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To cite this article:

Albataineh, M., Warren, B., & Al-Bataineh, A. (2024). The effects of Chromebook use on student engagement. *International Journal of Technology in Education and Science (IJTES)*, 8(1), 138-151. <https://doi.org/10.46328/ijtes.530>

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The Effects of Chromebook Use on Student Engagement

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Article Info

Article History

Received:

01 September 2023

Accepted:

10 November 2023

Keywords

Educational technology

Chromebook use and effect

Student engagement

Abstract

This action research project is intended to determine the effects of Chromebook technology on student engagement in the secondary classroom. The study involved a classroom of first-year students enrolled in a health course. These students used Chromebooks for the first time as part of the one-to-one (1:1) initiative. Chromebooks were utilized as a part of the curriculum, incorporating daily lessons, teaching tools, applications, and various activities for student learning. Data collection methods included observations, teacher journals, and field notes. On-task and off-task behaviors were noted, and the results of the data analysis showed the level of engagement involved when using Chromebooks in the classroom. Levels of engagement were explored through a six-week study in a 9th-grade classroom comprised of 28 students using Chromebook one-to-one. Engagement included focus, interest, participation in the lesson and activity, and positive social interactions between the teacher and classmates. This action research investigation indicated that incorporating Chromebook technology into lessons effectively increased student engagement and motivation.

Introduction

Given that our students are using technology in the classroom today more than ever before, it is no surprise that administrators are transitioning to the 1:1 Chromebook classroom environment in their schools. The Common Core State Standards expectations for technology have allowed teachers to choose how to address those standards in their classrooms. Moreover, since Chromebooks are easy to use, convenient, fast, and effective in supporting student success, more schools are prepared to equip each student with their device. Singer (2017) explained that “in 2016, Chromebooks accounted for 58 percent of mobile devices shipped to primary and secondary schools in the United States, up from less than 1 percent in 2012, according to Futuresource Consulting, the research firm” (Chromebooks Find an Audience section, para. 20).

The goal of the Chromebook 1:1 initiative is to allow students to access all the capabilities and advantages this technological device offers while gaining critical skills valuable for college and preparing them to be career-ready. Teachers have been using a variety of technology in their classrooms for years. We have adapted to the changes, have reaped the benefits, and understand how vital using the types of technology education is to student learning. The Office of Elementary & Secondary Education states that “technology ushers in fundamental structural changes that can be integral to achieving significant improvements in productivity” (Use of Technology in Teaching and Learning section, para. 1).

Since the development of the Chromebook, teachers and administrators have been taking advantage of this technology to enhance curriculum, allowing students to access an unlimited number of educational resources right at their fingertips. There are many benefits of Chromebook technology, including specifically designed tools made just for this device. An array of applications, educational games, and adaptive software are helpful in the classroom. There are opportunities for students to connect with others, stay organized, and keep up on assignments using Gmail, calendars, and video conferencing.

Chromebooks allow students to work together while completing group projects, reports, PowerPoint, or videos. Google (2011) describes that “all the educational resources of the web Chromebooks are built and optimized for the web. This means that Chromebooks can seamlessly access the Google Apps suite of productivity and collaboration tools (free for schools) and apps available in the Chrome Web Store, the Google Apps Marketplace, and content across the entire web. Chromebooks run your favorite flash-based educational tools” (All the educational resources of the web section, para 4). With Chromebooks, students can retrieve knowledge in the classroom, library, or home as part of the 1:1 initiative. Technology is relevant, and it is how kids learn today versus learning via textbooks and lectures.

Student engagement is a natural and pressing problem in the United States. According to a poll conducted by Gallup in 2016 of nearly a million U.S. students, Brennenman (2016) states that “engagement levels showed a consistent decrease as students got older, bottoming out in 11th grade” (Gallup Student Poll Finds Engagement in School Dropping by Grade Level section, para 3). Student engagement includes a wide range of behaviors. Researchers have categorized engagement as it relates to students in the classroom into three types: behavioral, emotional, and cognitive. These dimensions encompass participation, interest, ownership, and interactions between peers and teachers. (Fredricks, Blumenfeld, & Paris, 2004)

Engagement is the key to keeping students successful, and many wonder if Chromebooks will be a catalyst for keeping kids focused in the classroom. There is still some uncertainty about how the lack of face-to-face interaction and personal connection between the teacher and their student may affect the student’s ability to stay engaged and ready to learn.

Teachers are always searching for creative and innovative ways to keep their students focused on the task and motivated in the classroom. When students are actively learning, they participate and are engaged. Research has demonstrated that engaging students in learning increases their attention and focus, motivates them to practice higher-level critical thinking skills, and promotes meaningful learning experiences.

