Relationship Between Smartphone Usage and Academic

Performance of High School Students

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Milligan College

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Abstract

Today's youth are obtaining, or obtaining access to, smartphones at younger and younger ages. The purpose of this study was to examine if there was a relationship between smartphone usage and academic performance of high school students. This study also examined whether or not there was a difference between smartphone usage and academic performance for boys and for girls. The population for this study was from a high school in northeast Tennessee. Two English Language Arts (ELA) classes from each grade nine through twelve were invited to participate. Smartphone usage by the participant was measured with a researcher-created survey. A student's cumulative high school GPA was used to measure academic performance. The results indicated there was no relationship between smartphone usage and academic performance of high school students. Significant differences between the smartphone usage and academic performances were found for both boys and girls with the higher of the two coming from the girls. While it has been shown that electronic devices can be used for learning purposes as well as distract and pull students off-task from academic activities, this study suggests there is no relationship between a student's use of a smartphone for academic purposes and his or her academic performance.

Keywords: smartphone, academic performance, high school, student, learning device, tool

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Date: January 24, 2020

From: The Institutional Review Board (IRB) at Milligan College

Re: *Relationship Between Smartphone Usage and Academic Performance of High School Students*

Submission type: Initial Submission

Dear Russell,

On behalf of the Milligan College Institutional Review Board (IRB), we are writing to inform you that your study *Relationship Between Smartphone Usage and Academic Performance of High School Students* has been approved as expedited. This approval also indicates that you have fulfilled the IRB requirements for Milligan College.
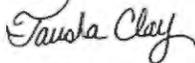
All research must be conducted in accordance with this approved submission, meaning that you will follow the research plan you have outlined here, use approved materials, and follow college policies.

Take special note of the following important aspects of your approval:

- Any changes made to your study require approval from the IRB Committee before they can be implemented as part of your study. Contact the IRB Committee at **IRB@milligan.edu** with your questions and/or proposed modifications.
- If there are any unanticipated problems or complaints from participants during your data collection, you must notify the Milligan College IRB Office within 24 hours of the data collection problem or complaint.

The Milligan College IRB Committee is pleased to congratulate you on the approval of your research proposal. Best wishes as you conduct your research! If you have any questions about your IRB Approval, please contact the IRB Office and copy your faculty advisor if appropriate on the communication.

Regards,

Tausha Clay

The IRB Committee

Table of Contents

Chapter 1

Introduction

In today's age, kids are digital natives and are accustomed to having their world - information, social media, music, videos, text messages, and phone calls - within reach everywhere they go. According to a study performed by Influence Central in 2016, the average age for getting a first phone is 10.3 years old. This coincides with findings conducted in 2016 and released in 2017 by Nielsen. The article looked at the age kids get a smartphone stating, "45% of mobile kids got a service plan at 10-12 years old. The most predominant age when kids got a service plan was age 10, 22%, followed by 8 years old, 16%, and ages 9 and 11 were tied at 15%" (Nielsen, 2017). In addition to kids receiving smartphones at younger and younger ages, studies are showing an increase in the amount of screen time among today's youth. The biggest of these recent increases is coming from the use of the smartphone (Common Sense Media, 2015; Common Sense Media, 2017). While not all teens have their own smartphone, access to a smartphone among teens is nearly universal. 95% of teens claim they have or have access to a smartphone. This figure represents a 22% increase from the 73% who claimed this in 2014-2015. Further, the gap between genders, races, ethnicities, and socioeconomic backgrounds of teens with access to a smartphone is only four percentage points, 93-97 percent. This was compared to the same households with access to a computer in the home which showed a range of 75-96 percent, a gap of 21 percentage points (Anderson & Jiang, 2018). Without question, teens' access to smartphones and their usage of them has been and continues to be on the rise.

