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The effects of blended learning on K-12th grade students

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Abstract

Blended learning is used to incorporate technology into the classroom and to aid in instruction. This literature review examines the effects of blended learning on student engagement, student achievement, and student perception in K-12th grade classrooms. Twenty-five peer-reviewed studies published between 2008 and 2016 were selected for analysis in this review. The reviewed research indicates that student engagement, student achievement, and positive student perceptions of learning increased when blended learning was used. Students also developed additional skills through the use of blended learning, such as the ability to self-pace and self-direct. Future research into implementing blended learning in K-12 classrooms was recommended.

The Effects of Blended Learning on K-12th Grade Students

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Abstract

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Keywords: *blended learning, engagement, K-12, elementary, secondary*

Table of Contents

The effects of blended learning on K-12th grade students

Recent test scores from around the world show that education in the United States continues to lag behind other developed nations (DeSilver, 2015). At the same time, the job market within the United States is changing and demanding a workforce that is more skilled and technologically savvy. Many business leaders point to 21st century skills, including technology skills, as the way to train the workers of the future and increase test scores for US students (Rotherham & Willingham, 2009). One way that teachers are meeting this need is through the use of blended learning.

The term blended learning involves technology in the classroom. More specifically, it refers to the use of online sites and apps to deliver a portion of the curriculum while the teacher facilitates instruction (Smith, 2015). In an early review of blended learning, Garrison and Kanuka (2004) defined blended learning as more than just adding-in technology but providing a "thoughtful integration of classroom face-to-face learning experiences with online learning experiences (p. 96)." The key difference, according to Garrison and Kanuka, is that teachers cannot just repackage old material and throw it online. Instead, teachers must rethink how to deliver and receive content in order to encourage students to think more creatively and more critically. Instead of a classroom that is taught purely by a face-to-face teacher or purely in an online setting, blended learning combines online content with face-to-face instruction and guidance. The intention is to allow students to get help from the expert, the teacher, while working on applying the concepts that they are learning via online apps and educational websites.

While many people have promoted the idea of blended learning as a magical cure that will fix education, there is a definite need for a comprehensive look at what actual studies are

finding. The literature on blended learning is quite diverse, but the majority of literature reviews, to date, have focused on blended learning at the college or graduate school level or have focused solely on the effect on achievement. A U.S. Department of Education (2009) meta-analysis of blended learning found that blended learning does provide higher student outcomes, but it noted that most of the research that it was reviewing had occurred at the college and graduate level, not at the K-12 level. It recommended an increase in studies done at the K-12 level.

The research at the K-12 level has slowly been accumulating, but it has not been thoroughly examined. Means, Toyama, Murphy, and Baki (2013) did a meta-analysis of research done on blended learning from middle school to graduate programs. This analysis looked at face-to-face learning compared to blended learning compared to online learning, and it found that blended learning produced higher scores compared to face-to-face classes and higher scores than just online learning alone. The analysis also noted that there was no difference between younger learners and older learners in terms of the effectiveness of blended learning. This analysis, however, was quite broad and covered learners aged thirteen through forty-four. A different meta-analysis, done by Cheung and Slavin (2013), was much more narrow and focused on blended learning in K-12 for mathematics classrooms. They found that blended learning produced a small but positive effect on student achievement in mathematics with a slightly higher effect on elementary school students as compared to secondary students. All three of these meta-analyses focused solely on achievement instead of looking at other effects that blended learning might have.

When looking at the research into blended learning in kindergarten through high school, three major themes emerge in terms of the effects:

- engagement
- achievement
- student perceptions.

Achievement and student perceptions are easily defined, but engagement is a trickier concept. While there are many definitions of engagement, perhaps the simplest way to define it is "the time and energy students devote to educationally sound activities (Kuh, 2003, p. 25)." One problem with this definition, and with engagement in general, is that it is difficult to measure. Most studies respond to this difficulty in one of two ways: using researcher observations or measuring on-task behaviors.

Differing from the other studies mentioned above, this literature review includes four specific elements. First, this review will focus specifically on blended learning in kindergarten through twelfth grade classrooms, and it will cover literature from the last ten years. Second, measures of engagement will include researcher observations and measuring on-task behaviors. Third, this review will also cover student achievement, measured through pretests and posttests as well as measured through standardized testing. Fourth, it will cover student perceptions of blended learning compared to a face-to-face classroom as well as student perceptions of blended learning compared to online learning.

This review is largely written for teachers and administrators. By looking at the effects of blended learning, this review will show the potential benefits as well as potential lack of benefits or even downsides to using blended learning. This will help administrators make decisions on whether or not to focus funding towards hardware and software that enables blended learning, while also helping teachers decide whether to pursue a blended learning approach within their own classrooms.

Methodology

In order to find relevant articles to review, a search was conducted using both ERIC and Google Scholar. The search terms used in the ERIC search were *secondary* AND *blended learning*, *blended learning* AND *engagement* AND *secondary*, *blended learning* AND *middle school*, *electronic learning* AND *secondary*, *blended learning* AND *elementary*, *electronic learning* AND *elementary*. ERIC was used as a database because it focuses on education, and it allows the user to limit the search to peer reviewed articles. Two search methods were then used to further the number of articles under consideration. The first method was to look for articles that cite the existing article, and the second method was to look at the articles that are cited in the existing article. Google Scholar makes it easy to do both methods.

Once the searches were conducted, the articles were narrowed down to include only articles from peer-reviewed journals that had been published in the last ten years and that included research that took place in a K-12 setting. Some of the articles used the terms *flipped classroom*, *hybrid learning*, or *electronic learning*, but the researchers did use more of a blended learning approach. All of the articles chosen used blended learning by integrating online technology into the classroom and using it to deliver a portion of the curriculum. Articles that did not meet these criteria were removed from the list.

After narrowing the list of articles down, each of the remaining articles was evaluated for reliability. The journals were examined to determine that they were all peer reviewed. Because the journals, and therefore the articles, were all peer reviewed, the authors, themselves, were not evaluated as extensively. Instead, focus was given to evaluating the research methods of the articles chosen. All of the articles used either qualitative or

quantitative research to explore the effects of blended learning. Articles that focused solely on opinion were removed from the list. The remaining articles were cut down further by looking at the quality of the research. Preference was given to articles with larger sample sizes for quantitative research or higher quality participants for qualitative research. The research process was cyclical. As good, quality articles were added to the final list, the additional search methods that looked at the citations were applied to those articles to find additional, high quality sources, which were then evaluated. Ultimately, twenty-five high-quality research articles published in the last ten years were chosen for analysis.

