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# Student Perceptions of a One-to-one iPad Program in an Urban High School

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**Abstract**

The iPad, which came out in 2010, was introduced in one-to-one initiatives in schools to replace the laptop, or simply as a new technology. Schools that incorporated tablets reported an increase in student-led learning, increased collaboration, and increased communication. Following a one-to-one iPad implementation at an urban high school for one year, juniors and seniors (n=76) participated in focus groups about their use of iPads for learning and their perceptions of the one-to-one iPad implementation. Students reported changes in communication, collaboration, learning strategies, as well as accountability and independence when learning with iPads. They also described several challenges of learning in an Internet-accessible one-to-one environment. The results highlight the importance of student support for tablet adoption when implementing one-to-one initiatives.

## Introduction

Internationally, tablets are being used in schools in countries such as South Korea, India, Kazakhstan, Turkey, France, Japan, Singapore, and Australia (Clarke & Svanaes, 2012). In the United States, schools, districts, and entire states have implemented initiatives to provide laptops or tablets to every student, known as a one-to-one initiative. Tablets are handheld computers, similar to a laptop with touchscreen capability (Enriquez, 2010). The iPad, which came out in 2010, was introduced in one-to-one initiatives in schools to replace the laptop, or simply as a new technology. Schools that incorporated tablets reported an increase in student-led learning, increased collaboration, and increased communication (Clarke & Syanaes, 2012). Given the recency of such programs, there is emerging evidence about their effectiveness and how tablets such as iPads improve learning outcomes and learning processes (Blikstad-Balas & Davies, 2017). The changes that accompany one-to-one tablet initiatives, the pedagogies, and new learning environments need to be researched to understand how best such technologies can contribute to student learning.

Despite the number of initiatives that have been implemented in recent years, the research about the use of tablets in one-to-one initiatives is limited and even more scarce in urban school settings. Urban schools are located in or close to a major city that is more likely to have higher concentrations of students from low-income families (Lippman, Burns, & McArthur 1996). Urban schools face different challenges than middle-class and affluent schools (Cuban, 2004), including differences in the safety of the environment, the amount of resources available, and access to support, both at home and at school.

This study took place in an urban high school in New England that implemented a one-to-one iPad initiative in 2013. Following feedback from a pilot initiative in the 9$^{th}$ grade in 2012-2013, a one-to-one iPad initiative was introduced school-wide during the 2013-2014 school year. In 2014, qualitative data was collected from teachers, administrators, and students using interviews and focus groups about their perceptions of the one-to-one iPad implementation, of which the data collected from students is presented in this paper. The research questions addressed in this paper are:

- How are iPads being used for learning in an urban instructional setting?
- What are students' perceptions of the iPad implementation?

As tablets and one-to-one initiatives become more prevalent in K-12 education, administrators, teachers, and parents need to better understand how tablet integration may improve students' learning experience. Notwithstanding the value of studying how teachers teach with tablets in a one-to-one initiative, and the learning outcomes that result from the implementation, it is equally important to investigate how students learn

with tablets and how they perceive these technologies as changing and possibly enhancing their learning experience. Although each technology has its affordances, iPads are representative of tablets that allow for connected, mobile, and flexible learning in classrooms. This research on high school students' perceptions of a one-to-one iPad implementation, and the ways in which they learned with iPads during a school year can inform future research and guide educators seeking to implement one-to-one initiatives.

## Review of Relevant Literature

This study examined the implementation of a one-to-one iPad initiative in a high school, where every teacher and student received a device. Relevant literature about one-to-one tablet initiatives and learning with tablets in K-12 classrooms is presented in this section.

### One-to-One Tablet Initiatives

Norris and Soloway stated that "For a technology to be truly useful, each child must have his or her own" (2008, p. 2). One-to-one classrooms are the first step in creating what Norris and Soloway (2008) call the handheld-centric classroom, where each student has his or her own handheld computer, but there are also other devices available to them in the classroom, such as networked PCs, probeware, and digital cameras. Norris and Soloway claimed one-to-one classroom merits included artifact creation and revision, collaboration, learning in-context, managing and coordinating the use of multiple resources, ongoing assessment, teacher feedback, and communication with the home, community, and administration.

A one-to-one tablet initiative can take on different forms. Richardson et al. (2013) described programs that allow students to take the device home, in essence "owning" the device for the school year. In other one-to-one programs students have access to the device or set of devices daily in the classroom. A third variant is known as 'bring your own device' (BYOD), when students provide the technology to be used in school. Although schools may supplement lower-income families in this case, some educators do not consider this scenario to be a true one-to-one program (Richardson et al., 2013), although device ownership can impact learning (Lee, 2015). While valuable, research on BYOD initiatives is not included in this section because all students, administrators, and teachers were provided with iPads in this study, removing several challenges faced by teachers and learners in BYOD environments.

The implementation of one-to-one initiatives differs across districts, within districts, and even within a school (Jones & Strudler, 2012). Burden, Hopkins, Male, Martin, and Tralia (2012) described three access models. First were schools that deployed class sets for use during the school day. Another model was when schools lent devices to the students for the school day that were not tied to a specific class. A third tactic was for schools to give devices to students for use at school and home for the duration of the pilot program. Beyond access, there are other considerations within a technology implementation program, such as having an Acceptable Use Policy (AUP), upgrading the network infrastructure, piloting the program, and incorporating professional development (Gaines & Martin, 2014; Gerger, 2014).

Successful implementation involves students utilizing their time, funds being allocated wisely, and students having access to the devices, apps, and Wi-Fi (An & Alon, 2013). Additionally, the researchers recommended that schools account for security of the devices and protocols such as registration and sign-out. Schmidt and Ho (2013) identified some common challenges when it came to implementing iPads in a school that are related to time: installation, configuration, deployment of apps, making backups, and overall care and maintenance of the devices. Hixon and Buckenmeyer (2009) wrote that other reasons for poor implementation included teachers' lack of time, training, equipment, and support.

Successful implementation in schools requires "careful and long-term planning before, during, and after the implementation process" (Montrieux, Vanderlinde, Courtois, Schellens, & De Marez, 2014, p. 482). Requirements include infrastructure, stakeholder preparation and engagement, and oversight and evaluation (Burden, Hopkins, Male, Martin, & Tralia, 2012; Gerger, 2014; Heinrich, 2012). To create unified goals, Johnson (2013) discovered that a team approach, such as student engagement and parental input, was instrumental in the development and implementation of the one-to-one iPad program.

**Learning with Tablets in K-12 Classrooms**

The role of the teacher is central to any classroom initiative, and several researchers have studied how teachers use tablets or iPads in classrooms (Jahnke & Kumar, 2014). While acknowledging the curcial role of pedagogy and teachers' decisions in using iPads in classrooms, this review does not focus on teaching strategies because the focus of this paper is student use of iPads, their perceptions of iPad implementations, and perceived learning with iPads. Several benefits and challenges have been reported with respect to iPad implementation in prior research.