The smartphone can be a powerful tool for communication and access to information. It is possible to call, text, and email others. It has a plethora of apps available to facilitate messaging through social media. Smartphones can connect to the internet through wifi connectivity and allow browsers to access the world wide web. If the smartphone has a data plan through its cellular provider, this same access is available virtually anywhere. This offers students the opportunity to collaborate on projects, ask classmates about upcoming assignments, set up tutoring sessions, email teachers, research information, and a host of other activities, all from a device they are accustomed to using on a regular basis (Lockhart, 2017; KARATAŞ, 2018). The only catch is there has been little research done in how much students use smartphones for schoolwork or other academic purposes as shown in the review of literature.

While the smartphone is a great tool for making people's lives easier, it certainly comes with its fair share of distractions. Most feel the need to keep up with information and social media in real time. Between links and related content, along with friends and family constantly updating media as well, keeping up with it all is like falling into a rabbit hole. The report from Pew states, "These mobile connections are in turn fueling more-persistent online activities: 45% of teens now say they are online on a near-constant basis" (Anderson & Jiang, 2018). A large percentage of this time is spent with social media. 31% of teens feel the effect of social media on their lives as positive while 24% feel it's negative and 45% indifferent (Anderson & Jiang, 2018). The distracting nature and its negative effects have been the focus of the majority of research on this topic and is explored later in the review of literature.

As mentioned, the review of literature in chapter two looks at previous studies which have explored overall smartphone usage and quality of life. Overall smartphone usage in these studies included any usage - during class, free time, and study time - and looked for correlations with things such as depression, anxiety, relationships, and academic performance. Very few of these studies have attempted to correlate the academic usage of smartphones specifically to an objective measure of academic performance. In addition, these studies were conducted with samples of college students in different countries. Some of these studies have shown discrepancies amongst samples from different countries as well as genders. It isn't safe to assume similar results can be found for samples taken from the U.S. public school population.

Statement of the Problem

Children have access to smartphones at younger and younger ages and its usage among them continues to increase. There is little existing literature on how much of this usage pertains to academic purposes. It is not known whether such usage has a relationship with a student's academic performance. Therefore, the problem addressed in this study was to determine if there is a relationship between smartphone usage and academic performance in high school students.

Purpose of the Study

The purpose of this study was to examine if there was a relationship between smartphone usage and academic performance of high school students. This study also examined whether or not there was a difference between smartphone usage and academic performance for boys. Finally, this study examined whether or not there was a difference between smartphone usage and academic performance for girls.

Significance of the Study

This study sought a relationship between smartphone usage and the academic performance of high school students. If a relationship was found to exist, either positive or negative, it has the ability to foster further research in an attempt to determine which aspects play the biggest roles and how. This can have implications on how teachers, students, and families seek to integrate or eliminate its usage in the educational process to the benefit of the students.

Limitations

The following were limitations encountered in the study:

1. The sample used for this study was from one school in eastern Tennessee predetermined by the researcher and not randomly selected.

2. The survey and corresponding Likert-type scale used to assess student smartphone usage was created by the researcher and not tested for reliability or validity.

3. The smartphone usage reported by students is subjective and may not reflect actual usage.

Definition of Terms

Smartphone usage- refers to voice calling, texting, world wide web browsing, and other app usage on the smartphone as it pertains specifically to academic purposes such as but not limited to the completion of school assignments, projects, and preparation for assessments.

Academic performance- includes performance on homework, projects, quizzes, tests, classroom participation, and any other factors a teacher used in determining a grade across all subjects and classes as measured through cumulative GPA.

Overview of the Study

With 95 percent of students having or having access to a smartphone, little is known about its usage for academic purposes and the relationship it has on academic performance. The purpose of the study was to determine if there is a relationship between smartphone usage and academic performance of high school students. This study also examined whether or not there was a difference between smartphone usage and academic performance for boys. Finally, this study examined whether or not there was a difference between smartphone usage and academic performance for girls. Chapter one includes the introduction, the statement of the problem, the purpose of the study, the significance of the study, the limitations in the study, definition of important terms, and an overview of the study. Chapter two examines a review of literature applicable to the study. Chapter three details the methodology and procedures used in the study and includes descriptions of the population, participants, data collection instruments used, procedures, and the research questions and hypotheses. Chapter four yields the data collected and the methods used for analysis. Finally, chapter five summarizes the findings, recommendations, and implications of the study.

