iPad Research With At-Risk Students in an Alternative School

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Abstract
This action research study occurred in a grades 5-12 alternative school for at-risk students in northern Canada. iPads were incorporated first in grades 5-8 (year one), and then in grades 5-8 and an ungraded class (year two). The goal was to enhance students' engagement in school and strengthen their language arts and numeracy skills. In year one, 21 students attended nine 30-minute digital literacy classes per week dedicated to remedial skills drills. In year two, teachers used the iPads to enrich classroom lessons and to facilitate project-based activities for (not necessarily the same) 21 students during three 65-minute digital literacy classes per week. Year one resulted in dramatically improved academic performance, but lower student engagement. Year two resulted in less markedly improved academic performance, but higher student engagement. The research team concluded that iPads are a technological tool that supports the teacher when used appropriately. The article contains 2 tables, 4 figures, and 12 cited references.

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In this action research study, iPad technology was incorporated first in grades 5-8 (year one), and then in grades 5-12 and an ungraded class (year two), in an "alternative" northern Canadian school dedicated to students considered academically at risk. The goal of both research years was to enhance students' engagement in school and strengthen their language arts and numeracy skills.

In year one, students in grades 5-8 attended three 30-minute digital literacy classes per day, three days a week, dedicated to providing skills drills by means of remedial English language arts (ELA) and math iPad applications. The data for year one consisted of the following student records: attendance records, office referrals, and ELA and math achievement records.

In year two, teachers engaged in iPad professional development, and the iPads were used to enrich subject-area lessons during regular grades 5-12 and ungraded classes. At the same time, these students attended one 65-minute digital literacy class per day, three days a week, dedicated to project-based activities that used iPad applications. The data for year two consisted of staff feedback and the following student records: attendance records, office referrals, and ELA and math achievement records.

The year one results showed improved academic performance, but lower student engagement. The year two results showed less dramatically improved academic performance, but higher student engagement. The research team concluded that iPads are a technological tool that can support the teacher's expertise in engaging students and improving their academic skills.

The iPad Phenomenon

This research belongs to the iPad phenomenon that has taken North American educators by storm since Apple released the product in 2010. iPads have been described as "nimble shape

shifters" (Chrichton, Pegler, & White, 2012, p. 24), possessing a "blessed wow factor" (Bohnenkamp, as cited in Waters, 2010, "Windows vs. Mac," para. 14) that incites "burning gizmo lust" (Waters, 2010, para. 2) during education's "one-time-in-history shift to digital" (Liu, as cited in Leonard, 2013, para. 8). More than three million iPads were sold within their first few weeks of release (Murray & Olcese, 2000, p. 42), outcompeting competitor products as they generated $436 million for Apple in the second quarter of 2013 (Leonard, 2013, para. 6). iPad proponents envision them as "magic bullets" (Falloon, 2013, p. 505) that will catalyze whole-scale educational reform (Chrichton et al, 2012), transforming teacher and learner roles (Dexter, Anderson, & Becker, 1999) in school systems that become increasingly defined by differentiated curriculum (Biesta & Burbules, 2003; Schrum & Glassett, 2009).

Although iPad supporters commend the product's portability (Teske, as cited in "EER District Spotlight," 2011), ease of use (Larkin, as cited in Leonard, 2013), visual appeal (Bohnenkamp, as cited in Waters, 2010), small size (Chrichton et al., 2012), cost effectiveness (McGraw, 2012), and long battery life (Leonard, 2013), in addition to its many applications (Murray & Olcese, 2000), and internet-based flexibility (Schrock, as cited in Waters, 2010), they have tempered their enthusiasm with caution that iPads are not the only answer to a school's technology needs. iPads complement, rather than replace, other keyboard devices such as laptop computers, which students need for larger projects (Waters, 2010). The "lack of compelling counter arguments" (Murray & Olcese, 2000) does not confirm the indispensable role that has been attributed to the iPad in our technologically motivated school systems.