Analysis and Discussion

Blended learning brings online technology into the classroom. Prominent leaders in the United States have promoted blended learning as a way to increase student engagement and, ultimately, student achievement (Rotherham & Willingham, 2009). But does blended learning actually increase student engagement and achievement? How do students respond to blended learning? This review will look at engagement, measured by observations and on-task behavior; achievement; and student perceptions of blended learning.

Engagement Through Observations

One way that researchers determined whether or not students were engaged was through observations. Researcher observations of student behavior overwhelmingly supported the idea that engagement is increased through blended learning. Camahalan and Ruley (2014); Huang and Hong (2016); Bottge, Ma, Gassaway, Toland, Butler, and Cho (2014); and Smith and Suzuki (2015) observed treatment groups of students using blended learning while the control group was in a traditional classroom, and all three studies included observations that students were more engaged in the treatment group. Other studies used an

action research format without control groups. Curwood and Cowell (2011) explored how implementing a blended learning unit into their curriculum would impact their students. While they had no control group, they did compare the results of blended learning to previous years of student observations and felt that students were more engaged in the blended learning environment than they had been in a traditional setting. Jacobs (2014) and Zaka (2013) also did not use control groups in their case studies, which looked at schools that had implemented blended learning to determine what made that implementation successful, but they both found that student engagement increased, which helped with the overall success of blended learning.

Camahalan and Ruley (2014) used observations of students as one measure of the effect of blended learning on students in an English classroom. They focused their research on writing at the middle school level and used a relatively small sample size of only sixteen students in one school. The students were divided into a control and treatment group, and the lessons focused on grammar. Overall, the treatment lasted two weeks. The researchers observed that students in the treatment group appeared to be more engaged in their task. Because of the smallness of the sample size, it is difficult to generalize these findings.

Huang and Hong (2016) had a slightly larger sample size in their study of Taiwanese tenth grade English students. In their study, 40 students were placed in the control group and 37 in the experimental group for a twelve-week long study. Huang and Hong were looking specifically at whether or not blended learning increased English reading comprehension and Information and Communication Technology (ICT) skills. At the end of the twelve-week experiment, they found that students in the experimental group, who had participated in blended learning, had shown a significantly larger increase in their ICT and English reading

comprehension skills than those in the control group. The researchers argued that this increase in skills was because students were more actively engaged in using the technology. Because this study had a larger sample size and lasted for a significant amount of time, it is easier to generalize the findings and argue that blended learning caused a sustained increase in engagement for the students involved in this study.

Bottge et al. (2014) found similar results using a much larger sample size. In their study, Bottge and his colleagues looked at 335 students with disabilities in 31 different middle schools. In the control group, teachers continued to teach as they normally did, but in the treatment group, they used "Enhanced Anchored Instruction (EAI)," which consisted of computer-based interactive lessons and videos in addition to regular classroom instruction (p. 424). The activities were largely conducted via a special software, though the researchers implied that the Internet was also used for this instruction and in completing the projects for each unit. The research team observed that in the treatment group, students were more immersed in the hands-on and application activities provided by EAI than in the traditional, more lecture-based control group.

Smith and Suzuki (2015) take the observations of Camahalan and Ruley, Huang and Hong, and Bottge et al. one step further and extrapolate a reason for students being more engaged in a blended classroom. In their study, Smith and Suzuki observed 56 secondary school mathematics students in a quasi-experiment. The control group received the traditional lecture format of the class while the treatment group gained access to embedded multimedia content, which is multimedia content that is embedded in a website for easy access. Much of this content was lectures and study materials recorded using screen capture software and were made available on Google Drive so that students could watch the lectures

outside of class, if they wished, and they could re-watch lectures and pause as needed. Smith and Suzuki observed increased engagement within the treatment group, and they argued that this was due to the fact that students were quieter in the classroom while they watched the videos, which led to fewer distractions for other students. While there were other factors that may have increased engagement, Smith and Suzuki pointed out the importance of a quiet classroom to help students focus.

Curwood and Cowell (2011) argued that the engagement in a blended classroom, a classroom where blended learning occurs, comes not from a quieter classroom but instead from the ability of students to explore new ideas. Curwood and Cowell led a two-year action research project in a high school English classroom focusing on creating digital poetry. They had students write poetry in the traditional way first using pencil and paper, and then, using iMovie, the students digitized their poetry to try to express what their poems meant. In the first year, they focused more on the tool and were unhappy with the results, so they modified the experiment in the second year to focus more on the content and on creativity and to let students explore the tool to the depth they wished. In the second year, Curwood and Cowell noticed the students were much more deeply engaged in the task because they were given new opportunities to be creative and try new ideas.

Both Jacobs (2014) and Zaka (2013) looked beyond a single classroom at how blended learning affected entire schools, and they found that it increased engagement throughout the school. Jacobs looked at eight schools in Oakland, California that had implemented blended learning. While the first year was a struggle because too much was implemented at once, the second year produced better results. Jacobs argued that this proved the need to “go slow to go fast” when implementing blended learning (Jacobs, 2014, p. 37).

In the second year, teachers focused on blending learning with just a few targeted programs instead of trying to implement a large number of new technologies at once. Teacher surveys in the second year reported higher levels of student engagement once the changes were made. Zaka (2013) looked only at one school in New Zealand, but he focused on how that school had successfully implemented the change and what blended learning meant for all of the stakeholders involved. After interviewing principals, teachers, and students, and observing multiple classrooms, Zaka pointed out that one of the most positive elements of blended learning was the increase in student engagement and motivation that came with blended learning. She argued that blended learning required more interaction and collaboration, which led to the projects being more open to a public audience because students were able to view one another's work. This led students to a higher level of motivation to work hard and produce quality work.

From these various studies, it is clear that blended learning increases observed engagement when it is implemented properly. In some classrooms, blended learning can create a quiet environment that promotes student engagement solely with the material (Smith and Suzuki, 2015). In other classrooms, it is not the quiet but the increased opportunity for creativity as well as the possibilities for interaction and collaboration among students that increase student engagement (Curwood & Cowell, 2011; Zaka, 2013). As Jacobs (2014) pointed out, however, successful implementation of blended learning needs to place emphasis on deliberate implementation of technology, and success was found when teachers were able to move at a reasonable pace with administrative support of the program in place. While Zaka and the other researchers' observations give insight into how and potentially why students are more or less engaged in a classroom, they rely primarily on observation and

qualitative data, which is rather subjective. A more objective way to look at engagement is to actually measure on-task behavior to demonstrate a numerical difference or lack of difference between traditional and blended classrooms and blended classrooms and online learning.