Putting a Chromebook into the hands of every student may incite fear in some administrators, teachers, and even parents. Some may question whether this expanding use of technology will keep kids on task and engaged. (Collier, 2015) interviewed Jennifer Fredricks, Ph.D., professor of human development at Connecticut College, who sees both the potential for technology and areas of concern. Fredricks cautions that “educators need to take care that technology in the classroom does not turn into students spending too much time staring at screens alone, rather than interacting with other students and teachers. A lack of such direct communication could impair the

ability of kids and teachers to form the relationships crucial to engagement” (Technology: The great engager? section, para 7). Teachers must continue to help students make meaning out of information and strategically use data. This will further empower students and keep them engaged for a successful future. Burns (2015) notes that “students of all ages need experience using technology and developing digital skills that can be applied to multiple tasks. If we truly want children to be college and career-ready, schools must take thoughtful and strategic action to include technology tools in classroom instruction” (The Common Core and Digital Skills Development section, para. 2).

According to the GoGuardian Team 2015 article, Chromebooks are the best option when choosing a technological device for the classroom. The article states that Chromebooks “help engage students with interactive lessons and prepare them for an increasingly digital workforce. Given the combination of high performance, low cost, and the development of custom web applications, it should not be a surprise that Chromebooks are quickly becoming the device of choice for school districts across North America” (7 Reasons Your Students Need Chromebooks in the Classroom section, para 1).

This study aimed to identify how using Chromebooks in the classroom affects student engagement. Some of the specific behaviors observed in this study are the degree of participation, attention, interest, and interaction the student had with classmates and the teacher. In particular, I noted those students asking to leave the class, not doing the assignment, and sleeping or putting their heads down. Because of the tools and applications used on the Chromebook, I observed if these tools aided in preventing homework incompleteness, late work, losing work, and not keeping up with missed assignments.

In *Action Research: A Guide for the Teacher Researcher*, Geoffrey E. Mills (2018) discusses the philosophy and purpose behind action research. He states “that educational change that enhances the lives of children is a main goal of action research. But action research can also enhance the lives of professionals.” (p. 17). He also encourages teachers to be continuous learners. The benefits of this study help teachers examine their instruction and practice so that they can improve themselves as well as the lives of their students. This study gives teachers insight while observing behavior patterns and noting changes in these behaviors as Chromebooks are implemented. The teacher can gauge whether their unmotivated students have improved and adjust their instruction accordingly.

This study was intended to examine the following research questions:

- Will the tools, applications, and programs I use in my lessons through Chromebook keep my students focused?
- Will the interactive learning keep them motivated and actively participating?
- Will the applications and programs in Chromebook make planning and organizing more efficient, therefore keeping them engaged and ready to learn?

Literature Review

With the continual integration of technology in the classroom today, the learning environment in school and instruction has changed to adapt to the needs of students. Computers, laptops, and iPads were once the technological advancement schools turned to. However, in the last few years, Chromebook use has taken over. Across the country, school districts have been implementing the Chromebook 1:1 program, providing every student with a device at school and home. There are many different implementation strategies, applications, and programs that teachers are using with these devices to maintain effective instruction. These strategies have been proven helpful in engaging the learner and preparing students for their futures. However, with the implementation of technology, there have been many challenges in the classroom. Technology and the implementation of the 1:1 Chromebook program have posed both positive and negative effects for the learner and the teacher. However, administrators and teachers continue to use these devices in hopes that they will help improve student engagement and motivation and instill academic achievement in students. Donovan, Green, and Hartley (2010) explain that “it is often assumed that changing the classroom by introducing technology will result in better teaching and increased student motivation, which ultimately means more effective student learning experiences” (p. 423). However, there are arguments that 1:1 use also decreases learning. Some research has indicated that increased technological use in classrooms negatively affects students’ ability to communicate face-to-face and interact personally with peers and teachers. Moreover, researchers are finding that students are distracted in the classroom. Teachers face these environmental changes, which impact student behavior, engagement, motivation, and achievement.

Positive Effects of Chromebook Devices in the Classroom

One-to-one implementation refers to one electronic device with internet capabilities provided for each student. With technology being used regularly for various tasks, it only makes sense that educators incorporate technology into their curriculum. Online textbooks have replaced print copies in many schools nationwide, and countless schools choose to go one-to-one. (Boutser, Corn, & Halstead, 2009; Spires, Wiebe, Young, Hollebrands, & Lee, 2012). Educators are aware of several ways in which technology enhances instruction and learning. There are many creative applications that Chromebooks provide in the classroom. Students can use many online resources to create content, such as videos, photos, and slideshows, in addition to conducting experiments and using technology to present their information. Google Apps for Education, the free suite of online applications for word processing, spreadsheet work, and presentations, are helpful for the teacher in their instruction and in keeping their students on task and relevant.

