iPad® vs. Browser: The Impact of Ease of Use on K-1 Progression in an Online Literacy Instruction Program

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Key Findings

- In a sample of over 5,000 kindergarten and first grade students, on average students using iPads logged in more often and for more time per session than students using computer browser-based platforms (Browser).
- On average, students who used an iPad completed more units at a faster rate than students who used a Browser.
- Considering the number of units needed to reach grade-level benchmark, iPad students could meet benchmark an estimated 7 weeks earlier than Browser students.

Introduction

The purpose of this study was to understand differences in login, usage behavior, and progress for kindergarten and first grade students using exclusively iPad or Browser versions of the online literacy program Lexia Reading Core5®. Core5, a blended learning program that combines online digital media with traditional classroom methods, has been shown to contribute to reading growth.[1] However, differences across the platforms in which the program is implemented may have an impact on students' behavior or progression within the program. For this study we had the opportunity to explore how platform (iPad or Browser) impacts students' progress.

Literature Review

When used with fidelity, blended learning literacy programs can lead to improved learning outcomes for students[1], particularly in the lower grades[2]. However, a recent study of educational technology use confirmed that only a small percentage of enrolled students actually meet program usage goals[3]. There are many potential reasons for not using blended learning products with fidelity. For example, teachers who have not received professional training for using computers in the classroom are less likely to see the value of incorporating computers and also less likely to use them[4]. A 2012 study evaluated teachers' perceptions of technology in schools and found that teachers had concerns about being able to fit computer time into a class schedule and what their role would be with the use of technology[5].

One proposed strategy for helping teachers more easily use technology in the classroom is using touchscreen tablets like iPads. Touchscreen technology, like that used on the iPad platform, has been found to be easier to use in contrast to computers, and can even close the performance gap for speed and accuracy of use for groups that often struggle with computer use (e.g. older adults)[6]. Young children using

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[1] Schechter, Macaruso, Kazakoff & Brooke (2015); Wilkes, Macaruso & Albert (2016)
[2] Prescott, Bundschuh, Kazakoff, & Macaruso (2017)
[3] Stanhope & Rectanus (2015)
[4] Cope & Ward (2002)
[5] Mundy, Kupczynski, & Kee (2012)
[6] Findlater, Froehlich, Fattal, Wobbrock, & Dastyar (2013)

touchscreen technology seem to find it intuitive as well[7]. The familiarity young children have with touchscreen technology is likely influenced by their prevalence and frequent use. The Common Sense Census found that 98% of children between the ages of zero to eight live in a home with at least one touch-screen capable mobile device, and spend an average of 48 minutes using them[8].

In addition to ease-of-use, other benefits to using iPads were observed by Sandvik, Smørdal, and Østerud (2012), who conducted a group case study of a class of young children to analyze their behavior and class dynamic surrounding the use of iPads. Their findings included a high rate of engagement with the learning program utilized on the iPad, and students' ability to easily work on the iPads independently, at their own pace, and with greater mobility and collaboration. Since touchscreen technology may be more engaging and easier for students to use, we hypothesized we would observe differences between students who used iPads and those who used a computer Browser. Differences such as decreased amount of time attempting to interact with the technology (e.g. trying to login) could lead to students being able to more readily begin using the literacy software and save teachers time. Therefore, iPads could offer ease-of-use benefits to both students and teachers.

Method

Participants

This study used a quasi-experimental design using a sample of schools from the Core5 database. Usage and progress information was collected for a subset of students in kindergarten and first grade from September 2017 to February 2018. These students attended schools of varying sizes in large, mostly urban districts from different geographic regions across the United States. Previous research has found that this sample of over 400 schools with 100,000 students often matches trends in year-long usage and progress in terms of gains made over the year, that are seen with all Core5 users. Core5 program data was accessed for all schools in the database with at least 30 students.

Students' login behavior was examined and categorized as 100% iPad or 100% Browser. This student data was then used to classify schools as iPad-exclusive or Browser-exclusive schools. There were 14 schools identified as iPad-exclusive (2,488 students). These schools were matched one-by-one with Browser-exclusive schools (2,894 students) with similar sample sizes and Beginning-of-Year characteristics such as the grade level students were performing at within Core5 (i.e. Below Grade Level, In Grade Level, Above Grade Level). In this collection of 28 schools, three school districts/networks had at least one school that was iPad-exclusive (iPad) and one school that was Browser-exclusive (Browser). As part of these analyses, information about why some schools had iPads and others did not was unavailable.