Engagement Identified through On-Task Behavior

On-task behavior is another factor that can be affected by blended learning. On-task behavior can be defined as student participation during class or as the level of task completion at the end of the class. Researchers' results about on-task behavior were mixed. Smith and Suzuki (2015) and Light and Pierson (2014) both saw increased work completion and on-task behavior in a blended learning classroom. They attributed this to the ability to self-pace. Conversely, de la Varre, Keane, and Irvin (2011) as well as Najafi, Evans, and Federico (2014) both found that students in the treatment group, who used blended learning, had the same level, or even a slightly lower level, of on-task behaviors as those in the control group, who were using only online learning. Because they were not comparing students to a control group in a traditional classroom, however, it is difficult to compare these results to the other studies in this review. By looking at the types of activities that the different studies used, it is possible to compare at least the blended portions of the different studies. De la Varre et al. (2011) and Najafi et al. (2014) both used activities that were not as fully blended as classes that saw increased student engagement through on-task behavior. It is possible that the blended learning being used in these studies was not as effective because it was not well executed.

Positive identification of on-task behavior.

Both Smith and Suzuki (2015) as well as Light and Pierson (2014) had similar findings that indicated that on-task behavior increased with blended learning. Smith and

Suzuki observed that more students took adequate notes in the blended learning classroom at one school, which they attributed to an increased ability to self-pace, allowing students to complete all lectures, even when they were absent. Light and Pierson also saw self-pacing as a key for student completion of work. Light and Pierson completed their research in four Chilean schools that were similar to charter schools. To give a basis of comparison, Light and Pierson also observed classrooms in a fifth school that was a public school in Chile. Teachers in all five schools were using Khan Academy for classes from fourth grade through twelfth grade. Through observations and interviews with administrators and students, the researchers concluded that students were completing more problems in these classrooms than they would in a regular classroom because they had the ability to self-pace and work at their own level within the Khan Academy online materials. One issue with these results, however, is that there is no control group for comparison. These results are based on Light and Pierson's perceptions as well as administrator and student perceptions of how much work they would complete in a traditional classroom instead of their blended classroom.

Negative identification of on-task behavior.

Not all researchers found that engagement and on-task behavior increased with the use of blended learning. Both de la Varre et al. (2011) and Najafi et al. (2014) found that students were equally engaged or even less engaged in a blended classroom. De la Varre et al. (2011) found in their research that some students were less likely to participate because of a lack of immediate teacher feedback in some blended learning programs. They did a two-year Randomized Control Trial with 700 students at 93 rural high schools across the United States with a focus on online distance education. The study used a control group, which did online distance education with a facilitator who only answered technical questions and kept

students on-task, and a treatment group, which had a facilitator who would interact more with students by offering tutoring sessions, encouraging students to keep with the program, answering questions, and leading discussions, which made these online distance courses more of a blended environment. In this particular study, however, the facilitator was not the course instructor, and feedback was usually asynchronous, meaning that students did not hear back immediately from the actual instructor. This led to frustration for many of the students, and the observers found that students who participated at higher levels in traditional classes participated and asked questions less in the blended course because of the disconnect with the instructor. This particular study looks at an extreme of blended learning where most of the content is online while only a small portion of class is done in the physical classroom, which could have contributed to the disconnect for students. Teacher feedback is an important aspect of learning, so having minimal teacher feedback likely created a disconnect and lower engagement for these students.

In a more balanced blended learning environment, Najafi et al. (2014) found that on-task behavior did not increase for the blended students. This study followed 29 Canadian students in a college preparatory high school who were taking an economics course. The instructor had students enroll in a Massive Open Online Course (MOOC) and complete lessons within the MOOC as part of their instruction in the course for three weeks. The control group did not meet as a class during these three weeks. The treatment group met once a week with the instructor for an hour. The research team used clickstream data from the MOOC to track student on-task behavior including how many of the videos students actually watched, how many practice quizzes they took, and how many times they retook quizzes for a higher score. Clickstream data tracks what students have clicked on within the MOOC. It

cannot tell whether students are actively engaged in what they click on, but it can tell whether or not they have taken the time to click through the different components of the MOOC.

In this study, Najafi et al. found that the clickstream data for students in both groups had no statistically significant differences, and the treatment group actually watched slightly fewer videos than the control group. One flaw of this study is that it took place in a college preparatory school, which has students who are more likely to be self-motivated, which could have led to the control group having higher numbers of task completion than would be seen in a public school. Another flaw is that it relies on clickstream data, which cannot tell whether students actively watched the videos and absorbed any of the content. Nonetheless, it is important to note that in both of these studies, students in a blended classroom did not engage more, as measured by their time on-task, than those in a purely online classroom (de la Varre et al., 2011; Najafi et al., 2014). In studies comparing a blended classroom to a traditional classroom, however, data indicates that students do complete more tasks in the blended environment (Light & Pierson, 2014; Smith & Suzuki, 2015). While task completion may be higher in a blended classroom than in a traditional classroom, that does not always mean that students are achieving at a higher rate. If schools are going to invest in the technology necessary for blended learning, it is important to consider not just whether or not it will engage students, but whether it will help them achieve more.

Achievement

When it comes to achievement, the results are quite varied, though more researchers found positive results than negative. Many researchers did find statistically significant increases for the experimental group that used blended learning when compared to a group

that used traditional, face-to-face teaching (Bottge et al., 2014; Camahalan & Ruley, 2014; Hall, Cohen, Vue, & Ganley, 2015; Huang & Hong, 2016; Kazu & Demirkol, 2014; Smith & Smith, 2012; Yapici & Akbayin, 2012). Other studies that did not use a control group also found increases in achievement for students (Ahn, Beck, Rice, & Foster, 2016; Capponi, Nussbaum, Marshall, & Lagos, 2010). Despite these positive results, there were other studies that produced mixed results where blended learning did not provide statistically significant results for all of the students (Billingsley, Scheuermann, & Webber, 2009; Chang, Shu, Liang, Tseng, & Hsu, 2014; de la Varre et al., 2011; Jacobs, 2014; Leo & Puzio, 2016; Smith & Suzuki 2015). Finally, there were two studies that actually showed that students in the blended learning group had slightly lower scores than those in the control group (Najafi et al., 2014; Siko, 2014). The reasons for positive gains in blended learning compared to mixed results or negative gains are complex and varied, but many of them relate back to the quality of the study itself and the way that blended learning was implemented.

Positive results.

Many different studies found positive results in achievement for blended learning. Kazu and Demirkol (2014) performed a six-week long study with 54 twelfth grade biology students in Turkey. The students in the blended learning group, which had access to a class blog that allowed them to answer questions, interact, and take notes collaboratively, scored statistically significantly higher on the posttest than students in the control group, which was a traditional, face-to-face classroom. Curious, Kazu and Demirkol looked at whether or not gender played a role in this outcome, but they found that while females did score higher in both groups, there was no significant evidence that one method worked better for one gender over the other.