Aside from using Chromebooks as learning tools, schools have gravitated towards these devices for several other beneficial reasons. The price of Chromebooks is vital to providing each student with their own devices. Demiski (2012) discovered that, among the different districts included in the study, the device implemented most was the Chromebook, a laptop-like device with a touchscreen, for its low price point and high durability. Studies verify that Chromebooks are weeding out other devices in the 1:1 initiative. It has been asserted that many districts are implementing Chromebooks because they are durable, have a built-in keyboard, and their price is better than their competitors.

Positive Effects on Student Engagement

Cortez (2016) reported that a study done at Maine Township High School in Illinois revealed that by using tools such as G Suite for Education and Google Chat, both productivity tools to help teachers and students interact with each other, ACT scores boosted and more engagement among its students were created as a result of real-world collaboration. Maine Township was one of the first users of these tools over ten years ago (Chromebooks and G Suite for Education Boost Student Engagement and Learning section, para. 5). She also explained that at another school, Placer Union High School District (PUHSD), which spans 1,000 square miles of Sacramento, Calif., suburbs, “truancy has reached the lowest level in the area thanks to Google Chat allowing teachers to check on troubled students” (Better Equity Means Better Learning Outcomes section, para. 10). For both Maine Township and PUHSD, Chromebooks and G Suite helped with their diverse student population (para. 8). And according to the school’s principal, despite hardships (like low-income status) that typically affect student assessment scores, students in Maine Township have outpaced all other schools in their area in terms of ACT performance (para. 9).

Another study by Diettrich and Balli (2014) reported that students were more interested and engaged in lessons when they were required to use technology in front of their peers instead of the teacher using it to present information. They also reported that using iPads and computers as 1:1 devices was engaging, mainly because they gave them control over their learning experience. The authors found that students were authentically engaged when learning by doing or using the technology themselves instead of watching others use it. They concluded that digital natives prefer technology-enhanced learning to traditional learning environments because it is more exciting and engaging than conventional instruction.

Negative Effects of Chromebook Devices in the Classroom

Herold (2016) states that, as with most education tools, districts have encountered roadblocks when attempting to transition to one-to-one computing initiatives. Districts have run into problems with the infrastructure and do not have enough capacity to support numerous internet users simultaneously. Unfortunately, technological issues will always exist and cause problems for schools. When managing a school full of devices running simultaneously, setbacks may arise. According to Heyboer, in 2016, Tennessee’s new online standardized state test, TNReady, failed on February’s first day of testing. In Alaska, the state had to cancel its online statewide exams for grades 3 through 10 after numerous schools complained that the online connection to the test was disrupted and student answers vanished. Students in some of the largest school districts in the state of Texas reported log-in problems with the state’s online standardized test in March, while others claimed some of their answers were gone after a computer glitch kicked them out of the online test even though they were not finished with the assessment. She also noted that Nevada received over one million dollars in a settlement from the state’s testing company to administer online tests because the computer servers continually crashed while students were taking the test. Minnesota, Kansas, and Virginia also experienced problems with their online state standardized exams.

Besides the technological issues, teachers also find that using these devices makes it difficult to monitor each student to ensure they use their Chromebooks for educational purposes. Monitoring screen time is especially

important as well. Students are already looking at screens for hours a day outside of school, and requiring them to look at screens for hours during the school day may create new issues. One study of Scottish youth found that overall screen time was a strong indicator of psychological distress independent of physical activity levels (Hamer et al., 2009), while another study of Australian adolescents determined that too much screen time foretold increased loneliness, depression, withdrawal, anxiety, inattentiveness, and aggression (Rosen et al., 2014).

Negative Effects on Student Engagement

To be engaged, students require social interaction and want their learning to be applied to real-life scenarios. Tackling authentic problems engages students and establishes a sense of purpose for learning. Most of today's students do not understand the world without technology because they have grown up with technology in almost every aspect of their lives. Keeping kids on task in the classroom has its challenges and always will. Research indicates that teachers are discouraged with off-task behaviors associated with digital tools in their classrooms. A study was done among college students in 2013 where they were surveyed for the frequency of use, reasons for use, and perceived level of distraction with devices in the classroom. Almost 85.9% of students said they were using devices for texting, 79% said they were checking the time, 68% said they checked email, 66% said they visited social networking sites, 38% said they surfed the Web, and 8% said they played online games (Mccoy, 2013, p. 7). The author concluded that using digital devices hinders students' ability to pay attention during class, negatively impacting their learning ability. Technology use within the classroom presents another distraction for learners. Teachers find students misusing technology during the instructional day daily. Even a user contract or agreement does not stop some students from disobeying the rules. One study conducted by Kuznekoff and Titsworth (2013) found that students who use their cellular phones during class lectures tend to write down less information, recall less information, and perform worse on a multiple-choice test than those students who abstain from using their phones during class. Despite the benefits of using technology in the classroom, if students are distracted during instruction, the advantages of technological use are irrelevant.