Johnson (2013) found that the iPad improved organization, including multi-tasking, planning, and note-taking, and that iPad use was accompanied by higher grades, enhanced learning, and the acquisition of more technology skills. Parents, teachers, and students have reported that the iPad program improved student learning (Edgar, 2013; Johnson, 2013). Students in the research used iPads to research up-to-date information, and perceived iPads as leading to more creative and hands-on project-based learning (Chou, Block, & Jesness, 2012; Johnson, 2013). Further, students are motivated to produce artifacts, to work collaboratively, and to be more engaged, rather than passively consume knowledge (Chou, et al., 2012; Falloon & Khoo, 2014). Researchers have also described the various iPad tools that work well for communication, research, productivity, feedback, and collaboration in the classroom, and bemoaned the lack of apps available for specific content areas (Chou, et al., 2012; Churchill, Fox, & King, 2012; Goodwin, 2012). Increased motivation, engagement, creativity, critical thinking, and independence have also been reported by researchers (Bebell & O'Dwyer, 2010; Chou, et al., 2012; Clarke & Svanaes, 2012; Gerger, 2014; Lee, 2015; Smith & Santori, 2015; Valstad, 2011).

Teachers' ability to easily differentiate instruction on iPads allows for personalized learning (Goodwin, 2012; Lee, 2015). There are multiple ways for students to access the curriculum and they can access information on their own and at a faster pace (Chou, et al., 2012). Tablets support different types of conversations, and a range of enhanced assessments, allowing students to demonstrate their understanding through different multimodal forms (Frey et al., 2015; Goodwin, 2012; Valstad, 2011). The iPad is also a catalyst for more creative endeavors through the use of its video, photo and voice recording abilities (Goodwin, 2012), providing new opportunities for students to demonstrate their learning in conjunction with a range of multimedia. Despite the several reported benefits for learning with iPads, common challenges in the literature include students getting distracted due to internet availability and apps, and not being accountable for their learning (Chou et al., 2012; Frey et al., 2015; Lee, 2015).

## Methodology

This research was conducted following one year of iPad one-to-one implementation in an urban high school. The site for the study was an urban high school that is racially diverse and has a large low-income population. During the 2013–2014 school year, the population was 1,559 with 39.2% of the population identified as white, 47.1% Hispanic, 6% Asian, 4.4% African American, 3% multi-race non-Hispanic. The majority of the students (75.1%) were considered low income. Following positive survey feedback from a pilot initiative in the 9$^{th}$ grade during the 2012–2013 school year, all students were provided with iPads at the beginning of the 2013–2014 year.

Following one year of implementation, interviews and focus groups were conducted with administrators, teachers, and students to understand their perspectives about teaching and learning during the one-to-one initiative. A qualitative approach was used in order "to enter into the other person's perspective," "find out what is in and on someone else's mind," and "to gather their stories" (Patton, 2002, p. 341). All full-time faculty at the high school, including teachers, substitutes, and administrators, were invited to participate in this study.

All junior and senior students whose advisory teachers chose to be involved were eligible to participate. Upperclassmen were chosen as they had experienced high school with the iPad and without it and could therefore speak about both experiences. Freshmen and sophomore students were excluded from the focus groups as they were not in the high school before the use of iPads and therefore could not speak from experience about the time before the implementation. This paper presents only the data from student focus groups conducted during the larger study.

**Student Focus Groups**

Advisory time is a period of the day in which students meet in groups with their advisory teacher and discuss topics on a variety of subjects including, college applications, financial literacy, students' grades, current events, and happenings in the students' lives. Advisory teachers were asked to invite their advisory students to participate in the study. From up to 15 students, about four students in each of the 19 advisory groups, a total of 76 participated in this study voluntarily. The Institutional Review Board approved a Waiver of Documentation of Consent that allowed for the verbal consent from all subjects, including children. Students who did not wish to participate in the study were invited to listen to the discussion.

An interview guide (Patton, 2002) was designed to answer the research questionsfocused on the implementation of the iPad at the high school for students and to maintain consistency during the focus groups. The semi-structured interview guide was compiled based on prior research, reviewed by three scholars, and tested with a pilot group of students, following which changes were made based upon feedback. During the focus groups, the researcher occasionally delved further into an issue or asked clarifying questions as needed. The final interview guide included the following questions: How do your teachers use the iPad in class? How do you use your iPad in class? Does this differ from how you used to do classwork? How do you use your iPad for homework? Does this differ from how you used to do homework? Thinking back to before the iPad program, what, if anything, has changed in the school culture since the introduction of iPads? Do you feel that your behavior in the classroom has changed as a result of the iPad program? Do you have any concerns with iPad use in the classroom? If you were given the authority over the iPad program, what would you do to improve it?

The focus group conversations were recorded with a digital audio recorder, transcribed, and analyzed. The data were first stripped of identifiers. Each focus group transcript was first open coded, following which minor categories emerged. The data was then analyzed across focus groups to refine the minor categories, leading to major categories and then common themes being formed. Bigger ideas and recurring themes were then classified and consolidating, creating overarching themes that were revisited and reclassified. At every stage, the coding was discussed with and reviewed by a second researcher.

Data in this study was triangulated by studying different subsets of participants — administrators, teachers, and students — in an attempt to gain a greater insight to iPad-use in the classroom. Thick description enhanced transferability by providing a detailed account of the setting (Cohen & Crabtree, 2006). A review of codes by two professors not involved in data collection contributed to dependability (Cohen & Crabtree, 2006). An audit trail was maintained to ensure confirmability of the data.

**Limitations**

This study was conducted at one urban high school with a diverse population that included low income students. Further, only seniors and juniors who were in advisory periods and were willing to participate contributed to the focus groups. Therefore, the data is not representative of all students in the school, especially freshmen, who might have had a different learning experience because they began school with the iPads. A final constraint of this study is the potential of researcher bias due to the association of the lead researcher with the district where the research occurred. In order to not influence the study by picking certain teachers with whom the lead researcher had relationships, all administrators and full-time teachers in the high school were invited to participate. Additionally, a second researcher reviewed the data analysis, the coding process, and provided input.

## Results

Preceding the one-to-one iPad implementation, all the teachers at the urban high school attended a two-day professional development training. Additionally, all the teachers involved in the pilot iPad effort in 9$^{th}$ grade were provided a school-wide professional development where they shared their experiences, taught specific apps, shared best practices, and answered questions. The administration firmly believed that support for teachers during times of change and professional development to help them teach with iPads was essential. Teachers used a Learning Management System, Schoology, to move their course content online - they would post items like documents, PowerPoint presentations, links, and quizzes. During the implementation, the teachers communicated with students using the iPads, changed how they provided access to the curriculum with the iPads, set up Schoology websites used for content delivery, and also kept track of how and whether students accessed the curriculum. Teachers reported using the iPads to offer differentiated instruction to meet individual

needs, attempting to flip their classrooms and lecture less, reflecting on their pedagogy and trying to facilitate students' learning goals. Some teachers attempted a blended approach, different pedagogies, and student-centered approaches.

The analysis of student focus group data resulted in six large themes about students' perceptions of the one-to-one iPad implementation in an urban instructional setting, namely, Communication and collaboration, Learning with iPads, Accountability and independence, Challenges with iPads, Students' personal use of iPads, and Teachers' use of iPads.

