, R. S (Eds.), *Technology applications in education: A learning view* (pp. 245-265). Mahwah, N.J: L. Erlbaum Publishers.
- Banas, J. R. (2010). Teachers' attitudes toward technology: Considerations for designing preservice and practicing teacher instruction. *Community & Junior College Libraries*, 16(2), 114-127. doi:10.1080/02763911003707552
- Ben, W. (2011, March 13). iPad could hinder teaching: Professors say. *The Chronicle of Higher Education*. Retrieved from <http://chronicle.com/article/iPads-for-College-Classrooms-/126681/>
- Bill & Melinda Gates Foundation. (2012). *Technology and Effective Teaching*. Washington, DC. Retrieved from https://edsurge.s3.amazonaws.com/public/BMGF_Innovation_In_Education.pdf
- Bolick, C. M. (2008). Technology integration: The Trojan horse for school reform. In Lee, J., & Friedman, A (Eds.), *Technology and social studies research*. (pp.173-188). Greenwich CT: Information Age Publishing.
- Center for American Progress (2013). Retrieved from <http://www.americanprogress.org/>

- Creswell, J. W. (2003). *Research design: Qualitative, quantitative, and mixed methods approaches* (2nd ed). Thousand Oaks, CA: Sage Publications.
- Dupagne, M., & Krendl, K. A. (1992) Teachers' attitudes toward computers: A review of the literature, *Journal of Research on Computing in Education*, 24, 420-429.
- Fletcher, J. D. (2003). Evidence for learning from technology-assisted instruction. In O'Neil, H.F., & Perez, R.S (Eds.), *Technology applications in education: A learning view* (pp. 245-265). Mahwah, N.J: L. Erlbaum Publishers.
- Fullan, M. (1996). Leadership for change. In K. Leadwood, J. Chapman, D. Carson, P. Hallinger, & A. Hart (Eds.), *International handbook of educational leadership and administration: Part 2* (pp. 701-721). Corvallis: Lower Academic Publishers.
- Hall, G. E., & Hord, S. M. (2001). *Implementing change: Patterns, principles, and potholes*. Boston: Allyn & Bacon.
- Hallinger, P., & Heck, R. (1996). Reassessing the principal's role in school effectiveness: A review of empirical research, 1980-1995. *Educational Administration Quarterly*, 31(1), 5-44.
- Hardin, J., & Ziebarth, J. (2000). Digital technology and its impact on education. Retrieved from <http://www2.ed.gov/Technology/Futures/hardin.html>
- Harris, J. (2005). Our agenda for technology integration: It's time to choose. *Contemporary Issues in Technology and Teacher Education*, 5(2), 116 -122.
- Hew, K. F., & Brush, T. (2007). Integrating technology into K–12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational Technology Research and Development*, 55, 223–252.
- Hoffman, B. (1996). What drives successful technology planning? *Journal of Information Technology for Teacher Education*, 5, 1-2.
- Horrigan, J. (2009). Internet access on the handheld. *Pew Internet & American Life Project*, Retrieved from <http://www.pewinternet.org/Reports/2009/12-Wireless-Internet-Use/4-Internet-access-on-the-handheld/2-Trends.aspx>.
- Hu, W. (2011, Jan 4). Math That Moves: Schools Embrace the iPad. *The New York Times*. Retrieved from: <http://www.nytimes.com/2011/01/05/education/05tablets.html?pagewanted=all>
- Johnson, R. B., & Onwuegbuzie, A. J. (2004). Mixed methods research: A research paradigm whose time has come. *Educational Researcher*, 33(7), 14-26.
- Matzen, J. N., & Edmunds, J. A. (2007). Technology as a catalyst for change: The role of professional development. *Journal of Research on Technology in Education*, 39(4), 417– 430.
- Maurer, M., & Davidson, G. (1998). *Leadership in instructional technology*. Columbus, OH: Prentice-Hall, Inc.
- McKenzie, J. (1999a). Scoring high with new information technologies. *From Now On: The Educational Journal*, 8(7), 9-17.
- Nanjappa, A. & Grant, M. M. (2004). Constructing constructivism: The role of Technology. *Electronic Journal for the integration of Technology in Education*. Retrieved from <http://ejite.isu.edu/Volume2No1/nanjappa.htm>.
- New Zealand Commerce and Economics Teachers Association (2014). Retrieved from http://www.nzceta.co.nz/Pages/digital_tech_landscape.htm

- Ochola, J. E., Stachowiak, R.J., Achrazoglou, J., & Bills, B. D. (2013). Learning environments and rapidly evolving handheld technologies. *First Monday*, 8(4). Retrieved from <http://firstmonday.org/ojs/index.php/fm/article/view/3932/3643> doi:10.5210/fm.v18i4.3932
- Otto, T. L. & Albion, P. R. (2002). Understanding the role of school leaders in realizing the potential of ICTs in education. In Paper presented at the international conference of the association for the advancement of computing in education, Nashville.
- Palak, D., & Walls, R. T. (2009). Teachers' beliefs and technology practices: A mixed-methods Approach. *Journal of Research on Technology in Education*, 41, 417-441.
- Picciano, A. (1998). *Educational leadership and planning for technology*. Upper Saddle River, NJ: Prentice-Hall, Inc.
- Schiller, J. (2003). The elementary school principal as a change facilitator in ICT integration. *The Technology Source*, Retrieved <http://ts.mivu.org/default.asp?show=article&id=1034>
- Taborn, T. W (2011). Tower School's 1:1 program brings the iPad 2 to the elementary classroom. *THE Journal*. Retrieved from <http://thejournal.com>
- Walters, E. A., & Baum, M. (2011). Point/counterpoint: Will the iPad revolutionize education? *Learning & Leading with Technology*, 38(7), 6-7. Retrieved from http://www.learningandleading-digital.com/learning_leading/201105#pg1
- Wozney, L., Venkatesh, V. & Abrami, P. (2006). Implementing computer technologies: Teachers' perceptions and practices. *Journal of Technology and Teacher Education*, 14(1), 173-207. Chesapeake, VA: AACE.