The students included in this study came from 24 racially diverse schools across five U.S. states, including both charter and public schools. See the table below for a breakdown of approximate percentages for each racial identity by platform. Schools had an equal proportion of male and female students, and on average their student populations were 71% Low SES (as calculated by free/reduced lunch eligibility). Eleven out of 24 schools reported English Language Learners (ELL) data for their students. Among those 11 schools, an average of 11% of students were considered ELL.

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[7] Piotrowski & Krcmar (2017)
[8] Common Sense Media (2017)

Table 1. Average percent of students across schools by platform

Platform	Black	Hispanic/ Latino	White	Asian	Hawaiian Native/ Pacific Islander	American Indian/ Alaska Native
iPad	37%	31%	21%	11%	4%	1%
Browser	37%	28%	32%	4%	1%	1%

Note: Averages were calculated from 20 of the 24 schools (10 iPad, 10 Browser) in the study due to availability of school-level, public demographic data for kindergarten and first grade.

Measures

The student usage and progress from iPad and Browser schools were compared on total number logins, number of units completed within Core5, how long on average it took students within each group to complete a unit, how often students logged into Core5, and how long each session lasted.

Instructional Program

Core5 supports educators in providing differentiated literacy instruction for students of all abilities in grades pre-K–5. Core5's research-proven program provides explicit, systematic, personalized learning in the six areas of reading instruction, targeting skill gaps as they emerge, and providing teachers with the data and student-specific resources they need for individual or small-group instruction. The six strands of reading instruction include phonological awareness, phonics, structural analysis, automaticity/fluency, vocabulary, and comprehension. Activities in the strands are organized into 18 levels: preschool (Level 1), kindergarten (Levels 2–5), first grade (Levels 6–9), second grade (Levels 10–12), third grade (Levels 13–14), fourth grade (Levels 15–16), and fifth grade (Levels 17–18). Students begin the online component with an embedded assessment that automatically places them in a level consistent with their reading ability. Students are required to complete each unit of an activity with 90%-100% accuracy before moving to subsequent units. For students who struggle in a unit, the program uses automatic branching to move them to a scaffolded task with fewer stimuli and more structure. If students continue to struggle, the program provides direct instruction that explicitly addresses the errors they made. Once students have successfully completed all activities at the standard, non-scaffolded step in a unit, they are automatically advanced to the next unit. On average, there are 70 units in each level of Core5.

Results

Significant differences between iPad and Browser students were tested for the average number of logins, average login duration, number of units completed, and minutes per unit using univariate ANOVAs. Results showed that students at iPad-exclusive schools logged in more often and logged more minutes on the online literacy program than students at Browser-exclusive schools. iPad students also completed more total units per average than Browser students.

Login Behavior. On average, students who used iPads logged in to the program an average of 69.09 times for an average of 31.04 minutes, while students who used Browsers logged in to the program an average of 62.88 times for an average of 26.85 minutes. These differences were statistically significant for average number of logins ($F(1, 5327) = 17.71$, $p < 0.001$) and login length ($F(1, 5291) = 18.99$, $p < 0.001$).

Figure 1. iPad student login more often and for longer sessions
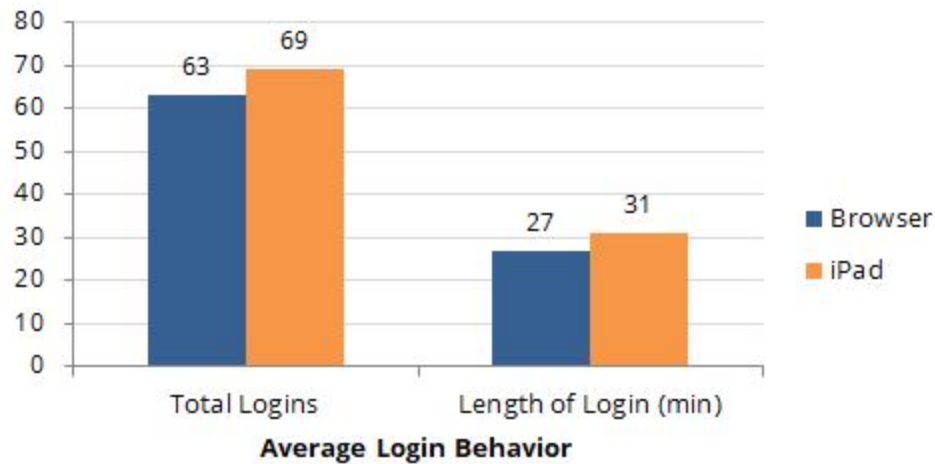
Units Completed. On average, students who used iPads completed 183.09 units while students who used Browsers completed 151.20 _ a difference of 31.89 units. This difference was statistically significant ($F(1, 5331) = 41.00$, $p < 0.001$) even when controlling for total time in the program throughout the study.