**Communication and Collaboration**

Communication was a common theme as several students reported constant contact and communication using their iPads. Students used a plethora of apps to communicate such as email, iMessage, and social media. The school provided a Google email address to every student that was also used for the student's Schoology account, resulting in students and teachers being more accessible to each other. One student said, "I remember last year, you could only talk to the people in your classroom. It would be like, 'shh, shh, we're doing work.' Now you actually can talk to the entire class…school," while another stated, "We email the teacher a lot more. You're in contact more. It's more connected." Students did not only communicate for academic purposes, which led them to claim they "know about everything." As students reported things to each other, other students would tell them, "Yeah, I already know." An upperclassman asserted that having a topic to rally around brought students together: "Things would happen around the school, like pride, or anything like that we would go on the social network and we would Tweet about it. And everyone would start talking to each other." Students shared videos, images, and interests both in and outside the classroom. They discussed what they saw or did on the iPad and found they had more "conversation starters." The iPads offered the ability for students to continue to communicate afterschool as well. An upperclassman spoke of a difference in the way that students made friends at school as a result of iPads. Previously, one would have to "find something in common [in person] rather than picking something out of social networks."

Despite the largely positive view of iPad facilitated communications, some students described their concerns with the content of some online conversations as hostile and facilitating bullying. A student summed up the experience as "I feel like everybody is in everybody's business. There is no escaping," while another student felt it affected his learning. "You're coming here to learn, if you don't want to learn, let the other kids learn. And kids are just over here starting drama over social media. We can't even go out of the classroom without hearing about it." One upperclassman even described the iPad as a weapon. "I really have a weapon in my hand, I feel like. It really is. Think about it." Some students mentioned that they thought the administration monitored their conversations online, while others drew attention to the fact that sometimes with the volume of communication on the iPad, some notifications can be overlooked.

As a result of all of the online communication, students described the school as being quieter, but that limits were needed for online communication. An upperclassman noted changes in the ways students communicated, by explaining that in the past, students talked to each other, whereas now "let's say I had to tell somebody something, I would iMessage them or I'd Tweet them." Students described their classes as being silent with less face-to-face interactions, where, "It's harder to have a class discussion because everyone is so immersed in their technology on their own." while another said the freshmen were on Twitter constantly, "and then their iPads got taken away and it was just like now they were forced to socialize and they were just there staring at each other. They don't know what to do."

Some students described the immersion in the technology as pervasive, with a few students finding this difficult to manage, for example, an upperclassman said, "Group chats are the worst. I'll wake up to 300 messages." Other students described how the problem continued into the hallways. "People don't even know how to walk in the hallway. They carry this giant thing in front of them." Yet another upperclassman said, "Everyone is looking down. You bump into like three people." Students explained that some students watched Netflix with their headphones in as they walked down the halls.

Several forms of collaboration resulted from the integration of iPads in the school, and these changes were perceived to increase online discussions, lead to long conversations, and students seeking help from each other online. For example, iPads allowed students to work together without being in the same room. A student said, "Like for example, the math classes sometimes… instead of going to people's houses sometime and working on them when you are stuck, you can go on an app and FaceTime instead." At the same time, conversations did not

always stay on topic, and some students believed that prior to the iPad initiative, students actively sought out others to collaborate and now they just turned to their iPad. One student stated, “They have Google, so why do they need someone to ask if they have everything in front of them?” Some students thus suggested there needed to be limits to iPad communication between teachers and students.

## Learning with iPads

iPads were students’ main means of accessing the curriculum, communicating with each other, and completing assignments. The biggest change that students reported is that they felt they now had a portable learning environment, which made it much easier to share resources or to finish work more efficiently. Students found they could use the iPad during the “in between moments” to complete work. One student said, “I think it's easier to do work at lunch with the iPad. If you have something to finish up on the iPad, it's really easy to just sit down and do it real quick.” Another student shared, “It's way easier. You don't have to wait until you get home, you can do it whenever. You can type it on your Notes and then email it to yourself.” Additionally, the learning management system, Schoology, by default, sets homework to be due by midnight. Students sometimes struggled with completing work because, prior to the iPads, they could work all night on homework. However, one student explained that the midnight deadline helped him to get the work done. He said, “We have to submit by 12 midnight. So, I think it's a good idea for schools. The deadline helps me get it done on time.” Students reported that iPads had changed the way that they were learning, provided opportunities for multimodal learning and differentiated instruction and given them more responsibility for their own learning.

### *Learning through Research*

The iPads provided Internet access that was not previously available always and that was often used by the students to do research and quick searches. An upperclassman stated, “The most useful thing is having the Internet right there, so at any time you can just look up information.” Similarly, another upperclassman described the way that she learns as being “a lot more independent now.” She went on to explain: “I have all this information at my fingertips and I can look up things. I don't have to ask the teacher if I don't understand something. I can just go online and help myself understand it. I feel that I am more self-taught now.” According to some students, having the ability to instantly research facilitated more discussion: “Especially when you are doing debates, you have all that information at your fingertips and you can just pull it up very quickly and it enhances your arguments.” An upperclassman admitted that for homework, finding answers online was easier than reading a text:

When we had to go home and look at a textbook, teachers would know what is in the textbook and then they'd give us questions where we'd have to think of an answer ourselves. But now when they give us any question, there is all this information on the Internet and we can take someone else's answer a lot easier…. and then use that instead of developing our own.

### *Multimodal Learning*

Students reported that the iPads allowed learning in different ways, applying, and creating. They were also able to learn content through different modes, and at different difficulty levels because teachers provided materials at different levels that students could access. Videos provided the opportunity for students to watch the lesson again as needed. A student shared how videos can help students get back on track. He reflected that if he was not paying attention in class, he could not do any work associated with the lesson, but if he was not paying attention while using the iPad, he could “just rewind it and get right to the work.” Another student stated that videos can sometimes teach him better than a classroom teacher because of the ability to control the video: “You are not just, ‘I got what the teacher said in the 30 second speech.’ You can pause, rewind, and do whatever you want to do.”

Additionally, students appreciated being able to showcase what they have learned in different ways with the help of an iPad. Teachers had begun to use more multimodal assessments and projects that involved the school-wide rubric tasks of speaking, listening, and using technology. Thus, students had “more ways to express those things...We weren't just limited to the writing process anymore. So, we were creating short films, trailers, documentary-like work, photo essays.” Students enjoyed sharing what they created with their peers.

*Learning by Notetaking*

Storing content on Schoology allowed students access to the curriculum from anywhere, freeing students from having to take notes. iPads also gave access to the content regardless of whether someone was absent or had the physical paper handout or not, which students greatly appreciated. An upperclassman stated, "if someone wants to learn, they have all the material in front of them because of the iPad." Work content was accessible from anywhere, so students described it as "only one click away" and "on demand." A student gave an example of thinking, "'Oh, I didn't learn this yesterday.' 'Oh, it's on the iPad.' So, if there is a video or something you missed, it's on the iPad." The content placed on Schoology remained there for the semester so that students referred to it as needed. Another student explained, "Now you can just go to Schoology and go to your class folder, and look up the PowerPoint, whereas before, if you didn't write it down, you didn't have it."