Opponents argue that iPads may be just another fad (Maddux & Cummings, 2014), vulnerable to abandonment when they cannot fulfill the unrealistic claims made by Apple and supportive consumers. Originally intended for individual use, iPads are being repurposed for classroom functions for which they were not designed (Leonard, 2013), and they therefore have built-in limitations. For example, iPads were not created "to be networked, save student work, or be shared with others" (Mageau, 2013, p. 3). Students therefore have challenges in submitting assignments from their iPads, retrieving content that is lost, and collaborating on projects that use multiple devices (Chrichton et al., 2012). Furthermore, although 30,000 applications designated as "educational" were already available in June 2010 (Murray & Olcese, 2000, p. 43), iPad apps primarily focus on content delivery instead of creation and collaboration (Hogan, as cited in Waters, 2010). When classroom teachers depend on iPads to enhance their instruction, "the wrong application could undo what good teachers are trained to do" (Littleton, as cited in McGraw, 2012, para. 12). When newer, better rival technological tools enter the market, iPads will fall by the wayside (Waters, 2010).

The iPad research results in northern Canada situate the research team somewhere in the middle of this controversy. Although individual iPad applications do not foster student collaboration, the digital literacy class enabled students to mix with other students from different classrooms, enhancing their collaboration and interpersonal connections. Remedial iPad apps were useful in improving students' literacy and numeracy skills in year one, and other apps were useful in improving students' academic skills and general school engagement in year two – but the research team concluded that classroom teachers remain key to optimizing instruction and student engagement. The team also found that iPads are not the answer when students need to retrieve work, because the regular maintenance process that restores iPads to their original state erases work in progress. Maintaining and updating the iPads, moreover, requires a dedicated staff person with technological skills and a significant amount of available time.

Action Research Methodology

This research was part of a much larger VOICE action research partnership between the two universities that serve northern and rural Manitoba, with funding from the Government of Canada and private industry. Within this larger action research framework, individual communities developed action research plans to address youth engagement issues with the support of university researchers. This article reports an action research study focused on answering the following question: Will incorporating iPad technology in enhance student engagement in school and strengthen the at-risk learners' literacy and numeracy skills? The research team consisted of a university professor, two school administrators, and several interested staff members from the same school.

iPad Research Year One

Sample

Students in grades 5-8 were selected on the basis of weak performance in ELA and math. In total, 21 students had the potential to participate in the 25 digital literacy class sessions that were scheduled between April 16 and May 31 during the first year of the study.

Method

The school purchased 20 iPads. Each staff member received an iPad for two weeks in March to become familiar with it and to explore remedial ELA and math apps. Of the 41 apps that the staff recommended, the following 8 (5 ELA and 3 math) apps were chosen for use in the digital literacy classes in April and May (see Table 1):

Table 1. Digital Literacy Class Apps, Year One

ELA apps	**Math apps**
Sentence Builders – grade 2 iTooch Language Arts – grades 5,6,7,8	Math Drills – grade 2-3 Rocket Math – grade 4 iTooch Math – grade 6

The digital literacy classes began on April 16. Students were scheduled into three 30-minute sessions per day, three days per week, as follows: two separate 30-minute sessions with the Student Support Educational Assistant in the Student Support Classroom, and a further 30-minute session with the teachers in their home classrooms.

Data Collection

The following records comprised the data for year one of the research:

- attendance (overall patterns for the following months: February-March and April-May)
- office referrals (behavior incident reports submitted to the office)
- achievement records (in-school ELA and math assessments done in April and June)

Results

attendance. Attendance patterns did not change significantly.

office referrals. There were no significant differences in the number of students who were referred to the office for misbehavior.

achievement records. Figure 1 shows the ELA grade level scores for students involved in the iPad sessions during the first year of the study. Of the 21 students,12 improved their ELA scores: 3 by a partial grade level, 6 by a full grade level, and 3 by two full grade levels.