Chapter 2

Review of Literature

The average age at which kids are receiving their first smartphone is at 10.3 years old (Nielsen, 2017). Further, 93-97% of households have access to a smartphone whereas only 75-96% have access to a computer (Anderson & Jiang, 2018). While screen time among youth continues to slowly rise, the smartphone is quickly taking the place of other forms of it such as television, tablets, and computers (Common Sense Media, 2015; Common Sense Media, 2017). With the majority of today's youth having access to a smartphone and spending so much time on it, it's important to understand its effects. When examining overall usage and outcomes, it was shown that smartphone usage has a significant relationship with work performance, specifically academic performance (Lepp, Barkley, & Karpinski, 2014; Winskel, Kim, Kardash, & Belic, 2019; Nayak, 2018; Felisoni, & Godoi, 2018). As the primary role of today's youth are students who are obtaining education through school, it is critical to investigate the role these devices have on their education. The review of literature explores overall smartphone usage and general effect, overall smartphone usage and academic performance, smartphone usage as it pertains to multitasking and academic performance, the use of electronic devices, including smartphones, specifically for learning, the incorporation of devices, including smartphones, into the classroom by teachers, and finally academic usage of smartphones and academic performance.

Overall Usage and General Effect

Research has been conducted to find relationships of problematic smartphone usage and addictive behaviors. A study involving over 3,000 college students gathered data through the use

of a 156 item survey. The survey quantified current smartphone usage, current usage of drugs and alcohol, psychological and physical status, and current academic performance. The range of scores possible for smartphone usage was 10-60 where a score > 31 was classified as problematic smartphone usage. Problematic smartphone usage was associated with poor academic performance, problematic use of alcohol, impulsivity, anxiety, and depression. All associations were of small effect size except for that of impulsivity which was of medium effect size. It suggested the links between problematic smartphone usage and its associations could be independent of each other in the case that problematic smartphone usage is looked at as an addiction itself and not the cause of the associations (Grant, Lust, & Chamberlain, 2019).

Other research has shown a significant relationship with cell phone usage and physical fitness. One study used college students as participants and showed that those which used cell phones less were more physically fit than those who didn't. Interviews with participants revealed cell phone use interrupted physical activity and suggested it could also have a negative impact on academic performance and contribute to increased levels of anxiety (Lepp, Barkley, Sanders, Rebold, & Gates, 2013).

The last research influenced additional research with 536 undergraduate students where relationships between cell phone use, academic performance, anxiety, and satisfaction with life were investigated. A questionnaire was used to measure cell phone usage, the Beck Anxiety Inventory was used to assess anxiety, and Diener's Satisfaction with Life Scale was used to assess the general outlook on life of each participant. As hypothesized, the results showed a significant relationship between high cell phone usage with academic performance, high cell phone usage

with anxiety, and academic performance and anxiety with Satisfaction with Life Scale scores.

Simple reasons such as distraction were used to account for academic performance. Reasons such

as feeling an obligation to keep up with it all were given for increased anxiety (Lepp, Barkley, &

Karpinski, 2014).

Grant, Lust, & Chamberlain (2019) has shown problematic smartphone usage can be

looked at as an addiction and can be related to many other factors in life. A common theme is

problematic smartphone usage being tied to anxiety and academic performance. The last study

attempted to measure one's satisfaction with life as a dependent variable of anxiety and academic

performance which in turn were the dependent variables of cell phone usage. Assuming there is

more at play in one's satisfaction with life, it was interesting to note how close the relationship of

cell phone use with satisfaction of life was to that of cell phone use with academic performance

and cell phone use with anxiety. This would suggest that both cell phone use and academic

performance carry a great deal of significance in the life of a student (Grant, Lust, & Chamberlain,

2019; Lepp, Barkley, Sanders, Rebold, & Gates, 2013; Lepp, Barkley, & Karpinski, 2014).