Students wrote notes, journaled, and annotated with their iPads. Journaling was something that could be done online and easily shared with the teacher in real-time. The way students took notes also changed. Students often used their iPads to take pictures of notes on the board rather than write out the notes by hand. A student shared, "My teacher calls us photographers because when she posts the notes on the board, we just take a picture of the notes." After taking pictures of notes, several students wrote on top of the photographs or took additional notes or just used the photos as is. Students stated that they were annotating a lot more than before, be it the resources, their digital worksheets, or their photos of what the teacher wrote on the board. Some students did this for note taking. Students often completed homework digitally, and annotated their homework as well before they submitted it.

The camera on the iPad was also used to document progress on assignments. In art class, the students were expected to take pictures of the stages of a piece, where students reported using this feature the most, because it was easy to document their work using photos and upload it to Schoology. This allowed students to be more accountable for their learning and freed the teacher from performing this task for every student.

*Learning Outcomes*

Student responses about their learning with iPads were largely centered around the learning process, how they used the iPad for learning and how their own habits changed. When students mentioned learning outcomes of the year of iPad implementation, their responses varied widely. Some students stated the work got easier, they had access to more resources, could learn more efficiently, could learn on their own, and could work on assignments ahead of time and submit them. Some claimed that their grades went up due to these conveniences, while other students talked about how their grades went down with the iPads because they had trouble focusing and were distracted when they were supposed to be working.

**Accountability and Independence**

With the iPads, students were given more control over their learning and were also held more accountable for their work because it was posted online. An upperclassman said, "I can't use the, 'I don't have Internet' excuse anymore.... Some teachers don't really take that anymore because you could stay after school or something. I used to say that." Students also could not claim to not know how to do something anymore. "So, there isn't an excuse to say, 'Oh well, I forgot what you said.' 'Did you rewatch the video?' 'Did you look it up online?'" Further, students were accountable for the work even when they were absent and the deadline for the work was not necessarily extended. This was convenient if students were absent, because of field trips or other reasons, students could check homework and also ask others because they could communicate easily and quickly.

An upperclassman stated that even if teachers had students work on paper, they would submit the work through Schoology. A scanner and an app were available for students to scan and upload all their work digitally. Students also explained how Schoology could verify that work was submitted: "And whenever I submitted something, then my teacher would tell me I didn't submit it and I could go back and check. And the Schoology app would tell me I did submit it. It would be helpful and it would work in my favor." Taking accountability for their learning led to students being more independent in managing their learning. They viewed this as helpful to them in their future educational endeavors, for instance, in college. One student termed this as "building in real world skills for the students to have beyond high school" because they were learning to not only download and use apps, but to also "handle multiple apps and projects all at once" and to communicate digitally. Another

student stated, “So, us being introduced to this technology in high school and helping us be aware of it and be able to use it correctly and well and help us study...I think it could be very helpful in making us future citizens in a technologically advanced society.” The downside of this, according to one student, was that students are expected to use their technology properly and if they are not able to, or do not do the work, they could fail.

### *Organizational Capabilities*

Several students highlighted their use of the iPad as an organizational tool that allowed them to submit work, write documents, store notes, and annotate and showcase their learning. At the same time, some students struggled with the change in organizing their materials and resources for learning effectively. A large theme in this area, expressed by several students, was their need for something physical and tangible. For instance, one student believed “it's just a lot easier when work and books are tangible. Because you can feel like you are actually accomplishing. I'm getting all these papers done. I'm finishing them and I can put that away,” while another student said: “It's way easier for an assignment to slide through on Schoology and not see it because you don't have a hard copy of it. You can't just look through your bag and be like, alright, this is all my work.”

Other students found the folder system of organization on the iPads to be overwhelming and struggled with findings materials and anxiety. This was highlighted in one student’s comment:
I feel like I lose stuff on the iPad.... On the iPad, I put it in one folder and there is a ton of stuff in that folder. I feel like I forget to do work on the iPad. I look at my bag and I don't have any paper in it.... It's not like a physical thing, so I forget a lot.

## Challenges with iPads

This study took place in an urban school with a diverse population, a majority of whom were low-income students. Providing all of the students with an iPad allowed the students to have access to the classroom content. A cable company offered a discounted rate to the students, but some students did not have access to the Internet at home, and the iPads work best with an Internet connection. Students mainly used their iPads at the school and at any local establishment that offered free Wi-Fi, such as the public library. As a result, some students described how they could not do assignments without Wi-Fi at home and not everyone had Wi-Fi. These students wanted some kind of limitation put in place on the amount of Internet required homework, because they had to stay after school or find other ways to complete it. The most mentioned challenge with using iPads for learning was that students found working with them to be distracting due to the availability of apps, online media, and social media. They also found it difficult to adapt their learning strategies to learning with iPads and apps.

### *iPads as Distraction*

Many students stated that the iPad was a distraction, because it provided several excuses not to do their school work, both in the classroom and at home. One student claimed,

> It opens up a lot of windows that the teacher can use for the classroom, but it also brings a lot of distractions; a lot of things that aren't really needed in the classroom.

while another believed the iPad to be a distraction to everybody:

> When you have an iPad in front of you, no matter how mature you are, no matter if you are the teacher, a student, the principal, it doesn't matter, in my opinion, you cannot deny the fact that it is a distraction tool.

Several students explained how they found it to be a great learning tool, but a “double-edged sword,” because it also hindered their learning. One student said,

> I have that third option of ‘Oh this problem is too tough I'm getting bored,’ and then I would just sit back and check my iPad for Twitter and stuff. It just adds another distraction element.

Another student described it as his “most distracted year yet,” confiding:

> Even though the iPad is super-useful, especially the aspects where you get to use the Internet, it left a lot of room for me to be able to do what I want and the teacher not knowing, so I was really distracted in all my classes and at home.

Students found that it was easy to hide what they were doing on the iPad in the class, they would just swipe their screen when teachers walked around the class. They shared that when they were supposed to be working on their iPads, they would sometimes just be playing a game or messaging someone, listening to music and the teacher wouldn't know. For this reason, a student discovered that an "old-fashioned book" was a better way to learn sometimes.

> I feel like you can teach yourself with a book, the book doesn't have Twitter on it. When I'm reading my college book at home, there's not going to be an iPad in my face.

Some students claimed distractions with the iPads were the reason they did not do their homework. When they were not asked by the teacher to stay on task, were not in school and "not violating anything," they could use the iPad as an entertainment device. One student stated,

> I'd be saying at night, 'I'm going to do my homework', but honestly, I go on a website, somewhere I'm not supposed to be on. I forget. An upperclassman explained that the iPad allowed students to procrastinate doing their homework, because he could use the Internet to find answers really quickly, and therefore did not feel the urgency to do the homework right away.

Students also shared that iPad use could be addictive, and that several of them felt a compulsion to check for new notifications on their devices. On student stated that even the most strong-willed of them could get distracted when using the device, and another reflected:

> I know it's a lot about self-control, but technology is like an addiction. You take someone's phone away from them and they go crazy. If they lose it for 2 seconds, they are like, "Oh my God, where is my phone?" And then it becomes like that with the iPads too and social media and texting.