Figure 1. Year One ELA Scores, April and June

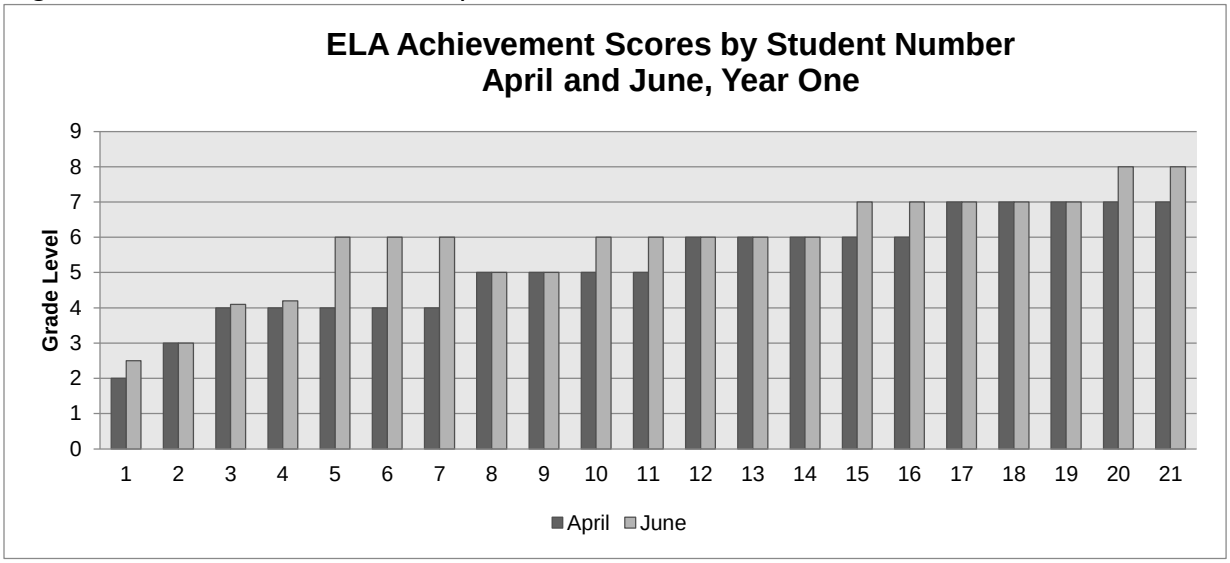
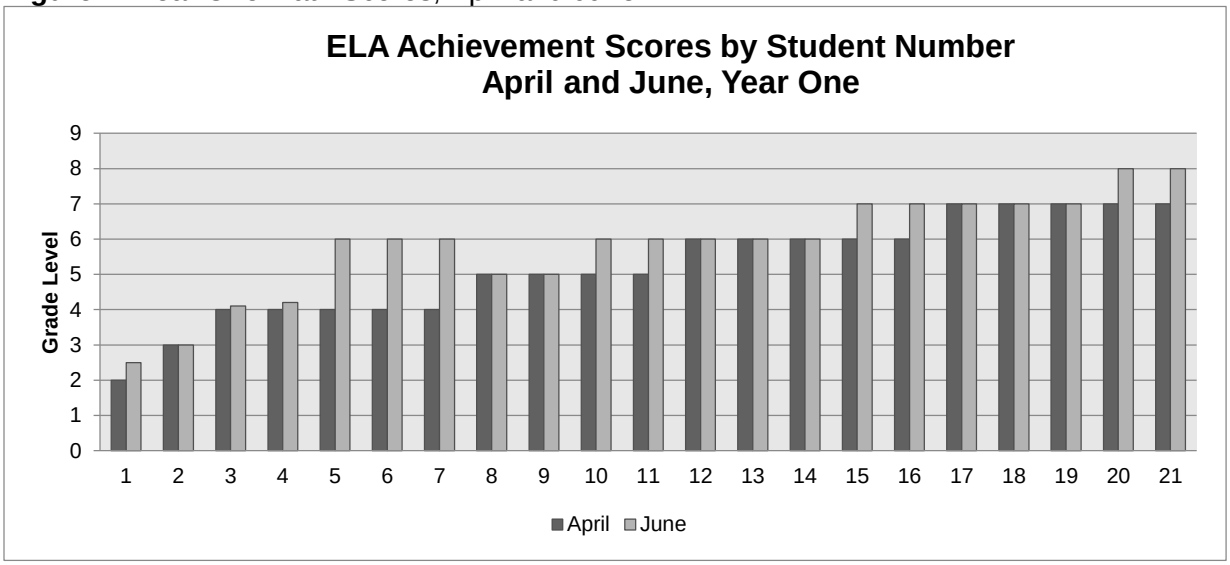