Reasons for positive results.

Camahalan and Ruley (2014) and Capponi et al. (2010) also found that students in a blended environment had significant increases in achievement, but they delved further than Kazu and Demirkol by looking for a reason for this increase. Camahalan and Ruley (2014) looked at middle school students in a writing program. Although their sample was small with only sixteen students, they did show statistically significantly higher scores with the group that used blended learning compared to the group using traditional, face-to-face learning. Through observations, Camahalan and Ruley concluded that the increase in scores was because the teacher was able to spend more one-on-one time with students, which helped to increase their understanding of the material. Capponi et al. (2010) also determined that increased interaction with the teacher was key to increasing student achievement. Originally, their experiment was set up to be primarily online learning. They wrote a script that they expected students to follow as they solved online problems independently on their electronic devices. Instead, they found that students continually violated the script by seeking help from the teacher on the problems. This led the researchers to develop a more blended learning script that allowed students to interact with the teacher as they worked independently. After modifying the script, student achievement went up. These two studies show an increase in student achievement due to teacher interaction within a blended classroom when compared to a face-to-face classroom as well as compared to a purely online classroom.

Positive results related to higher-order and lower-order skills.

Another question that researchers sought to answer was whether or not blended learning was more suited to simple skills or complex skills. Both Huang and Hong (2016) and Ahn et al. (2016) determined that blended learning can help students with lower level

skills that require rote memorization or were best suited to drilling. Huang and Hong studied 77 Taiwanese students in an English classroom, and they found that students had statistically significantly higher English reading comprehension scores after spending twelve weeks using blended learning when compared to the control group, which used only face-to-face learning. Much of the online portion of the class involved watching videos or participating in English language drills, which are lower level skills.

Ahn et al. (2016) also found that blended learning can be successful for lower level skill achievement. They studied 9,204 mathematics students in the District of Columbia Public Schools who were in grades four through eight. The researchers focused on demographics and time in the program, First in Math (FIM), and how those two factors compared to student achievement results. They found that time in the program was important for lower achieving students, who had much higher gains in their achievement than students who were already high achieving. The program was one that focused on basic, rote drills, and the researchers determined that it was very effective for lower achieving students who may be missing some of the basic skills that the program focused on. They argued that even twenty hours of rote math drills using FIM per school year could improve scores for lower achieving students and is worth the time and investment for the district. In both studies, basic skills were enhanced through the use of blended learning.

Smith and Smith (2012), however, argued that it is not lower level skills that are best learned in blended learning but higher level skills. They studied 51 secondary students in California that were in a Computer-Aided Design course. While the experiment only lasted one week, it produced statistically significantly higher scores for the experimental group, who used blended learning through online videos to explain the content, when compared to

the control group, who learned the material using a textbook. Smith and Smith specifically noted that student scores for the experimental group were highest on the more complex tasks and not as significantly higher on the simpler tasks. They argued that this showed the potential impact of blended learning on higher level skills because it offers students a variety of ways to access the material to reach a wider variety of learners.

Positive results related to types of activities.

This ties into the idea of types of activities and how they affect the results of blended learning. Yapici and Akbayin (2012) and Bottge et al. (2014) both had significant gains in their blended learning group when compared to their traditional learning group, and they attributed these gains to appropriate use of blended learning. Yapici and Akbayin (2012) performed their study with 107 ninth grade biology students in Turkey over the course of eleven weeks. During that time, the blended learning group participated in a wide variety of activities, including watching videos and online animations, participating in online discussions, and completing follow-up homework assignments and online quizzes. This exposure to a variety of activities led to higher student engagement with the material and statistically significantly higher scores. Bottge et al. (2014) worked with 335 students with disabilities in mathematics. They had their blended learning students participating in a computer-based interactive program that required more hands-on work and video problems. They also noted higher levels of engagement, which they tied to their achievement scores. Students in the blended learning group had statistically significantly higher scores than those in the control group, which used just face-to-face methods.

Positive results for students with disabilities.

Bottge et al.'s (2014) study also shows the ability of blended learning to positively affect achievement for students with disabilities. This ability is also shown in Hall et al.'s (2015) study, which looked at using blended learning with students with learning disabilities. Hall is a researcher with CAST, a special education company that also creates software for classrooms, and she and her team implemented a new software at four middle schools from four different school districts in the northeastern United States. The study had 284 students participating, and 73 of those students had either a learning disability or health issue that required an IEP. The control group used digital books that had some interactive content, but they did their Curriculum-Based Measurement (CBM), or formative assessments, using pencil and paper. The treatment group had their CBM embedded in the program so that students could complete it as they were reading. The study found that students had statistically significantly higher scores in the treatment group that used the online, embedded supports, and students with learning disabilities had an even higher increase of more than 10% when compared to students in the control group. These two studies show the possibilities for blended learning to increase student achievement for students with various disabilities.

Mixed results.

Billingsley et al. (2009), however, found mixed results when it came to using blended learning with students with disabilities. They did a study with ten high school students with emotional and behavioral disabilities in a self-contained classroom. During the study, they rotated between three treatments - traditional face-to-face, blended, and purely online learning - in order to teach nine concepts over nine weeks. At the end of each concept, the students took a quiz over it, and at the end of the nine weeks, the most successful method was

used to teach a tenth concept. The researchers found that the most successful method was blended learning, but no single method worked best for all of the students. Some students were not successful at all with blended learning. This study was flawed, however, due to its small sample size and problems with the targeted population. The study ended up missing several data points due to student refusal to work, which is not unusual for students with emotional and behavioral disabilities. Despite the mixed results, this study does show some positive benefits of blended learning for some students in this population.

Several other researchers have found mixed results when it comes to blended learning where scores were higher but not always statistically significant. Chang et al. (2014) studied 65 eleventh grade students at a vocational high school in Taiwan that were in an electrical machinery class. The study lasted five weeks, and the blended learning group did have slightly higher scores at the end of the study when compared to the traditional learning group, but the difference in scores was not statistically significant. The researchers believed that the short length of the study limited the increases in achievement, though there are other studies with short time frames that did produce statistically significant growth in achievement (Smith & Smith, 2012). Leo and Puzio (2016) studied 75 students at a private school that were in ninth grade biology. The classes they observed were using more of a flipped model than true blended learning, as most of the online learning took place outside of the classroom, but they did incorporate some online learning activities such as interactive labs into the classroom time as well. The results of the study were somewhat mixed. While the students in the experimental, blended learning group, did have higher scores on all three assessments given during the study, only one of the assessments produced scores that were statistically

significantly higher for the blended learning group compared to the traditional learning group.