*Adopting New Learning Strategies*

Students' comfort levels with the iPads varied based on how accustomed they were to the iPad and this influenced how they used the iPads for learning. They were accustomed to learning a certain way and found it difficult to change and adopt new strategies. The juniors and seniors, who had learned without the iPad for all of their schooling, roughly eleven to twelve years, appeared less comfortable using them to learn. One upperclassman thought that if they had been given the iPads as freshman, they might have been more accustomed to them and gotten over the novelty of all the off-task possibilities. Students believed that the younger students, especially the sophomores who had the iPad for a year already, were better at using them. One student said,

> This is like our last year. I think if we had it for four years, we could have gotten over the fact that we have a bunch of games that we can play all day long.

Students also said that they were already set in their ways of doing things.

> That's the only way I'll learn: by writing, listening… My sister, she's a 7th grader, and they are going to get used to it quicker than what we did in a year. They'll be with it for four years.

Some students described finding it difficult to try apps, that it took time to get used to them, and sometimes they were unsuccessful. One student explained,

> For some of my classes, I tried doing the apps and NoteAnytime and stuff and I can't process it as well. I feel like I'm reading, but I'm not really getting it because I'm just going from one thing to another. And if I have to write it out, like handwritten, I'm re-reading it and getting the concept.

**Students' Personal Use of iPads**

Students were given the iPad for the academic year. Although the primary purpose was for school work, students began viewing the iPads as personal devices and increasingly used them as entertainment devices.

*iPads as Personal Devices*

Students knew they could keep the devices for a year, and that they had permission to download what they wanted, so they began using the devices for personal reasons, began considering them their own, and got attached to them. One student explained,

> I end up using it for my eBay accounts. I use it for a bunch of stuff other than school-related. I do treat it like it's my own because for the time being, it is," while another shared, "They give you your iPad in August and you put your whole life—your social media accounts and pictures -and it comes due and you have to just give it back.

Some students worried about their personal use of the iPads and whether the school could see what they were doing online. An upperclassman believed that use of the iPad should be personal and not the business of the school, especially when not on school grounds. Students worried that if they Tweeted something when not in school, they could still "get in trouble for it," and that they shouldn't be held liable for what was done out of school.

*iPads for Entertainment*

Students used the iPad for entertainment, and credited it with allaying boredom and making for a more enjoyable entertainment experience, e.g. to watch movies, play games, and use social media. As an entertainment device, students said there was always something to do.

> You can't be bored anymore, I think that's what it is. There is always something to kind of do on your iPad, whether it be a game or on social media.

Students reflected that they mainly used six apps, Twitter, Instagram, Tumblr, Facebook, Vine, Games, YouTube, Pool, although they had access to many more. They also mentioned using Snapchat, Candy Crush, Netflix, Pandora, and iMessage, and using their iPad for playing music and doing online shopping. One student stated that the iPad offers more entertainment than classroom tools:

> For one school-based thing, there are seven social media things within the iPad. So, we can do one school thing, but there is also all our other social medias that distract us completely.

An upperclassman recounted what happened when the school collected the iPads at the end of the year:

> When they just took our iPads away, every senior right now is like, 'What the hell do I do all day?' Because we are so used to having them, being on them, and looking things up.

**Teachers' Use of iPads**

Students attributed their use of iPads for classes to the teacher's choice. They described their teachers' use of the iPads as falling on the extremes. One student explained,

> Some of my teachers, they are either all for it, or totally against it. I had physics last semester and everything was flipped learning…And I have a teacher this term, and he's like iPads away; it's work time.

Students were also not allowed to use iPads in all classes. They described a math class, where people would get in trouble for taking their iPads out in the middle of lessons, and that there were classes where teachers regularly asked them to put away their iPads.

Students also noted that some teachers who used the iPads a lot initially stopped using them as much as the year went on. For example, initially teachers would conduct quizzes on the iPad but later began using paper quizzes, or stopped using the iPad altogether. Some students believed that their teachers were using the iPad "just for the sake of using it…because it makes it feel like it's not a waste." One student believed that veteran teachers continued to teach with their former methods and therefore the iPads were not utilized. In general, students used the iPad for everything in the classroom including 'Do Now' activities, classwork, following along with a PowerPoint, taking notes and conducting research. Their responses to how it is used in class ranged from, "It runs 80% of the class," to "It's gotten to the point that I don't even charge it. It's dead right now. I don't use it in school."

They believed it would be much more valuable to students if there were consistency in teachers' use of iPads, and if either all of the teachers either used them or did not. They said,

> It's hard when some of my teachers want to use it and some of them don't because then I think that some of my notes are on the iPad but then they are on paper.

Students' main challenge when teachers used iPads was the unpredictability of use, especially with homework and when assignments appear online. One student said,

> I'm supposed to check my iPad every hour at night to see if you posted some work for me. No, I'm not going to do that, sorry.

Students suggested that teachers should inform students when they upload assignments or assign new homework. Given the multiple challenges they faced with getting distracted by the different apps, possibilities, and communication with social media on the iPad, students made several suggestions for how iPads should be managed by the teachers and by the school.

*Classroom Management*

Students recognized that teachers deal with classroom management differently, because they had experienced teachers who did not acknowledge the iPad and what students were doing on it, while others watched what they did, and others asked them to put it away. Students made several suggestions for how teachers should manage iPads in the classrooms and manage students' use of iPads. For example, they felt it was the teacher's responsibility to utilize the iPad in such a way that students would not go off task. One student said,

> They could possibly do the entire lesson on the iPad. If the entire time you have to use the iPad for the lesson, people wouldn't be on another app.

They perceived that teachers had many different approaches to limit or manage the iPad. For example, blocking, using it for strictly educational purposed, locking students into an app, having classroom sets, iPad collection iPad days, and monitoring.

One student suggested allowing teachers to monitor students' iPads through a program:

> I think they need a program so that they can see what each student is doing on the iPad.

Some students said they would not mind having their iPads monitored, and were also open to other restrictions such as not allowing Facebook. One student said,

> If it's possible to block certain apps like social media and games and stuff, I feel like it would be a lot more helpful. That's usually what everybody is on and that's why they can't pay attention in class.

Several students believed this would be in their best interest, even though some acknowledged they would not enjoy apps being blocked. One student did not feel that blocking apps would be ideal for their learning style.

> Honestly, I'd be aggravated. I can't be too focused on a class, I need at least a two-minute distraction. A little check on Instagram and let me get back to class.

Another student suggested giving teachers the ability to lock students into an app would be beneficial, where students couldn't turn to other apps for certain periods of time, if they were taking notes, or learning.

Students offered many solutions to managing the iPads including getting rid of social media apps, having a timeframe from which the iPads could be used, and blocking everything that is non-educational. One student felt that there were only a few apps that were really needed.

> As long as there was Schoology, NoteAnytime, and Google to search things, there wouldn't be the distraction level because you can't play games."

Others suggested that a classroom collection of iPads would be ideal when the iPads were not being utilized for class, or that the use of iPads could be timed in order to cut down on "off-task behavior." One student suggested a cubby system for collection.

> Have a cubby for kids. Okay, 20 minutes, go put it back in the cubby."

Another student suggested that students only have the iPads at home.