Usage and Academic Performance

One study investigated overall smartphone usage as it related to academic performance. It

used questionnaires distributed to 119 South Korean and 270 Australian college students. It

explored correlations between smartphone usage, problematic smartphone usage, and academic

performance. The data collected were self-reported smartphone addiction and GPA. Across both

samples, a positive relationship was found between smartphone usage and problematic smartphone

usage. For the sample containing the Australian students, a negative relationship was found

between smartphone usage and GPA. The study indicated that those who use a smartphone are at a higher risk for problematic smartphone usage. This problematic smartphone usage may lead to a possible reduction in academic performance (Winskel, Kim, Kardash, & Belic, 2019).

Another study was conducted involving 429 students in India. The study measured smartphone usage through the amount of time spent on the smartphone as well as monthly bills. A questionnaire was given to check on addiction, usage, and effect on performance. The results showed that females tended to use the smartphone more than males but males were more affected by their usage of it (Nayak, 2018). "Apart from behavioural changes female students were found to have hardly any effect of Smartphone addiction on them, unlike the male students who were found to neglect work, feel anxious and lose control of themselves" (Nayak, 2018, p. 170).

A similar study conducted in the same year used 43 college students in Brazil. It used apps to measure actual smartphone usage at all times throughout the duration of the study. The data yielded a significant negative result relationship between smartphone usage and academic performance. It attempted to control for confounding variables by examining factors such as self-efficacy and past academic performance. It showed each 100 minutes spent using a smartphone per day correlated to a drop in 6.3 points in student ranking on a scale from 0 to 100. In addition, it showed the effect to be double if only usage during class time was used (Felisoni, & Godoi, 2018).

Other research looked specifically at in class personal smartphone usage. One study used measurements conducted over a 14 week period of 84 first year college students in South Korea. It collected data through smartphone usage logging, mobility tracking, class evaluation, and class

attendance. The data revealed that phone interruptions occur on average once every three to four minutes and typically lasts for a minute. This suggests that students spend approximately 25% of class time on smartphones. It predicted in class usage from daily usage habits and found a negative correlation between in class usage and academic performance (Kim et al., 2019).

Another study regarding in class usage being tied to poor academic performance used direct experimentation to measure its effects. The study used two groups, a control group and an experimental group, to give simulated lectures and quizzes. The control group had their cell phones off and not available during the lecture and quiz. The experimental group was engaged in a text message conversation during the lecture portion of the experiment with members of the research team. Those in the experimental group showed a significant reduction in performance in the followup quiz, almost a 30% lower score (Froese et al., 2012).

As most of these studies indicate a negative correlation between in class mobile phone usage and academic performance, one way to remove its influence would be for schools to simply prohibit students from bringing them to class or even to school. One study looked at a range of different schools, specifically middle and high school systems in the US, with bans in place and their reasons for implementing the bans. While taking into account prior performance, it showed a significant increase in high stakes test scores with the biggest coming from the low achieving students (Beland, & Murphy, 2016).

As a few studies thus far have implied, cell phone and smartphone usage may not be directly related with academic performance (Grant et al., 2019; Winskel et al., 2019). Instead, it may just be an indicator of other factors present. One study looked to measure metacognitive

awareness as a dependent variable of cell phone usage, self-efficacy, and entrance exam scores of university students in Turkey. No relationship was found with cell phone use and entrance exam scores or metacognitive awareness. Instead, higher cell phone use was shown to negatively affect planning strategies and procedural knowledge. These two are assumed to have an impact on academic performance (DOS, 2018).

While overall usage was tied to having a negative relationship with academic performance, the study conducted by Felisoni, & Godoi (2018) showed its effect to be double if just in class usage was used. Other studies only examined in class usage as the independent variable in their work and in each, a negative relationship with academic performance was found. This relationship can be further stressed by contrasting the methods utilized and results found in the studies conducted by Winskel et al. (2019) and Kim et al. (2019) While the former looked at overall usage and found a negative relationship with one of its samples, it didn't find one with the sample from South Korea. The latter study used only in class usage and did find a negative relationship with its sample from South Korean. This suggests in class usage has a much greater impact on academic performance (Kim et al., 2019; Froese et al., 2012; Beland, & Murphy, 2016). What plays a factor in the usage of these devices during class?