Minutes Per Unit. On average, students who used iPads completed a unit every 7.85 minutes while students who used Browsers completed a unit every 9.37 minutes _ a difference of 1.52 minutes per unit. This difference was statistically significant ($F(1, 5361) = 35.32$, $p < 0.001$).

Figure 2. iPad students complete more units in less time
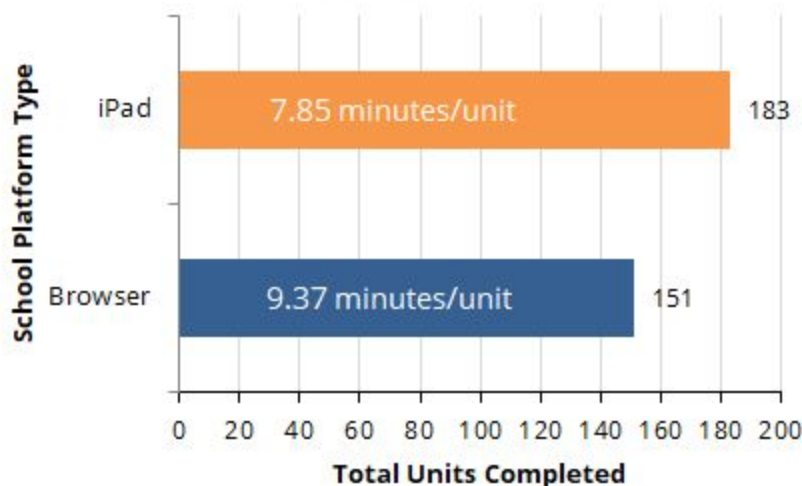
Conclusions

This study examined differences in kindergarten and first grade student Core5 usage and progress on iPads or Browsers. Considering the number of units needed to reach grade-level benchmark (approx. 280 units for each grade), iPad students could meet benchmark an estimated 7.6 weeks earlier than Browser students based on the completion rates identified above. For the students struggling the most, the benefit was even greater, with iPad students starting the year performing below their grade level saving an estimated 7.9 weeks over Browser students. Students may move through units faster due to fewer navigational barriers on iPads. This means that, by using iPads, a significant amount of time could be given back to the teacher for classroom instruction, with especially great impacts for struggling readers.

Students using iPads also logged into Core5 more often and for longer than students using Browsers. This may be because students can log into the program and begin sessions rapidly due to touchscreen technology. Additionally, if students enjoy using the program more on iPads, they may opt to use it more. Teachers also may assign students to use the program more often on iPads because they may be more available within the classroom, compared to the restricted access experienced with computer Browsers, which may need to be reserved and shared throughout the school. Together, these findings provide preliminary evidence that, because of ease-of-use, iPads may be more powerful than computer browsers for delivering educational lessons to kindergarten and first grade students.

Limitations

As with all research, this study is not without limitations. We were only able to select from a sample of schools that use Core5 on iPads or Browsers, and thus our results may not be a perfect representation of all student usage behavior and progress among all iPad or Browser users. This study also did not take into account schools that use other devices or a combination of devices. Additionally, we used a quasi-experimental design, in which schools chose whether to deliver Core5 via iPad or Browser. The reasons why they utilize iPads or Browsers may be varied and could be related to other factors that affect student usage behavior and progress, such as teacher training and professional development or school support for educational technology.

Future Research

Although this study provides preliminary evidence in favor of iPads, many questions about optimal educational technology delivery remain. Research concerning students' and teachers' opinions about the appeal and usability of iPads or Browsers in their classrooms would be useful to gain perspective about why usage differences are being observed and could orient future research. More research is needed to determine how schools give their students access to educational technology, as well as the ratio of students to devices. How much emphasis schools put on educational technology is an important avenue for research to consider as well. Future research along these lines can clarify why and how schools and individual teachers chose to administer Core5, contextualizing and extending understanding of the patterns found in the present study. Altogether, the present findings provide an encouraging and intriguing picture about the impact and role iPads can play in delivering the digital media components of Core5, and point to exciting opportunities for continued exploration of this topic.

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