Methodology

This study utilized a qualitative research approach using experience-based, descriptive, and visual data to examine the research problem. This study aimed to identify how Chromebook implementation in the classroom affects student engagement. In particular, the data was collected through observations, teacher journals, field notes, and noting students' on and off-task behaviors as they participated in the activities given. The researcher was an active participant observer and a passive observer.

Levels of engagement were explored through a six-week study in a 9th-grade classroom comprised of 28 students using Chromebook one-to-one. As an active participant observer, the researcher got a snapshot of how well the students were immersed in the lesson by gauging their level of participation and interaction. As a passive observer, the researcher monitored students' behavior as they worked independently, paying attention to what they were doing and their degree of progress. In the field notes, the researcher recorded what they saw and heard and their reactions to such observations. The researcher made any necessary changes to the instructional methods from

these observations and notes. Engagement was documented, mainly through the focus, interest, participation in the lesson and activity, and positive social interactions between the teacher and classmates. Sources through which the data was taken were the various tools in Chrome that the students used to complete homework assignments and review for tests. As part of this study, Chromebooks were used almost every day in the 52-minute class period. Specific behaviors were noted regarding the interest and engagement of each student, social interactions between students and teachers, and student preparedness.

Although technology has been a part of teacher instruction for decades, the Chromebook 1:1 initiative is relatively new to schools. Many teachers and administrators are learning to incorporate these devices into the curriculum to make it a part of their students' daily lives. Engagement with students has always been a challenge in the classroom, and with the rise of technology, teachers are learning new ways to keep their students focused and ready to learn.

The participants used in this study were freshmen from a total student population of 2,300. All the students in this high school were given a Chromebook as part of the school's 1:1 initiative. Students were permitted to take their devices home. Teachers were encouraged to incorporate Chrome's various programs into their curriculum. Students were required to bring their devices to class daily, as they used them for various activities as a part of the teacher's curriculum. The students in this study were predominantly Caucasian, mixed genders, and lived in a middle-class, rural town. Three of the 28 students in this study had IEPs with accommodation and specialized services to meet their educational and social-emotional needs. One student was a Spanish-speaking student from South America. He had minimal English-speaking skills. Students had access to their Chromebooks during the school day and at home. They were responsible for the protection, care, and maintenance of their device at all times.

The definition of engagement in this study was the measure of focus, interest, participation in the lesson and activity, and positive social interactions between teacher and classmates. Students are considered "on task" when they come to class prepared with the necessary materials, actively immersing themselves in the lesson, and asking questions or commenting on the activity. "Off-task" behaviors include coming to class unprepared, leaving the classroom for various reasons, social interactions with others unrelated to the activity, not participating in the lesson, and general uninterest.

Results

The results of this study were centered around the research questions.

Research Question One: Will The Tools, Applications, and Programs Used In The Lessons Through Chromebooks Keep My Students Focused?

There were a variety of tools, apps, and programs within Chrome that were used in this study to determine student engagement. These included Canvas, Google Translate, Pronounce, Quizlet, Kahoot, and the tools Google Suite

provides. Students could access these tools anytime with their Chromebooks at school and home. For homework assignments, the researcher used a program called Canvas. Canvas is an online program in which the syllabus, assignments, announcements, assessments, and social and educational interactions are organized together. Since Canvas is online, this eliminates any worksheets or handouts a student would need to put in their folder or book bag. During the six-week study, the researcher assigned homework through Canvas two days a week and then assigned a handout another two days (giving one day free from homework). The researcher noted how many students submitted the homework on time late and whether it was missing or lost. These behaviors are noted in Figure 1.