> That eliminates the distractions in the classroom and it still allows us to have all the opportunities at home, to watch videos and submit assignments online and look up answers on the Internet, or do research, or write papers.

## Discussion

Students' perceptions of the one-to-one implementation at an urban high school that are presented in this paper were part of a larger study that included teacher and administrator perceptions. The research with students revealed that students' use of iPads in their learning experience largely corresponded to the existing literature in terms of benefits, but that students experienced multiple challenges when integrating the iPad in their academic lives. The extent to which students described their challenges was surprising, indicating that these cannot be ignored in the face of the benefits of iPad or tablet integration in K-12 learning experiences. Likewise, this study revealed an aspect of iPad implementations and one-to-one initiatives that is not widely researched – that of K-12 students' adoption of new technologies, and their adaptation to changes in their learning environments when technology is integrated.

### Student Learning with iPads

The high school in this study utilized a content management system, Schoology, to host curriculum content and students interacted with it using iPads, making several aspects of instruction digital. This is widely considered a best practice and consistent with research in one-to-one implementations (Churchill, Fox, & King, 2012; Garthwait & Weller, 2005; Johnson, 2013; Zucker, 2009). Students praised the streamlined process and access for convenience, flexibility, and quicker turnaround, similar to Chou et al. (2012) and Gerger (2014), although some students struggled with finding and organizing files with the iPad (Valstad, 2011). Communication between students and their teachers/peers increased both in and out of the classroom (Chou et al., 2012) and students were online a lot, using several apps and social media sites, although some students found it pervasive and detrimental to real conversations in class. The students collaborated more with the iPads, finding that they could collaborate anyplace, anytime, and also that they had more tools at their disposal to do so, similar to a report by Alberta Education (2012). As found by Broussard et al. (2014), students in this study also claimed that the iPads made them more accountable, that it was easier to access content anywhere, make up classes when absent, and complete assigned work.

The iPad implementation facilitated an environment where multimodal learning and assignments were possible. Students learned using different types of resources, could re-watch or re-learn from content, and created presentations, videos, documents, music, etc. They thus not only consumed different types of content but also produced multimodal content (Falloon & Khoo, 2014; Frey et al., 2015; Jahnke & Kumar, 2014). Students appreciated the differentiated instruction offered to them through various apps, and enjoyed being able to learn from content that included varying degrees of difficulty (Alberta Education, 2012; Lee, 2015). Students used their iPads for a great deal of research, finding and sharing resources, similar to the findings of Chou, et al. (2012) and Johnson (2013). They also used the iPads to learn "on-demand" or in-context (Norris & Soloway, 2008), accessing materials and resources within the context of assignments, when needed, and to learn more

about specific content. Reinforcing prior research (Goodwin, 2012; Johnson, 2013), they used the iPads to take notes, record, and multi-task. Additionally, they highlighted their use of annotations, describing various ways in which they annotate and use the camera feature to document both notes and their own work.

Albeit anecdotal evidence, students were divided in their perceptions of the learning outcomes, reporting both higher and lower grades as a result of the one-to-one iPad implementation, whereas Johnson (2013) reported only higher grades. In general, students appreciated the flexible learning environment and felt more independent and accountable for their learning.

**Students' Challenges with iPads**

Students had Wi-Fi access in the school, as recommended in prior one-to-one implementations (An & Alon, 2013), but also used their iPads online after school hours. Despite attempts to offer Internet access in collaboration with a cable provider, some students reported difficulties completing assigned work at home due to lack of access, and suggested that Internet-based homework be limited. From a usability standpoint, the iPads were described as relatively easy to use. However, students struggled with the organizational structure of files and resources, and the different steps and apps necessary to get work done on an iPad. The steps were not complex, but they were time-consuming for students. Students also often forgot their passwords for websites and apps, which was a cause for frustration.

Although prior researchers have reported the distractions students face due to Internet and app availability on tablets (Chatham, 2015; Chou et al., 2012; Frey et al., 2015; Lee, 2015), the extent to which students discussed the distractive nature of iPads and the ways in which this hindered their learning as well as their completion of classwork or homework was surprising in this study. Many students reflected on their use of social media and games during their classes, their ability to "hide" what they were doing, and they ways in which their use of the iPads had become compulsive. They acknowledged their own responsibility for their learning, but believed it was the responsibility of their teachers to better manage their use of iPads in classrooms. They made several suggestions for teachers to prevent them from getting "off-task," such as locking them in to a single learning app, using a software to monitor what they do on the iPads, blocking specific apps or any apps not used for learning, and limiting student time on iPads based on what was being taught in class. Some students even termed the iPads an "addiction" or "addictive," and described the ways in which their use of iPads hindered their learning at home, even citing this as a reason for not completing homework and for worsening their academic performance.

Students also discussed their constant use of social media and online communication as being accompanied by several problems. They perceived online communication and the constant exchange of information as pervasive, overwhelming, and even redundant. Online communications sometimes turned hostile and there were perceptions of cyberbullying. Messages were also misconstrued because students communicated differently than in the past, through text, where they could not read each other's facial cues or voice, tones, and inflections.

**One-to-one iPad Implementation**

From the perspectives of the students involved, the one-to-one iPad implementation at the urban high school led to several changes in the structure and organization of learning materials, the availability of curriculum and other online resources, and the ways in which all stakeholders communicated with each other. The introduction of iPads was largely successful from an installation, integration, and technical standpoint at least for the students, as they did not report technical problems or challenges with app deployment, maintenance, etc. as reported in the past (Schmidt & Ho, 2013). Most students also had Internet access after school hours, whether at home, a friend's house, the school, or the local library. From the student data, it was clear that a flexible, and portable positive learning environment prevailed, where students began learning in a multimodal manner and using technologies and methods that somewhat corresponded to the 2016 ISTE (International Society for Technology in Education) standards for students (https://www.iste.org/standards/standards/for-students). Students felt empowered and accountable, took charge of their learning in a connected environment, expressed themselves in various ways on different platforms, collaborated both online and in the classroom, and grappled with the challenges of using digital and social media in a connected world. The one-to-one integration of iPads thus led to what Blikstad-Balas and Davies (2017, p. 315) termed "21st century learning" with one-to-one devices. Teachers provided differentiated materials and instruction, which was greatly appreciated by students who could decide how and what kinds of resources they would use. The ability to personalize learning for

students and also allow students choice in how they learn is acknowledged as one of the transformational benefits of one-to-one implementations with laptops or tablets (Downes & Bishop, 2015). At the same time, the ways in which iPads were used varied widely across the high school in this study, with some teachers not using the iPads at all and others integrating it in their teaching.

Teachers' inconsistent use of the iPads for teaching and their differing views of classroom management of iPads were problematic for students. While representative of different teaching styles, beliefs, and approaches to technology adoption, clarity in communicating classroom policies or phases where iPads should or should not be used could be helpful to students. Likewise, phases of teaching, collaboration, or communication in the classroom without iPads that help students develop skills needed for real-life collaboration or communication could be included. In addition to professional development, continuing support for teachers during a one-to-one implementation can help them continue to integrate tablets, reflect on their teaching with tablets, and use tablets consistently (e.g. within a subject area). A discussion of strategies for the classroom management of iPads, the use of the Learning Management system in similar ways across departments, and policies around expectations and communications would be helpful to both students and teachers in a one-to-one implementation. For example, students struggled with assignments or resources posted late in the evening, so clear guidelines for new resources or posting of work could be created.