Jacobs (2014) studied eight schools in Oakland, California that introduced blended learning across the entire school. These schools also had mixed results. While some of the schools in the study produced statistically significant gains in achievement on standardized tests, others only produced small gains. The Rogers Family Foundation, which funded the experiment, argued that scores would continue to rise in subsequent years and that blended learning may take time to produce results across the district. Teachers who were surveyed for the study also argued that students were achieving more in the classroom, even if it was not always reflected on standardized tests. Smith and Suzuki (2015) studied 56 secondary students in a mathematics classroom. They found that students who were in the blended classroom receiving online activities and the ability to self-pace only had moderately higher achievement scores than the students in the traditional classroom, and the difference in these scores was not statistically significant. Interestingly, though, students in the blended learning group filled out surveys that revealed that they perceived themselves as learning more, even when their scores were only moderately higher. While the results of all four of these studies are not as encouraging as those that produced definitively positive results, they are still not discouraging when it comes to blended learning. They did show positive gains for students in a blended learning classroom when compared to a traditional classroom.

Negative results.

One study did, however, find that student scores decreased in a blended classroom when compared to a traditional classroom. Siko (2014) studied 47 eleventh graders taking an International Baccalaureate (IB) biology class at a large, suburban high school in the

Midwest. During the first trimester, students were taught using traditional, face-to-face methods. In the second trimester, students were taught using blended learning. There was no statistically significant difference between student scores from one trimester to the next, but the scores were slightly higher for students during the traditional phase of learning. This study is flawed in its design because it is not comparing apples to apples. Because there was no control group, the study relies on achievement data for two different sets of content. It is possible that the content in the second trimester was more difficult, which could have led to lower scores during that trimester. It is hard to equate causation with blended learning when so many factors were not controlled during this study.

When comparing blended learning with online learning, the achievement results all tend to be mixed or even negative. De la Varre et al. (2011) studied distance education at rural high schools in the United States where the facilitator either plays an active role, making the classroom blended, or a passive role, keeping the classroom purely online. They found that there were fewer dropouts in the blended program, but there was no statistically significant difference in achievement, as reported by the facilitators. Najafi et al. (2014) studied 29 high school economics students at a university preparatory school in Canada who were using MOOCs, and they found that the students in the online only group had slightly higher scores than those in the blended learning group, though the scores were not statistically significantly different. The researchers believed that students in the blended learning group did not watch as many of the videos in the MOOC, which they proved using clickstream data, because they were also meeting with the teacher. Completing less of the videos in the MOOC may have lowered their overall achievement scores.

Overall effect on achievement.

Overall, achievement is shown to be higher for students in a blended learning classroom when compared to a traditional classroom more often than not, though the difference is not always statistically significant. The comparison between blended learning and online learning is not as clear. Although the US Department of Education (2009) meta-analysis found that blended learning produced higher student outcomes than online learning, this result was based largely on studies done at the college level. At the K-12 level, it is far less conclusive, and the results are mixed, at best. One final aspect of blended learning that should be considered is how students respond to it and what their perceptions of this type of learning are. These responses can indicate how willing students are to participate and work hard in a blended learning classroom.

Student Perceptions

Students are important change agents, and it is necessary to pay attention to their perceptions of an implemented change in order to make that change as successful as possible. Many researchers noted how students responded to blended learning through comments made by students, observations made by the researcher, attitudinal surveys of students, and interviews. The majority of researchers found that students had a positive perception of blended learning (Chang et al., 2014; Curwood & Cowell, 2011; Hall et al., 2015; Leo & Puzio, 2016; Light & Pierson, 2014; Siko, 2014; Smith & Suzuki, 2015; Snyder, Paska, & Besozzi, 2014), though one research team found that students had a lowered sense of community and a more negative view of blended learning (Wendt & Rockinson-Szapkiw, 2015). Several researchers also looked at how student perceptions of other aspects of the classroom, such as the subject being taught or the Internet in general, were changed by blended learning (Akgunduz & Akinoglu, 2016; Yapici & Akbayin, 2012). Other researchers

specifically focused their research on student perceptions and looked at how student perceptions of blended learning could be manipulated for a more positive outcome and a better acceptance of blended learning and use of technology (Daley, Hillaire, & Sutherland, 2016; Mondi, Woods, & Rafi, 2008). Overwhelmingly, these studies found support from students for blended learning and revealed what could make blended learning most successful.

Positive perceptions tied with engagement.

The researchers who saw positive student perceptions of blended learning found that students felt more engaged with the blended environment. Smith and Suzuki (2015) surveyed 56 secondary mathematics students who were in an experimental group using blended learning. They found that 80% of students preferred blended learning and perceived it to be more engaging than the traditional classroom. Hall et al. (2015) had similar results with their study of blended learning with sixth, seventh, and eighth grade English students, many of whom had learning disabilities. Surveys of the students found that students felt more engaged when the Curriculum-Based Measurement was embedded in the reading software because they saw it as more related to what they were reading and doing. This was especially true for students with learning disabilities. The students who completed the CBM on paper did not always make the connection between formative assessment and classroom content. Chang et al. (2014) had 65 eleventh grade electrical machinery students in a Taiwanese vocational school fill out self-assessment surveys after completing the experiment in which the experimental group was exposed to blended learning. They also found that students had more positive perceptions of blended learning.

Interestingly, students perceived themselves as more engaged even when their scores

were the same or only moderately higher in the blended model (Chang, 2014; Smith, 2015). Light and Pierson (2014) attribute this to the gamification model that they argue is inherent in blended learning. They argued that students were more engaged by the blended learning model because it felt more like a game, and this increased their desire to learn, even if it did not increase their scores. Gamification is when teachers take aspects of traditional game playing, such as keeping score, creating competition, and providing rewards, and apply it to the classroom. Not all blended models use true gamification, but some students see the ability to use online activities as more fun and game-like than a traditional, face-to-face classroom. This was also seen in Curwood and Cowell's (2011) work. During their action research, which looked at using blended learning to teach a poetry unit, one of the students became particularly engaged with the digital poetry assignment. When interviewed, the student argued that his interest in the assignment was due to his interest in using technology.

Positive perceptions tied to flexibility.