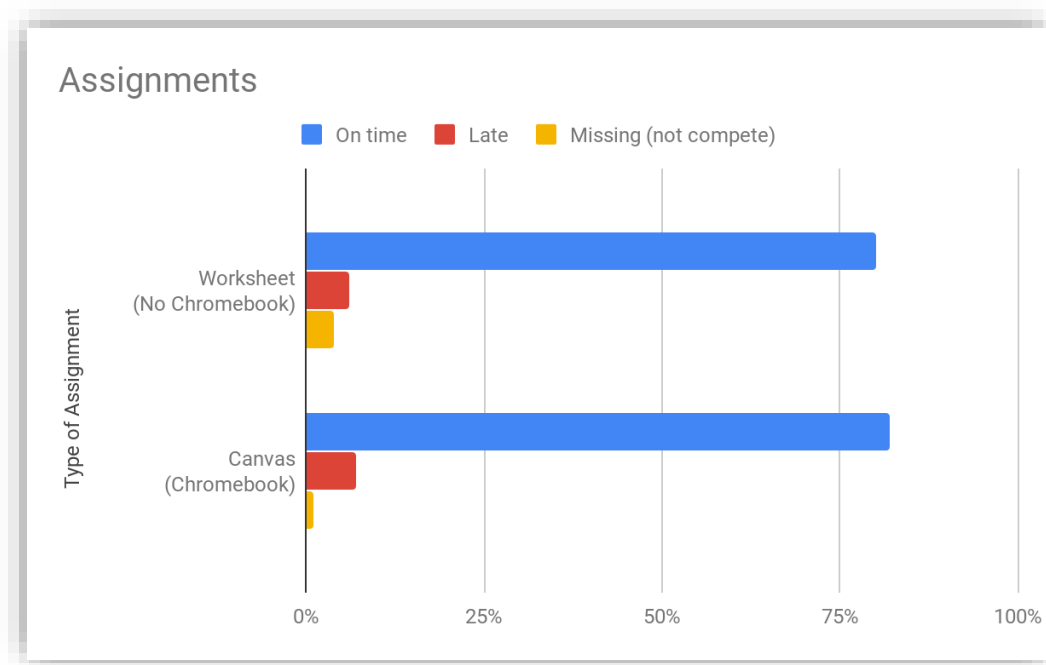


Figure 1. Percent of Assignment Completion Using In-Class Worksheets vs. Using Assignments Online

Figure 1 shows no significant difference in the behaviors observed when given handouts versus the online assignments. Whether given a handout or an online assignment in Canvas, students turned in their homework 80% of the time. The percentage of students turning homework in late was also very close to each other. There was a small percentage gap in the missing assignments, with handouts at 4% and online at 1%. The researcher's direct observations contribute to this slight difference in turning assignments into students losing handout assignments. Online assignments in Canvas cannot be lost.

Research Question Two: Will Interactive Learning Keep Them Motivated And Actively Participating?

Three tests from three different units learned in class were given throughout the six weeks of this research. Before each test, there was a day of review. We used Quizlets, Kahoots, or a review worksheet for review. Review for the tests took the whole class period (approximately 52 minutes) and was conducted the day before each test.

Student engagement during the review is noted in Figure 2.

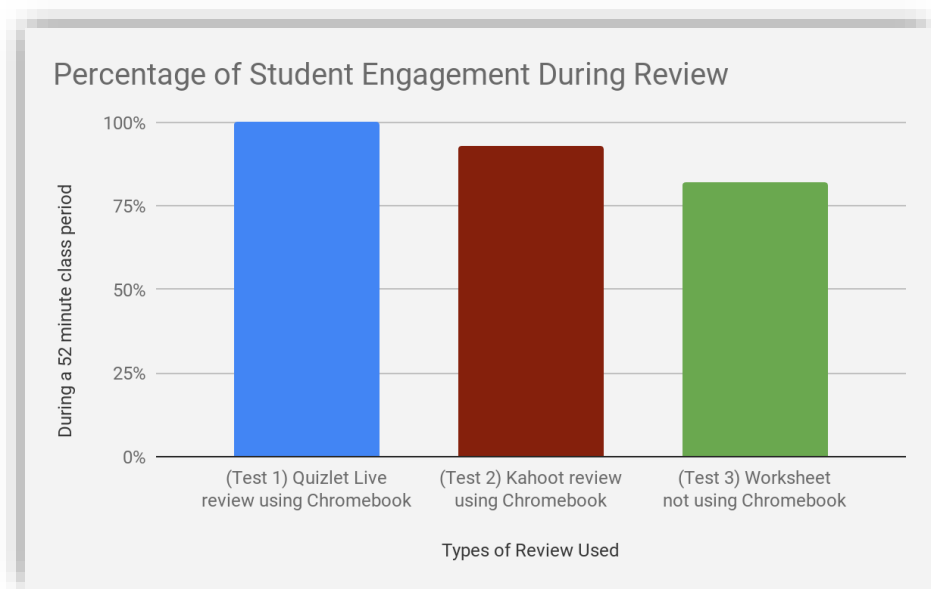


Figure 2. Percent of Student Engagement during Test Review Using In-Class Worksheets vs. Online Review

Figure 2 shows that the Quizlets proved 100% effective in keeping the students focused and actively participating. Each student used their Chromebook to complete the Quizlets, which are Live, and force students to play as if a group game. Students must participate for the group to succeed, as each group competes against each other. All 28 students were actively engaged with Quizlet Live throughout the entire day of review. The Kahoots were completed using their Chromebooks as well. However, Kahoot reviews were completed as an individual effort. The researcher observed a few students discontinue completing the review activity during the review before the second test.