**Student Adoption of iPads during One-to-one Implementations**

Although student perspectives of learning during one-to-one implementations of laptops have been investigated in the past (Downes & Bishop, 2015), and student use of technology in schools has been researched (Hohlfeld, Ritzhaupt, Dawson & Wilson, 2017), students' adoption of iPads, or for that matter tablets, the ways in which they struggle to adopt technology that is mandated in their learning environments and how they adapt their learning habits within the new digital ecology is a major theme that emerged in this study.

Students in this study used iPads in several ways for learning, communication, and collaboration in their academic pursuits. They also viewed the iPad as a personal device and an entertainment device, using it for personal reasons – pictures, social apps, texting, games, and shopping. They did not report major problems with usability beyond forgetting passwords and file organization. Although effort and performance expectancy were not investigated in this study (Ifenthaler & Schweinbenz, 2016), students had a largely positive attitude towards the value of the iPads that influenced their use of iPads. It was clear that students acquired new technology and information literacy skills, learned to connect and collaborate digitally, learned to search, evaluate, and use online information, produced various types of content (e.g. videos), and learned to annotate digitally. They also navigated social media, changed the ways in which they began or continued relationships online, and struggled to deal with the barrage of online information and communication that accompanies ubiquitous computing, as well as the distractions offered by games and other entertainment apps. This is representative of the real world, where students are faced with these challenges when they go to college or begin work, and have to manage their time and their use of different apps. Contrary to anecdotal claims about digital natives and millennials who adapt easily to technology, this study reveals the real challenges students face when using technology continuously, be it socially or for their learning endeavors, reinforcing Bullen and Morgan (2016)'s call for a focus on *digital learners* over digital natives.

Students in this study experienced several challenges when trying to adapt their learning strategies to become digital learners with iPads. They experienced anxiety and feelings of loss when they could not "see" or physically possess their learning materials and submitted assignments. They struggled to organize and manage resources digitally in the iPad or online as opposed to physically in folders, although they greatly appreciated the flexibility and availability of digital resources that enabled them to study anyplace and anytime. They reflected on the classroom changes that took place as a result of iPad use – be it quieter classrooms, students preferring to message rather than speak with each other – and worried about how distracted they could get during class and while doing homework. Students struggled to find strategies to deal with these challenges and succeed in their classes, although they enhanced their previous learning strategies by annotating, taking photographs of notes or work and annotating on those, their description of the ways in which they grappled with technology adoption for learning highlights the importance of *student support* during one-to-one implementations.

Rogers (2003) Diffusions of Innovations theory is often used to study how an innovation is accepted by participants in a social system, and to explore the different factors that influence adoption, such as the perceived attributes of innovation, the type of innovation-decision, communication channels, the nature of the social

system, and the extent of change agents' promotion efforts. One-to-one tablet implementations, where devices are provided to students, do not offer a choice to students, who are also participants in the innovation-decision (Rogers, 2003). The focus is understandably on teachers who integrate tablets in their teaching. Communication and support are offered to both teachers and students, where often, professional development is focused on the teachers and students receive orientations to tablet use and policies surrounding the use. Strategies for *learning with iPads* - making changes to learning habits, evolving strategies for managing time and resources that are needed due to the more individual, accountable, and personalized learning that occurs with tablets in one-to-one environments, and most importantly, developing strategies for dealing with distractions and the constant deluge of information and messages - are important areas to be addressed with students during technology adoption in one-to-one initiatives. Areas already often addressed in K-12 technology education such as information literacy, digital footprint management, and acceptable use of social media also need to be reinforced as educational environments integrate tablets for each student that are also available for them outside schools.

The participants in this study were juniors and seniors who had at least ten years of prior experience learning without iPads before they participated in one year of the one-to-one implementation. The participants suggested that they were too set in their ways and that the freshmen and sophomores would work better with the iPads as they had been using the iPad for education since they entered high school and had the opportunity to use them in carts in 8$^{th}$ grade. This is an area for future research. Nevertheless, given the diversity of students in an urban school, *students' comfort level* with technology, especially the iPad or other tablets should be analyzed and addressed during a one-to-one implementation. Future research can also focus on the factors that help students learn with tablets and the specific pedagogical approaches that facilitate or hinder learning in classrooms as well as individual learning with tablets.

## Conclusion

The context, culture, needs, pedagogies, and implementation of tablets in one-to-one initiatives varies in each school, district, state, and country. This paper presented the analysis of student focus group data following the implementation of a one-to-one iPad implementation at an urban high school. The results reinforce the benefits of one-to-one tablet integration for student learning in prior research and highlight the ways in which students developed communication and collaboration skills as well as learning strategies that will help them in future educational and professional contexts. Additionally, the importance of student support for technology adoption and learning with new technologies emerged as an area of focus for one-to-one implementations. Notwithstanding the specific nature of the context of this study, it contributes to the research aimed at investigating and improving one-to-one tablet implementations, and can be valuable to educators engaged in such initiatives.

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## References

Alberta Education (2012). *iPads: What are we learning? Summary report of provincial data gathering day.* Edmonton, Alberta: Queens Printer.

An, H., & Alon, S. (2013). iPad implementation models in K–12 school environments: An exploratory case study. *Society for Information Technology & Teacher Education International Conference, 2013*(1), 3005–3011.

Bebell, D., & O'Dwyer, L. M. (2010). Educational outcomes and research from 1:1 computing settings. *Journal of Technology, Learning, and Assessment, 9*(1), 1–16.

Benton, B. K. (2012). *The iPad as an instructional tool: An examination of teacher implementation experience* (Order No. 3516595). Available from ProQuest Dissertations & Theses Global. (1029869338). Retrieved from http://search.proquest.com/docview/1029869338?accountid=9676

Blikstad-Balas, M., & Davies, C. (2017). Assessing the educational value of one-to-one devices: have we been asking the right questions?. *Oxford Review of Education*, 1-21.

Broussard, J., Hebert, D., Welch, B., & VanMetre, S. (2014). Teaching today for tomorrow: A case study of one high school's 1:1 computer adoption. *Delta Kappa Gamma Bulletin*, *80*(4), 37–45.

Bullen, M., & Morgan, T. (2016). Digital learners not digital natives. *La Cuestión Universitaria*, (7), 60-68.

Burden, K., Hopkins, P., Male, T., Martin, S., & Trala, C. (2012). iPad Scotland Evaluation. University of Hull. Hull, United Kingdom. Retrieved from http://www.janhylen.se/wp-content/uploads/2013/01/Skottland.pdf

Chatham, C. D. (2015). Limiting student personal computer device distractions in a 1-to-1 classroom environment (Order No. 3702590). Available from ProQuest Dissertations & Theses Global. (1682464138). Retrieved from http://search.proquest.com/docview/1682464138?accountid=9676

Churchill, D., Fox, B., & King, M. (2012). Study of affordances of iPads and teachers' private theories. *International Journal of Information and Education Technology*, *2*(3), 251–254.