Other students argued that their interest in blended learning was due to the flexibility, especially when it came to catching up when they missed class. Leo and Puzio (2016) worked with 75 9th grade biology students at a private high school. The students in the blended learning group made repeated positive comments about the blended learning model, and the students in the control group, which received face-to-face instruction, expressed envy of those who were in the blended group. The students in the blended model said that they preferred that model because it was easy to catch up in class if they missed a day of school. Snyder et al. (2014) also found that students preferred blended learning and appreciated the ease of catching up. The researchers were involved in an action research project in a 9th grade Global History and Geography class. The instructor flipped some instruction by

sending home screencasts of the lectures. In class, students were exposed to blended learning through a variety of active learning and hands-on activities. Some of these activities involved online models and some did not. By the third year of the study, 84% of students supported the use of the screencasts and felt it enhanced their learning because they could pause, rewind, and re-watch at their own pace, and they could easily catch up on what they had missed if they were not in class.

Negative perceptions.

Not all students, however, prefer a blended learning environment. Some of the students in Snyder et al.'s (2014) experiment did not like blended learning because they felt it was too time consuming. Sending lectures home increased their homework, and they felt that some of the video lectures and online activities were boring compared to an interactive lecture from their teacher. Siko (2014) also had some students who struggled with blended learning in his study of 47 eleventh grade students in an IB biology course. After surveying students and parents following the blended learning portion of the class, Siko found that while many students appreciated the flexibility that went with blended learning, they struggled with the ability to self-pace. Both students and parents acknowledged that learning to self-pace was an important skill, but they worried that it might prevent some students from being successful in a blended learning course.

Wendt and Rockinson-Szapkiw (2015) looked at community building in middle school science classrooms and found that blended learning had a negative impact on community. They divided 84 students in five different middle school classrooms into control and treatment groups. One problem with this division is that 57 students ended up in the treatment group and only 27 in the control, which could have skewed the data since less data

came from the control group. The control group completed their collaborative activities face-to-face while the treatment group used Edmodo to hold synchronous and asynchronous discussion forums as their collaborative activities. After nine weeks, students were given the Classroom Community Scale (CCS), which is a survey that measures student perceptions of community within the classroom. The researchers found that the students in the control group had a statistically significantly higher sense of community than those in the treatment group. They argued that the online discussion forums suffered from difficulty of use and the chance for miscommunication and went on to connect the idea of community to engagement, arguing that students who do not feel a sense of community in the classroom are less engaged in their work.

Positive perceptions tied with an increase in skills.

While a sense of community may suffer in a blended classroom, there are other skills and perceptions that are enhanced by blended learning. Akgunduz and Akinoglu (2016) studied 74 seventh grade science students in Turkey over an eight-week period. They divided students into three groups - a control group which received face-to-face instruction, an experimental group that used blended learning, and an experimental group that had their studies supported by social media use. Students in all three groups took two pretests and posttests using the Science Attitude Scale (SAS) and the Self-Directed Learning Skills Scale (SDLSS). For both surveys, students in the blended learning group scored statistically significantly higher on the posttest than either of the other two groups. This indicates that students in the blended learning group had a larger increase in their interest and positive perceptions of science as well as an increase in their ability to self-direct. This ties into Siko's (2014) findings that students in a blended learning environment learn to self-pace and

keep themselves on task. Yapici and Akbayin (2012) also found that students had an increase in other skills while using blended learning. Their study of 107 ninth grade biology students in Turkey had students in the experimental group, which used blended learning, and the control group, which used face-to-face learning, complete the Internet Use Attitude Scale (IUAS) as a pretest and posttest. Students in the blended learning group had statistically significant gains in their IUAS score while the control group did not. Yapici and Akbayin (2012) argued that this shows the potential for blended learning to increase student interest in using the Internet and being better versed in technology usage, in general.

Increasing positive perception.

Two research teams looked specifically at how to increase student reception of Internet usage and of blended learning in order to make blended learning more successful in the classroom. Daley et al. (2016) worked with 126 sixth grade science students at two different midwestern middle schools. The researchers wanted to know why students were not consistently using the embedded supports in the Investigating and Questioning our World through Science and Technology (IQWST) curriculum and how they could increase student usage of these supports, which would, hopefully, increase their achievement in science. During the experiment, researchers showed students how to analyze data from the curriculum including content knowledge, demonstrated by how many practice problems a student got correct; support usage, demonstrated by how often students clicked on additional supports; and difficulty of questions, demonstrated by student rankings on a Likert scale as they went through the program. After teaching students how to read the data, they asked students to write recommendations for how students could gain better scores in the program based on the data they were shown. Next, the researchers had students look at their own data and then

make suggestions for how they, themselves, could do better in the program. Surprisingly, the researchers found that some students did not use the embedded supports because they felt that it was cheating. After going through the data with students and showing them how to read the data, students continued their use of the curriculum. The researchers found that students who had given themselves the advice to use more supports were 2.5 times more likely to use the supports after seeing their own data. The researchers argued that it is important to teach students how to analyze their own data in order to change their perceptions of how to use blended learning programs.

Mondi et al. (2008) also looked at how to change student perceptions of blended learning and how to get students more interested in using the technologies available to them. During their study, the researchers worked with nineteen Malaysian Smart Schools, which are public schools in Malaysia with a government-funded technology initiative. They surveyed 992 students using a self-created Use and Gratification Expectancy Questionnaire and then randomly reduced the results to 398 to achieve statistical sampling power. They were looking specifically at what motivates students to use technology and what are students self-perceived learning needs. They found that students' perceptions of technology will influence their willingness to use it. Students are most likely to use technology when they believe that it will meet their needs, and if they are gratified in their use of the technology, they will continue to use it. Students' perceived needs in a technology, according to the researchers, include a need for it to develop their knowledge, be entertaining, be aesthetically pleasing, be easily integrated into their existing mental schema, and provide social collaboration. The researchers argued that teachers who implement blended learning need to be careful to choose technologies that students perceive as meeting these needs and that if the

technology fails to meet these needs, students will develop a reluctance to use that technology again.

Overall effects on student perception.

The overwhelming majority of studies show that blended learning is positively perceived by students. While it may not always work to build a sense of community in the classroom (Wendt & Rockinson-Szapkiw, 2015) and may cause some students difficulty if they lack the ability to self-direct and self-pace (Akgunduz & Akinoglu, 2016; Siko, 2014), it does develop a variety of other positive skills and perceptions. As the researchers point out, however, it is important to make sure students understand their own data and how it is affected by their choices when it comes to blended learning (Daley et al., 2016) and to choose technology that appeals to students and meets their perceived needs (Mondi et al., 2008).