Figure 2 shows the math grade level scores for students involved in the iPad sessions during the first year of the study. Of the 21 students, 14 improved their math scores: 3 by a partial grade level, 4 by a full grade level, and 7 by two full grade levels.

Figure 2. Year One Math Scores, April and June



iPad Research Year Two

Sample

Of the 42 students who were initially selected from grades 5-8 and a newly created ungraded classroom, on the basis of their weak performance in ELA and math, 21 students regularly participated in digital literacy classes throughout the second year of the study. The other 21 students either opted out of the class or were on alternate programs with different schedules for attendance.

It should be noted that the 21 students who participated in year two of the research were not necessarily the same 21 students who participated in year one. Due to the school's geographic location and its "alternative" nature, it experiences high rates of transition. For example, 61% of the students who attended in May had been new to the school in September. Therefore, a new student sample was selected for year two instead of following the original plan to use the student group from year one.

Method

First, the research team addressed security issues that arose from year one, in order to restrict app downloads by students and to facilitate app downloads by staff. The students were assigned numbered iPads, making it easier to contact students if the iPads were compromised.

Then, the digital literacy classes were shortened to one 65-minute session per day, three days a week, between September and May. Two classroom teachers and three educational assistants were assigned to the digital literacy classes. The research team also changed the focus for these classes from ELA and math drills, using iPad remediation apps, to project-based inquiry, using a variety of iPad apps for different subject areas.

Finally, the research team expanded the use of iPads to include general classroom use in addition to the digital literacy classes. The team also arranged two full days of iPad professional development, tailored to various grade levels and classroom subject areas. Teachers' iPad use was tracked by means of electronic sign-out sheets.

Data Collection

The following records comprised the data for year two of the research:

- staff feedback (staff survey response sheets from teachers and educational assistants who used iPads in digital literacy and subject-area classes in year two)
- attendance (overall student patterns for year two and the previous year)
- office referrals (behavior incident reports submitted to the office in year two)
- achievement records (in-school ELA and math assessments done in September and June of year two)

Results

staff feedback. In addition to the non-curricular projects during digital literacy classes, teachers reported using iPads to enhance classroom lessons in ELA, math, family studies, and science. Staff connected to the digital literacy classes reported that the 65-minute time periods were too long.

About half of the school staff members (teachers and educational assistants) reported using iPads in their instruction during the second year of the study. The following comments are from these individuals' iPad survey response sheets:

- I used them for a novel study so that my students can follow along while I read. Not all my students like using the iPads for novel study. Some really like it.
- iPads went really well in novel studies for the students who are good readers and could follow along while being read to as a group. Weaker readers chose not to have an iPad and preferred the novel be read to them.
- iPads were used for research in family studies. For the most part, students worked really well with the iPads, but on occasion had to be redirected.
- I found that the iPads filled a lot of the gaps of resources that a first year teacher may experience. The iPads have been used by my students as dictionaries, thesauruses, and even novels for novel study. My students loved being able to use the iPads for this. They come into class every day and request an iPad before they even sit down.
- The iPads provided some fun teachable moments for our students. The Olympics was one that we really took advantage of. Apple provided an Olympic app that we used to do research and exploring of the Sochi games. We also used the iPads for viewing the opening/closing ceremonies, and to watch Canada take gold in curling and hockey.
- I found it challenging to teach how to use various apps due to not having the equipment in order to do so. I think that with the proper adapters for connecting to a projector would have been a big help. This would allow us to demonstrate use of the apps and allow the students to create on their own. It took a lot of man power and small-group explanations before students could complete their assignments.
- I found that when students were asked to do an assignment with typing, the majority of them would prefer to use a computer over an iPad. The novelty of the iPad wore off quickly and students were not as excited to use the iPad.
- Students from different age groups worked well together and it was nice to watch. They got to know the other students better.
- Some projects worked better than others and engaged all the students. The "how to" was one such project. Some students who would normally would try to do the least amount of work possible were actually being creative, using book creator to create a "how to" book and looked like they were having fun.
- Initially, my intention was to use the technology for science class, specifically for students to access information/videos in a group effort – student as teacher. The problems were continuous. Loss of internet access on some iPads, delay in getting earphones for use while listening to videos made it too noisy in classroom, difficult to monitor students to ensure they were on track.