They were logged into the review activity game but were not answering the review questions. Those students' focus was on something entirely different. There was 93% active participation in Kahoots. For the third test, the researcher handed out a review worksheet. Several students expressed their disappointment in doing a worksheet and asked why they were not completing the review activity using Quizlet or Kahoot. The review worksheet was only 83% effective in keeping the students engaged. Students not engaged in the review worksheet were doing other homework, talking to classmates, or working on other non-related activities.

Research Question Three: Will The Applications And Programs In Chromebook Make Planning And Organizing More Efficient, Therefore Keeping Them Engaged And Ready To Learn?

Several applications and programs within Chromebook effectively made planning and organizing more efficient for both the student and the teacher. A particular application called Pronounce was an engaging tool for students who needed test readers. This application is a text-to-speech program with a natural voice that reads aloud any part of the text the student highlights. This application alleviated the manning to obtain the appropriate staff to

read tests. Pronounce also kept these particular students engaged by giving them the independence to choose how they wanted to use the app for themselves and to be able to organize which tests, essays, and any other online homework assignment they wanted to read aloud.

Another tool that was useful for engagement was the Google Translate application. A Spanish student used Google Translate for every assignment, helping him translate and learn English throughout the instruction. This application helped the student keep up with his learning, as the course was fast-paced. His quizzes/tests and conversations with the other students or the teacher were easily translated through this application.

Discussion

Based upon previous research in the literature compared to this study, there have been both positive and negative effects on 1:1 Chromebook use and student engagement. Having students with diverse needs makes it challenging to find the appropriate and helpful tools to accommodate their specific requirements. As Maine Township and PUHSD observed, Chromebooks and G Suite did help with their diverse student population. (Cortez 2016). Although assessment scores or truancy were not measured in this particular six-week study, the effectiveness of Chrome's tools for my students with various needs proved beneficial. Access to the Pronounce application when necessary and Google Translate available for my non-English speaking student was essential in keeping those students in line with the current instruction without wasting necessary educational time.

When Diettrich and Balli (2014) reported that students were more interested in lessons when required to use technology in front of their peers instead of the teacher using technology to present information, I found this was also evident in this study as the students used Quizlets and Kahoots as a review for their tests. The students enjoyed using these interactive online games. Competing against each other and participating as a class kept them more engaged than working on the review handout alone. They also observed that 1:1 devices gave students control over their learning experience. They were authentically engaged when learning by doing or using the technology themselves instead of watching others use it.

However, technology may also produce some adverse outcomes as well. Districts have run into problems with the infrastructure and do not have enough bandwidth to support numerous internet users simultaneously (Herold, 2016). Unfortunately, technology presents issues for students and teachers. When managing a school full of devices running simultaneously, setbacks may arise. Figure 3 shows the challenges with the Chromebooks during the six-week study. Although only 10% of the students were affected, the technical issues that these students faced were out of their control. These issues included slow or no internet connection and glitches in the system. Almost half of the students in the study had no issue with their devices. However, other problems, such as recharging or simply forgetting their device at home, did occur. These are common issues when using technology in the classroom, especially with a 1:1 device where the student is solely responsible for their Chromebook.

Teachers also find that using these devices makes it difficult to monitor each student to ensure they are using their Chromebooks for educational purposes. This was observed while using the Kahoot review before the test, as a

few students were engaged in something entirely different than the task.