Conclusions and Recommendations

The United States' educational system is not performing to the same level as other developed countries, and its students are suffering. The traditional classroom is leading to lower test scores and graduating classes who are not prepared for the jobs available in a globalized economy. Today's jobs are geared more towards technology and innovation, but students are not being taught these skills effectively. Business leaders are pushing for a higher presence of technology in the classroom, and blended learning is being touted as the way of the future. But if students are not engaged, achievement is stagnant, and students are not receptive to the change, this new teaching style will flop.

Engagement

Does blended learning increase student engagement? I believe that it does. Numerous studies have shown increases in student engagement through a blended learning classroom (Bottge et al., 2014; Camahalan & Ruley, 2014; Curwood & Cowell, 2011; Huang & Hong, 2016; Jacobs, 2014; Light & Pierson, 2014; Smith & Suzuki, 2015; Zaka, 2013). Researchers have observed students becoming more engaged with the material. While Camahalan and Ruley (2014) had a small sample size, these conclusions were backed up by Bottge et al. (2014) and Huang and Hong (2016) who also observed increased student engagement when interactive technology was added to the curriculum. Case studies of schools or individual classes that implemented blended learning also saw teacher observations of increased student engagement (Curwood & Cowell, 2011; Jacobs, 2014; Zaka, 2013) These observations were also backed up by quantitative data that showed increased engagement by increased task completion (Light & Pierson, 2014; Smith & Suzuki, 2015). This increase in engagement came because students were able to express themselves in new ways and to explore innovative new ideas that are not available in a strictly traditional classroom.

The two studies that did not show an increase in on-task behavior and task completion were rather unique. In both of these studies, the control group was not a traditional classroom but a fully online distance education course. De la Varre et al. (2011) explored online distance education with a changing role for the facilitator and found less participation from some students due to a lack of connection with the instructor. I believe that this study actually shows a need for an even more blended approach than de la Varre's team used. The disconnect came because the instructor was not in the room with the students, making communications asynchronous. In a well-blended classroom, the instructor is present and

able to respond to student questions and concerns immediately, which would negate the issues found in this study. In the second study, Najafi et al. (2014) were comparing a treatment group that was using MOOCs and getting teacher led study sessions with a control group that was only using the MOOCs. The researchers used clickstream data to determine student engagement, which is a flawed measurement. It is impossible to tell from the clickstream data whether the students were actively engaged in watching the videos or not. In addition, the students who were receiving teacher led study sessions may have watched fewer videos because they felt more confident in their understanding of the material. Despite these two studies, the evidence of engagement through on-task behaviors and observations remains convincing.

Achievement

Positive results.

Does blended learning increase achievement? When compared to a traditional classroom, I believe that blended learning does increase achievement. When compared to an online classroom, I believe that blended learning could increase achievement if implemented well. When comparing blended learning to a traditional classroom, the majority of researchers found that achievement was statistically significantly higher (Bottge et al., 2014; Camahalan & Ruley, 2014; Hall et al. 2015; Huang & Hong 2016; Kazu & Demirkol, 2014; Smith & Smith, 2012; Yapici & Akbayin, 2012). There are many reasons for why scores might increase in blended learning, but I believe a large part of it has to do with the increased student interaction with the teacher, which provides for more one-on-one support (Camahalan & Ruley, 2014; Capponi et al., 2010). It is also important to note that scores increased for a variety of types of students and types of skills. Some blended learning

programs focused on lower level skills, and they were successful in getting lower achieving students to achieve higher scores through the use of rote drills online (Ahn et al., 2016; Huang & Hong, 2016). This application can be quite important for districts and classes that struggle with lower achieving students in order to bring them back up to grade level.

At the same time, I believe that blended learning has a much larger capacity than just merely drilling students on basic skills. Blended learning also has the ability to teach higher order skills and to really engage students in a more creative and critical thought process (Smith & Smith, 2012). In order to do this, the way that blended learning is structured must be carefully considered. It is not enough to just incorporate a technology that provides rote drilling if you want students to develop higher order skills. Instead, the teacher must deliberately choose online activities that appeal to a variety of learners and that offer a variety of methods for accessing materials and engaging beyond just memorizing facts. By offering a wide variety of activities that require students to work and think at a variety of developmental levels, researchers were able to increase student achievement (Bottge et al. 2014; Yapici & Akbayin, 2012). Thus, blended learning is effective for more than just lower level skills but can also help transform education to promote higher level thinking.

Blended learning can also be useful for students with disabilities. Hall et al. (2015) found that students with learning disabilities had even higher gains than their classmates, who did not have learning disabilities, when they used blended learning. The embedded supports available in many blended learning softwares can really help students who are struggling achieve larger gains in achievement. This does not just apply to lower achieving students, as previously explored, but also to students with learning disabilities. Billingsley et al. (2014) also looked at students with disabilities, but they focused on emotional and

behavioral disabilities. Their results were not as conclusive as Hall et al.'s, but they did find that blended learning worked better for most students when compared to traditional or to purely online learning. While blended learning may not have worked for all of the students in this study, it did work better than any other method, which is encouraging. Students with emotional and behavioral disabilities can be a hard population to connect with and reach, so a method that could reach the majority of students is definitely one worth exploring.

Flawed designs.

While the majority of researchers found statistically significant positive gains, some researchers saw only moderate gains that were not statistically significant (Chang et al, 2014; de la Varre et al., 2011; Jacobs, 2014; Leo & Puzio, 2016; Smith & Suzuki, 2015). These gains are not as definitive as those that were statistically significant, but they are still positive towards blended learning. Several of the studies that did not have statistically significant gains also mentioned that the time frame for the study may have been too short. Researchers believed that, given more time, students would show higher gains in the blended group (Chang et al., 2014; Jacobs, 2014). Several of the experiments also could have benefited from a better blended model. Leo and Puzio (2016) used more of a flipped model than a truly blended model because they sent most of the online activities home as homework, though they did do some online work in class. The online activities also tended to be video lectures and not as many interactive, higher order thinking activities. It is possible that students would have achieved even higher gains if they had been exposed to more engaging online material. De la Varre et al. (2011) also had a blended environment that needed work. They were comparing online learning to a blended environment, but in the blended classroom, the instructor was still not present in the classroom. Instead, a facilitator helped students and

worked to keep them engaged. The largest student complaint in this study was the delay in communication with the actual instructor, which led to frustration and confusion. It is possible that a deeper blending that allowed the instructor to be face-to-face instead of at a distance would have enabled students to have higher achievement. Whether or not a better blended learning environment would have increased scores even more, all of these studies did show that blended learning does increase scores, just not to a statistically significant level.