About half of the school staff members reported that they did not use iPads in their instruction during the second year of the study. The following comments are from these individuals' iPad survey response sheets:

- As a teacher, if you don't have access all of the time to an iPad, it is hard to plan what you will do with them. I think iPads are great teaching tools, but as a teacher not skilled in its use, it is hard to apply to class.
- The inability to save work from day to day and to have paid apps was a deterrent.
- I find it easier to keep students' focus on one thing. I use a projector and desktop computer in my classroom. Adults are so varied in their skills that it would be time consuming to get some of them going and others would be frustrated by the wait.

attendance. Although eight students showed an improvement in attendance, and cumulatively the targeted students attended 167 more days altogether, overall there was little difference in the digital literacy class students' school attendance patterns.

office referrals. Student behavior incidents are tracked through office referrals. During the second year of the study, there were 168 referrals for the targeted 21 students, only 18 of which came from the digital literacy class. The one student who had 5 referrals from the digital literacy class was subsequently allowed to take an alternative subject during that class time. This student eventually requested to be allowed back into the class and was very successful. The initial difficulty for the student was not understanding the "purpose" of the class and finding the class too long.

achievement records. Figure 3 compares students' ELA grade level scores in September and June during the second year of the study. Of the 21 students who participated in digital literacy classes in year two, 12 increased their ELA scores: 6 by a partial grade and 6 by a full grade.