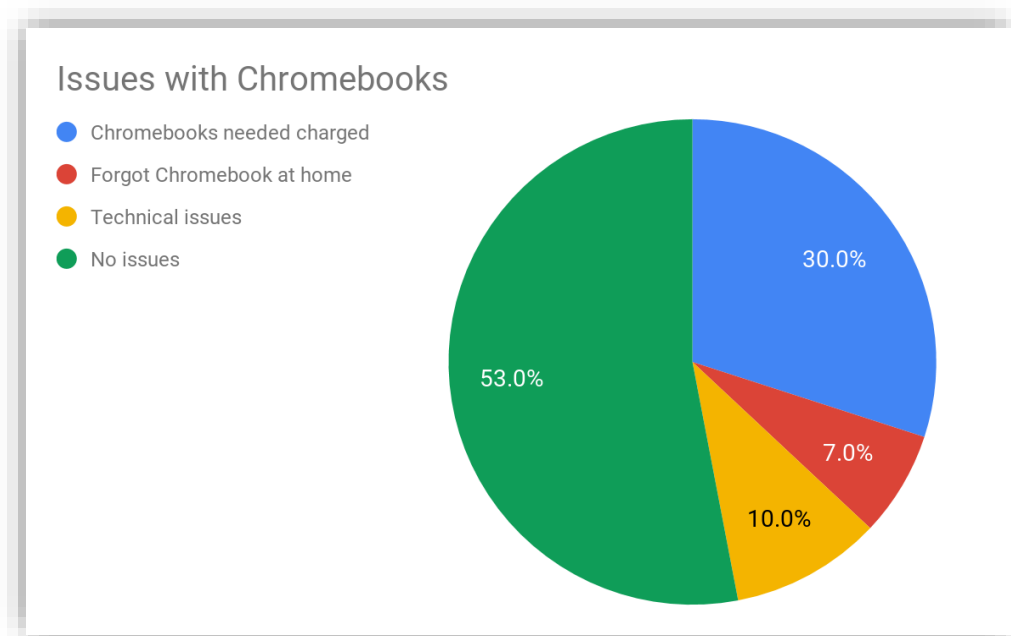


Figure 3. Percent of Issues Students Faced Using Chromebooks

With the tools and programs used, in particular with this study, students benefited from receiving quicker feedback on assignments and tests, online access to announcements and student learning objectives, and homework assignments that were readily available. With Chromebooks, losing assignments is impossible, as all work is stored in Canvas and available anytime. These benefits were vital in keeping the students focused and engaged in their learning.

Conclusions and Recommendations

According to this study, the data indicates that student motivation levels are slightly higher when using Chromebooks than students who are not using Chromebooks. The many tools that Chrome offers students proved beneficial for their learning. The use of Chromebooks also seemed to increase the student's level of enjoyment, especially in reviewing for the tests, expressing their delight in these online review games. An increase in participation and improvement in organization and focus are observed.

Based on this study's findings, increasing Chromebook use would seem to be the logical recommendation for the continued growth of student motivation. Technology seems to play a central role in student learning. By now, almost all classrooms have incorporated technology as part of their curriculum, as it prepares students for their future and the opportunities ahead. Administrators are responsible for the 1:1 implementation of Chromebook devices, and teachers are responsible for utilizing these devices in the classroom. However, issues involving technology will always be a concern. Although the benefits of each student having their own Chromebook are great, some disadvantages accompany that responsibility. Online learning and technology implementation may be the standard in today's schools, but teachers must always have a backup plan for instances where technology

cannot be relied upon. The traditional pencil/paper assignment should not be eliminated. When systems are down and devices are forgotten at home, educators must be prepared to modify their instruction to reach all students properly. Teachers must know which online tools best fit the curriculum and continue monitoring the engagement levels to support their students' learning. This is an ongoing process, as technology is constantly changing. The applications and tools on Chromebook will continue to be modernized, new tools will be introduced, and the old will become outdated. Teachers must be disciplined to keep up with these changes to meet their student's needs and individual learning styles.

Reflecting on this study, however, the positive impacts the tools in Chromebook have made on those particular students who needed differentiation outweigh some of the previously discussed challenges. Without Google Translate, the Spanish-speaking student would not have been able to understand or keep up with the material at the same pace as the other students. Translating would have been a struggle and might have caused the student's focus to decline. The test reading application on Chromebook eliminated any time wasted and helped build these students' confidence level by being in control of their learning. These kinds of applications should continue to be used to enhance student learning. Teachers must stay educated on the many types of learning tools in Chromebooks in order to serve those students with special requirements.

Based on this researcher's experiences, this study has some limitations. Because of the content being taught, specific lessons allowed for more educational activities on the Chromebook than others. There may be other opportunities for the students to research and use the online resources for other content areas. However, not all content being taught necessarily calls for a need to include technology; therefore, Chromebooks will not always be integrated. In this research, the researcher incorporated hands-on learning and real-life application. Chromebooks and other forms of technology may not be used regularly. This may be the case for different subjects and at various times during instruction.

Overall, the research showed increased student engagement when using Chromebooks. The researcher hopes to see these results translate into better academic achievement. However, this research must be ongoing and measured throughout the year. Ongoing monitoring is the key, as not all students fit into the same category regarding learning styles and preferences. Technology has become the center of students' world. Teachers must provide students with the skills to adapt as they learn new and exciting educational tools, and we must continue preparing them for their future.