Only two studies found that blended learning did not increase scores (Najafi et al., 2014; Siko, 2014). Both of these studies had flaws. Najafi et al.'s (2014) study had a smaller sample size at only 29 students, and the study took place in a university preparatory school, which may have affected student motivation. Furthermore, the blended learning group was not a fully blended class. Students only met with the teacher for one hour a week, and it was to review the videos they were watching in the MOOC. There was less one-on-one interaction and time with the teacher than a well-blended classroom should have. I believe that if the blended environment had been better designed, the students would have had higher increases in achievement. Siko's (2014) study also had flaws because it had no control group. One trimester, students were exposed to a face-to-face classroom, and the next trimester, they were exposed to blended learning. The scores were slightly higher in the first trimester, though not statistically significant. It is highly possible that the change in material led to a change in scores. Oftentimes, the further students are in a course, the more difficult the material is. This could easily account for the slightly lower scores in the second trimester. Siko would need to repeat this experiment with a control group to prove any kind of causation with blended learning. I believe that the evidence of positive correlation between

blended learning and achievement far outweighs the two studies that had negative correlation and flawed studies.

Student Perceptions

Results.

Furthermore, several of the studies asked students to rate their own perceptions of blended learning. This may be one of the most compelling pieces of evidence as it points to the students' own perceptions. On-task behavior, observations, and test scores cannot tell the researcher if the student's brain is truly engaged or if they are merely going through the motions. The studies that looked at student perceptions found that students perceived themselves to be much more engaged in a blended classroom and that they preferred this style of learning (Chang et al., 2014; Curwood & Cowell, 2011; Hall et al., 2015; Leo & Puzio, 2016; Light & Pierson, 2014; Smith & Suzuki, 2015; Snyder et al., 2014). In some studies, students had mixed perceptions. They appreciated the flexibility and ease of blended learning but did struggle with their own ability to self-direct and self-pace (Akgunduz & Akinoglu, 2016; Siko, 2014). While these struggles did affect student perceptions, many students also did acknowledge that these struggles were good for them. The ability to self-direct and self-pace are incredibly important skills in today's society and job market. These are some of the skills that teachers and business leaders are hoping to prepare students to have, so it is actually a positive that students saw these skills as necessary for a blended learning classroom. In addition, it can increase a student's positive perception of the subject that they are learning (Akgunduz & Akinoglu, 2016), and it can increase student's ability to use the Internet as well as student's positive perceptions of Internet use (Yapici & Akbayin,

2012). Clearly, blended learning has an important, positive impact on student perceptions and skills.

The one study that found decreased student perceptions used an activity that was not particularly well-suited to blended learning (Wendt & Rockinson-Szapkiw, 2015). While collaboration can be done quite well in a blended classroom, merely holding a discussion online instead of face-to-face is not the best use of technology. Blogging and responding to each other or having students collaborate or interact with experts via Skype or Twitter would have been a better way to increase collaboration and community. Despite the findings of this one study, most of the studies indicated an increased student sense of engagement and an appreciation for blended learning.

How to increase positive perceptions.

There are also ways to increase positive student perceptions of blended learning and to ensure that blended learning is successful. Daley et al. (2016) found that students as young as sixth grade are able to understand and analyze their own data from blended learning. By showing students how their use of technology impacts their achievement, teachers can help students to better understand how to properly use the technologies involved in blended learning. Using the technologies more effectively can lead to more positive gains, which can, in turn, lead to more positive student attitudes about blended learning. This is clearly shown by Mondi et al. (2008) in their study, which showed that students who are gratified in their use of technology are more likely to use that technology. If students are having better achievement and enjoying the software, they are more likely to want to use it.

Recommendations

Blended learning has been shown to increase student engagement, student achievement, and student perceptions of technology and of the material being taught, and it can be implemented fairly easily. Even districts that are not 1:1 can use some aspects of blended learning through the use of technology carts or computer labs. One of the easiest places to start is to pick one aspect of the curriculum that would benefit from technology access.

Implementing blended learning in schools.

Schools should begin implementing more blended learning in classrooms. One way to ensure the success of blended learning is to ensure that all teachers are aware of the best practices in implementing blended learning. When blended learning becomes too technology based and lacks the appropriate amount of teacher interaction, students are less likely to be engaged (de la Varre et al., 2011). At the same time, too little technology can lead to a lower sense of engagement as well, since students are drawn to gamification and the use of technology in the classroom (Light & Pierson, 2014). An appropriate balance must be struck between technology use and teacher support and availability. Furthermore, the activities chosen in a blended learning classroom must be considered. Certain activities lend themselves to technology use more than others. Discussions with classmates are often better face-to-face while technology can be used to interact and discuss with experts or people unable to be in the room (Wendt, 2015). Students also respond best to technologies that they find fun and aesthetically pleasing but that also allow them to have higher achievement (Mondi et al., 2008). By considering what activities are best suited to technology use, teachers can increase student engagement, achievement, and positive attitudes.

It is also important to consider the stakeholders involved when beginning a blended learning program. If students, parents, teachers, and administrators are not all on board, blended learning has a lower chance of success (Zaka, 2013). All of these people are affected by the choice to move to blended learning, and they can either help or hinder the process. To get teachers on board, it is important to have structured and useful professional development opportunities that incorporate examples of successful blended learning. Teachers need time to prepare to begin blended learning. If they rush too fast or try to use too many technologies at once, it can cause negative results (Jacobs, 2014).

Administrators and parents also need to be on board and to see the research and evidence that blended learning can be successful. Prior to implementing blended learning, parent meetings need to be held so that they are aware of the reasons for change and the evidence that change can be successful. These meetings can help sway parent perceptions to be positive and optimistic about the change (Billingsley et al., 2009).

Finally, students need to be brought on board. They are directly affected by blended learning, and it is vital that they be willing to work with the new technologies in order to make them successful. This can be done through careful and thoughtful consideration of the technologies being used and slow and progressive implementation of change. By moving slowly, both teachers and students can adjust to the change and fine-tune what works best for them both.

Future research on blended learning.

Future research still needs to be done on blended learning. Many of the studies out there have a variety of flaws from small sample sizes to stretching the definition of blended learning (Curwood & Cowell, 2011; de la Varre et al., 2011). More studies need to be

performed that have large sample sizes and an ability to create a relatively equal control and treatment group. While this is not always perfectly feasible in a school setting, more can be done so that the groups are at least even in numbers and pre-experiment abilities.

Furthermore, more research needs to be done in using specific types of blended learning in different content areas. While some of these studies exist, more could be done to help teachers make choices on what program to begin their implementation with depending on their content area. Additionally, more studies need to be done at the elementary level. There is a large gap in the research when it comes to blended learning and younger students. Blended learning has the potential to increase student engagement, achievement, and perceptions of learning and could begin to make America a powerhouse of education in the world today.

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