Chou, C. C., Block, L., & Jesness, R. (2012). A case study of mobile learning pilot project in K–12 schools. *Journal of Educational Technology Development and Exchange*, *5*(2), 11–26.

Clarke, B. & Svanaes, S. (2012). One-to-one tablets in secondary schools: An evaluation study. Stage 1 2011–2012. *Tablets for schools.* London, England*:* Family Kids & Youth. Retrieved from https://www.e-learningfoundation.com/Websites/elearningfoundation/images/PDF%20Documents/Honeywood_2012_Barbie_Clark.pdf

Cohen D, & Crabtree B. (2006) *Qualitative research guidelines project.* Princeton, NJ: Robert Wood Johnson Foundation. Retrieved from http://www.qualres.org/HomeLinc-3684.html

Cuban, L. (2004). Meeting challenges in urban schools. *Educational Leadership, 61*(7), 64–69.

Downes, J. M., & Bishop, P. A. (2015). The Intersection between 1:1 Laptop Implementation and the Characteristics of Effective Middle Level Schools. *Research in Middle Level Education Online*, *38*(7), 1–16. http://doi.org/10.1080/19404476.2015.11462120

Edgar, T. (2013). *Effectiveness and satisfaction of iPad integration in the undergraduate classroom* (Order No. 1537331). Available from ProQuest Dissertations & Theses Global. (1364611435). Retrieved from http://search.proquest.com/docview/1364611435?accountid=9676

Enriquez, A. G. (2010). Enhancing student performance using tablet computers. *College Teaching, 58*(3), 77–84.

Falloon, G., & Khoo, E. (2014). Exploring young students' talk in iPad-supported collaborative learning environments. *Computers and Education*, *77*, 13–28. https://doi.org/10.1016/j.compedu.2014.04.008

Frey, N., Fisher, D., & Lapp, D. (2015). iPad deployment in a diverse urban high school: A formative experiment. *Reading & Writing Quarterly*, *31*(2), 135–150. https://doi.org/10.1080/10573569.2014.962202

Gaines, J., & Martin, E. (2014). *Bring Your Own Device: Implementation, recommendations and best practices.* New York. *Northeast Comprehensive Center.* Retrieved from http://scdn.wsboces.org/documents/BringYourOwnDeviceInformationalBrief.pdf

Gerger, K. (2014). *1:1 tablet technology implementation in the Manhattan Beach Unified School District: A case study* (Order No. 3647116). Available from ProQuest Dissertations & Theses Full Text. (1630090350). Retrieved from http://search.proquest.com/docview/1630090350?accountid=9676

Goodwin, K. (2012). Use of tablet technology in the classroom. Sydney: New South Wales: NSW Department of Education and Communities.

Grimes, D., & Warschauer, M. (2008). Learning with laptops: A multi-method case study. *Journal of Educational Computing Research*, *38*(3), 305–332. doi: 10.2190/EC.38.3.d

Hohlfeld, T. N., Ritzhaupt, A. D., Dawson, K., & Wilson, M. L. (2017). An examination of seven years of technology integration in Florida schools: Through the lens of the Levels of Digital Divide in Schools. *Computers & Education*, *113*, 135–161.

Ifenthaler, D., & Schweinbenz, V. (2016). Students' acceptance of tablet pcs in the classroom. *Journal of Research on Technology in Education*, *48*(4), 306-321.

Jahnke, I. & Kumar, S. (2014). Digital Didactical Designs: Teachers' Integration of iPads for

Learning-Centered Processes. Journal of Digital Learning in Teacher Education, 30(3), 81-88.

Johnson, D. P. (2013). *Implementing a one-to-one iPad program in a secondary school* (Order No. 3604540). Available from ProQuest Dissertations & Theses Global. (1475264216). Retrieved from http://search.proquest.com/docview/1475264216?accountid=9676

Jones, S., & Strudler, N. (2012). Examining implementation strategies, goals, and impacts of Apple iPad tablets in K–12 educational settings. In *Society for Information Technology & Teacher Education International Conference*, *2012*(1), 2857–2860.

Lee, C. (2015). Use of iPad for teaching and learning: A review of the literature. *International Journal Social Media and Interactive Learning Environments*, *3*(3), 184–199.

Lippman, L., Burns, S., & McArthur, E. (1996). *Urban schools: The challenge of location and poverty.* Washington, DC: National Center for Education Statistics, U.S. Department of Education.

Lowther, D. L., Ross, S. M., & Morrison, G. M. (2003). When each one has one: The influences on teaching strategies and student achievement of using laptops in the classroom. *Educational Technology Research and Development, 51*(3), 23–44.

Montrieux, H., Vanderlinde, R., Courtois, C., Schellens, T., & De Marez, L. (2014). A qualitative study about the implementation of tablet computers in secondary education: The teachers' role in this process. *Procedia-Social and Behavioral Sciences, 112*, 481–488.

Mueller, P. A., & Oppenheimer, D. M. (2014). The pen is mightier than the keyboard: Advantages of longhand over laptop note taking. *Psychological Science, 25*(6), 1159–1168.

Norris, C., & Soloway, E. (2004). Envisioning the handheld-centric classroom. *Journal of Educational Computing Research*, *30*(4), 281–294.

Norris, C., & Soloway, E. (2008). Getting mobile handhelds help bring K–12 classrooms into the 21st century. *District Administration Magazine, July*. Retrieved from http://www.districtadministration.com/article/handhelds-getting-mobile

Patton, M. Q. (2002). *Qualitative evaluation and research methods* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Penuel, W. R. (2006). Implementation and effects of one-to-one computing initiatives: A research synthesis. *Journal of Research on Technology in Education, 38*(3), 329–348.

Richardson, J., McLeod, S., Flora, K., Sauers, N., Kannan, S., & Sincar, M. (2013). Large-scale 1:1 computing initiatives: An open access database. *International Journal of Education & Development Using Information & Communication Technology*, *9(*1), 4–18.

Rogers, E. (2003). *Diffusion of innovations* (5th ed.). New York: Free Press.

Schmidt, M., & Ho, C. (2013). It doesn't "just work": Lessons learned from a mass deployment of iPad tablets pilot project. *World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2013*(1), 959–967.

Smith, C. A., & Santori, D. (2015). An exploration of iPad-based teaching and learning: How middle-grades teachers and students are realizing the potential. *Journal of Research on Technology in Education*, *47*(3), 173–185.

Valstad, H. (2011). Introducing the iPad in a Norwegian high school: How do students and teachers react to this technology (Master's Thesis). Trondheim, Norway: Norwegian University of Science and Technology. Retrieved from http://daim.idi.ntnu.no/masteroppgaver/006/6039/masteroppgave.pdf

Vu, P., McIntyre, J., & Cepero, J. (2014). Teachers' use of the iPad in classrooms and their attitudes toward using it. *Journal of Global Literacies, Technologies, and Emerging Pedagogies, 2*(2), 58–76.

Zucker, A. A. (2009). Assessment made easy: Students flourish in a one-to-one laptop program. *Learning & Leading with Technology, 36*(8), 18–21.

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