References


- Bouterse, B., Corn, J.O., & Halstead, E.O. (2009). Choosing the perfect tools for one-to-one. *Learning & Leading with Technology*, 37(1), 14-17.
- Brenneman, R. (March 22, 2016). EducationWeek. *Gallup Student Poll Finds Engagement in School Dropping by Grade Level*. Gallup Student Poll Finds Engagement in School Dropping by Grade Level (edweek.org).
- Burns, M. (July 1, 2015). George Lucas Educational Foundation. *The Common Core and Digital Skills*

- Development. <https://www.edutopia.org/blog/common-core-digital-skills-development-monica-burns>.
- Google Inc. (2011). *Chromebooks for Education*.
https://static.googleusercontent.com/media/www.google.com/en/us/chromebook/static/pdf/Chromebooks_for_Education.pdf
- Collier, L. (June, 2015). *Grabbing Students*. American Psychological Association
<https://www.apa.org/monitor/2015/06/grabbing-students>.
- Cortez, M. (December 2016). EdTech. *Chromebooks and G Suite for Education Boost Student Engagement and Learning*. <https://edtechmagazine.com/k12/article/2016/12/chromebooks-and-g-suite-education-boost-student-engagement-and-learning>.
- Demski, J. (2012). The hard(ware) choice. *THE Journal: Technological Horizons in Education*, 39(9), 28–35.
- Dietrich, T., & Balli, S. J. (2014). Digital natives: Fifth-grade students' authentic and ritualistic engagement with technology. *International Journal of Instruction*, 7(2), 21-34.
<https://files.eric.ed.gov/fulltext/EJ1085266.pdf>.
- Donovan, L., Green, T., & Hartley, K. (2010). An Examination of One-to-One Computing in the Middle School: Does Increased Access Bring about Increased Student Engagement?, *Journal of Educational Computing Research*, 42 (4), 423–441. <https://doi.org/10.2190/EC.42.4.d>.
- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School Engagement: Potential of the Concept, State of the Evidence. *Review of Educational Research*, 74, 59-109.
<https://doi.org/10.3102/00346543074001059>.
- Hamer M, Stamatakis E, Mishra G. Psychological distress, television viewing, and physical activity in children aged 4 to 12 years. *Pediatrics*. 2009 May;123(5):1263-8. DOI: 10.1542/peds.2008-1523. PMID: 19403489.
- Heyboer, K. (2016, April 21). N.J. PARCC Joins Growing List of Exams Plagued by Tech Glitches. NJ.com.
https://www.nj.com/education/2016/04/nj_parcc_joins_growing_list_of_exams_plagued_by_co.html.
- Herold, B. (2016, February 3). PARCC Scores Lower for Students Who Took Exams on Computers. *Education Week*. <https://www.edweek.org/teaching-learning/parcc-scores-lower-for-students-who-took-exams-on-computers/2016/02>.
- Kuznekoff, J., & Titsworth, S. (2013). The impact of mobile phone usage on student learning. *Communication Education*, 62(3), 233-252.
- Mills, G. E. (2018). *Action Research: A Guide for the Teacher Researcher*. New York, NY: Pearson Education, Inc.
- McCoy, B. (September 2013). Digital distractions in the classroom: Student classroom use of digital devices for non-class related purposes. Faculty Publications, College of Journalism & Mass Communications, University of Nebraska, Lincoln. Digital Distractions in the Classroom: Student Classroom Use of Digital Devices for Non-Class Related Purposes (unl.edu).
- Rosen LD, Lim AF, Felt J, Carrier LM, Cheever NA, Lara-Ruiz JM, Mendoza JS, Rökkum J. Media, and technology use predicts ill-being among children, preteens and teenagers independent of the negative health impacts of exercise and eating habits. *Comput Human Behav*. 2014 Jun; 35:364-375. doi: 10.1016/j.chb.2014.01.036. PMID: 25717216; PMCID: PMC4338000.


- Singer, N. (2017, May 13). How Google took over the classroom. *The New York Times*.
<https://www.nytimes.com/2017/05/13/technology/google-education-chromebooks-schools.html>
- Spires, H. A., Wiebe, E., Young, C. A., Hollebrands, K., & Lee, J. K. (2012). Toward a new learning ecology: Professional development for teachers in 1:1 learning environments. *Contemporary Issues in Technology and Teacher Education*, 12(2) 232-254. <https://citejournal.org/wp-content/uploads/2016/04/v12i2currentpractice1.pdf>.
- U.S. Department of Education. Office of Elementary & Secondary Education. (September 3, 2013). <https://oese.ed.gov/archived/oii/use-of-technology-in-teaching-and-learning/>.

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