Figure 3. Year Two ELA Scores, September and June

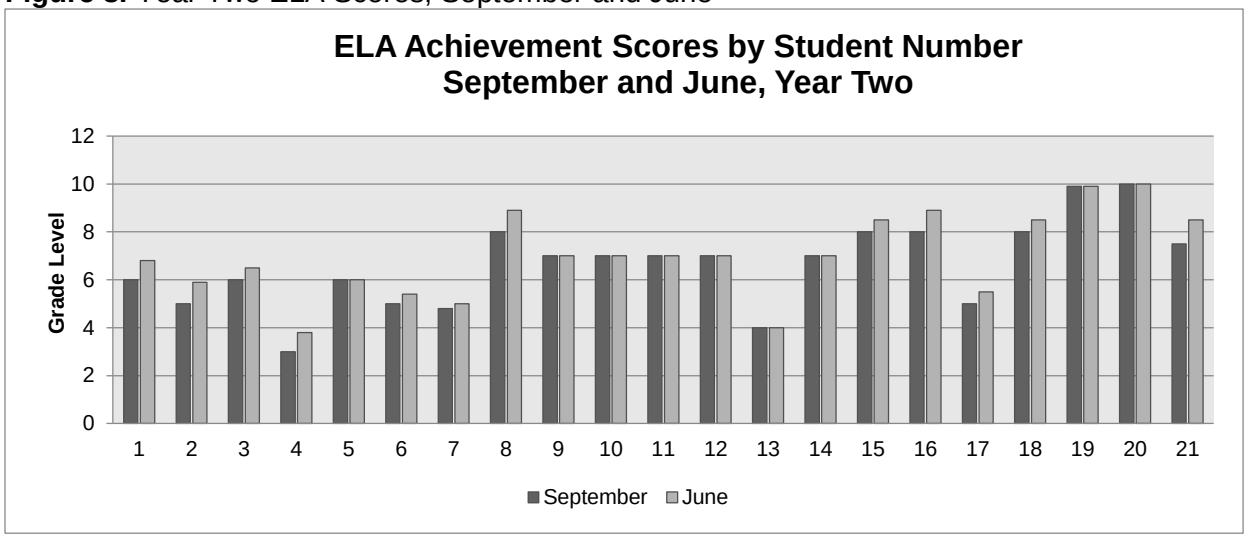
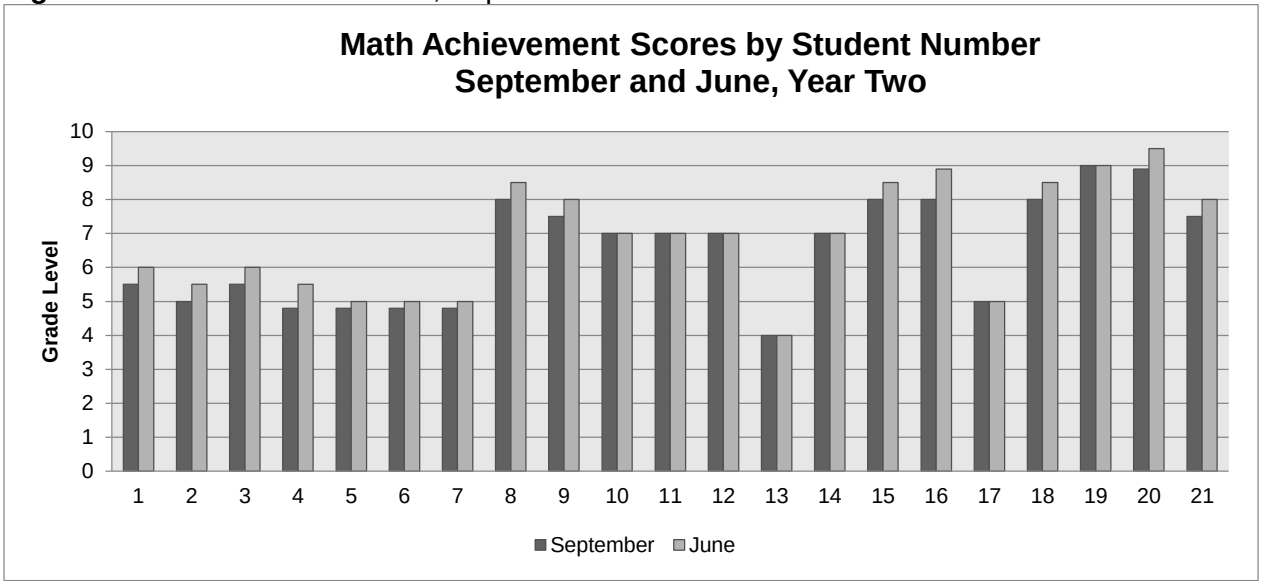


Figure 4 compares students' math grade level scores in September and June during the second year of the study. Of the 21 students who participated in digital literacy classes in year two, 14 increased their math scores: 12 by a partial grade and 2 by a full grade.

Figure 4. Year Two Math Scores, September and June



Discussion

The following discussion focuses on issues of security, technological support, feedback from staff, and student performance and engagement.

Security

The research team discovered that the year one students had accessed and downloaded apps on some of the iPads. Security was addressed through use of the iPad configurator. Each evening, all iPads were placed into the configurator and returned to their original state ready for use the next day. A drawback of this procedure is that work could not be saved from one day to the next. Beginning in May of the second year, this practice was changed to a once-a-week restoration.

When two students put passcodes on the iPads, the school had to rely on the students to identify themselves – and reveal the passcodes – before the iPads could be reset in the configurator. At that point, the research team numbered the iPads so that individual students could be identified if the iPads were compromised.

Technological Support

One of the school's "tech-savvy" teachers volunteered to set up and maintain security, and to ensure that the iPads were working. The time commitment involved in resetting the iPads each night is 30 minutes, provided that there are no complications (such as passcode problems). When the iPad operating system is updated, the time required is much greater. During the second year of the study, the after-hours time commitment for this individual was 166 hours between September and May.

The tech support volunteer also developed an easy-to-access sign-out system. Through their desktop computers, staff can instantly access the sign-out page. A spreadsheet indicates how many iPads are available on a given date and time.

At the end of year two, 137 apps had been installed on the iPads excluding the apps that are standard to the iPads.

Professional Development

Staff indicated a need for PD, because it was one thing to try the apps but another to use the apps and the iPads effectively in a classroom setting. The research team provided two days of professional development: a day for the research school's teachers in November and a school division-wide in-service day in February during the second year of the study.

The creation of the following 24 digital literacy class projects, complete with detailed lesson plans and rubrics for student assessment, is primarily attributable to the professional development that the digital literacy teachers received in year two (see Table 2):

Table 2. Digital Literacy Class Projects, Year Two

Amazing Facts	Hero Talk	My Concern Is . . .
Autobiography	How To . . .	Pet Peeve
Children's Book Review	If I Could Change . . .	She Told Me . . . He Told Me . . .
Come On – Join Our Festival Brochure (Trappers' Festival)	If I Could Meet . . .	Sochi 2014
Describe an Object	Jokes and Riddles	Stump the Teacher
Fable	Make a Meme	Welcome to St. Patrick's Day Scavenger Hunt
Glogster	Movie Review	Writing a Fitness Review
Greek Trading Cards/ Greek and Roman Gods	Music Review	5W Research

However, there remains a need to train educational assistants in the use of iPads. One of the digital literacy class teachers noted, "The professional development that was provided was very useful and provided many ideas for projects. However, the EAs that work with our students during digital literacy were not a part of this PD. I felt that the experience with the iPads would have provided them with more comfort and knowledge to use when assisting the students."

Effects on Student Performance and School Engagement in Year One

Twenty-one (21) targeted students in grades 5-8 had the opportunity to participate in 25 digital literacy sessions that used remedial iPad apps between April and May during the first year of the study. During these sessions, students progressed through the app levels, and their in-school ELA and math grade level assessments increased significantly. In ELA, 6 students improved by one full grade level, and 3 improved by two full grade levels. In math, 4 students improved by one full grade level, and 7 improved by two full grade levels. However, staff feedback indicated that the students did not enjoy spending nine 30-minute sessions, totaling 270 minutes per week, doing remedial iPad apps. Therefore, year one's gains in literacy and numeracy skills were offset by losses in student engagement.

Effects on Student Performance and School Engagement in Year Two

Although student attendance patterns continued to reflect the previous year's patterns, staff members reported that the 21 students who attended digital literacy classes in year two were engaged and participated in the project-based activities. The length of the class (three 65-minute sessions, totaling 195 minutes per week) was the biggest obstacle. The digital literacy class has since been rescheduled to five 30-minute sessions, totaling 150 minutes per week.

An unexpected benefit of the digital literacy class was that it enabled students to mix with other students of various ages and grade levels from different classrooms, enhancing student collaboration and interpersonal connections. The project-based learning captured students' attention and was, overall, a positive experience. Now that initial projects have been developed, the teachers have a basis for continuing the digital literacy program in future years.

ELA and math grade level assessments increased between September and June during the second year of the study. In ELA, 6 students improved by one full grade level. In math, 2 students improved by one full grade level. Therefore, year two's gains in school engagement were offset by less spectacular gains in literacy and numeracy skills (as compared to year one's results).

It should also be noted that the same students did not necessarily participate in years one and two of the study. Therefore, although both student samples were selected with the same criteria, differences in the results are at least somewhat attributable to individual differences in the participants.

Conclusions

iPads are a technological tool that supports the teacher when used appropriately. The digital literacy class brought students of different ages together, which enriched their educational and social experiences – although it did not affect their attendance or misbehavior patterns. In year one, the remedial iPad apps significantly improved the target students' ELA and math scores, but they did not enjoy the digital literacy classes. In year two, the students much preferred the iPad activities, but their academic gains did not match year one's improved ELA and math scores. School use of iPads requires a significant amount of time by a staff person who has the technological skills needed for iPad maintenance and updating.

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