Usage, Multitasking, and Academic Performance

Using a large worldwide survey of undergraduate students, data from EDUCAUSE shows 74% use a laptop during class, 66% use a smartphone, and 62% use a tablet. 54% of these users often connect to the internet with more than one device during a class period (Dahlstrom, Bichsel, & EDUCAUSE, 2014). A study looking specifically at the effects of multitasking suggested while

these electronic devices have the potential to enrich the learning process, they are also a key

distraction from the lesson at hand (Barker, 2017).

One study, while also showing the negative effects of electronic media usage in general

with academic performance, measured time spent using said devices differently from previously

mentioned studies. This one used time diaries to account specifically for multitasking and not just

how much of something was done in blocks of time. In addition, it showed that two thirds of the

study's participants reported using such devices in class, while studying, or completing homework.

It speculated the indicated levels of multitasking had an impact on academic performance as prior

research has shown multitasking to be detrimental to academic performance (Jacobsen, & Forste,

2011).

A mixed-methods approach was used in a study of undergraduate students. Classroom

observations, questionnaires, and interviews were used to find a relationship between digital device

usage during class and performance in the class. The questionnaires were used to gather student

self-reported usage of cell phones, laptops, and ability to multitask. Observations were used

primarily to triangulate some of the self-reported student data. These observations typically found

that students use cell phones and laptops for non-academic purposes more frequently and for

longer durations than they estimated. Most students perceived themselves to be good multitaskers

through the questionnaire and through interviews. They felt they could easily go back and forth

between something on their phone while the teacher is transitioning or between key points in a

lecture. Again, this didn't correlate with the findings. The analysis showed that any student who

used a digital device at all during class suffered a 0.36 point drop in grade on a 4.0 scale (Duncan,

Hoekstra, & Wilcox, 2012).

Another study looked at data collected from college students using an unobtrusive

smartphone app to monitor usage statistics over a 56 day period and self-reported smartphone

usage, studying attention, and multitasking preference. It also used a measure for the student's

ability to understand the impact of smartphone use in the classroom that is not related to the

learning process. For the 216 participants for which usage data were collected via the monitoring

app, it was shown that the smartphone was unlocked an average of more than 60 times per day for

three to four minutes yielding a usage of 220 minutes per day. This was used along with

questionnaire results showing students' opinions on their needs and capabilities to multitask while

checking their smartphones due to FOMO (fear of missing out) at times when they know they

should be focused on academic activities such as paying attention to the lecture and taking notes.

Significant correlations were found with higher overall smartphone usage, both throughout the day

and during class, and poor course performance, including those who perceived themselves as good

multitaskers (Rosen et al., 2018).

While unspecified and off-target usage has shown to be related to negative academic

performance, is there a way to use these devices for learning? If so, does it have a positive effect? It

turns out there are ways to do so. Online courses, supplemental instruction, and interactive lessons

are just a few of them. But, are they effective?

Devices Used for Learning

Online courses take place without the traditional classroom and teacher. Lectures,

homework assignments, and quizzes and tests are all administered over the internet. This can be

done through computers, laptops, tablets, and smartphones. Is this as effective a means of

instruction as traditional classes? In a causal-comparative study using over 4,000 participants, a

statistically significant increase in performance was found by those who had taken the online

course as opposed to the traditional course. At the same time, a statistically significant decrease in

retention rates was noted among those enrolled in online courses (Atchley, Wingenbach, & Akers,

2013). The increase in performance but drop in retention rates suggests the idea of a hybrid

approach.

In a hybrid approach, the course is taught traditionally but supplemental instruction exists

for the students to use online. A study attempted to compare the effectiveness of this supplemental

instruction to that of face-to-face. Using four traditional classes, each with the option of no,

face-to-face, or online supplemental instruction, it was shown that online supplemental instruction

yielded the highest grades for each class. Runner up was face-to-face instruction followed by no

supplemental instruction (Hizer, Schultz, & Bray, 2017).

One experiment measured the effect of using SMS text messages as a means to teach

students new vocabulary words relevant to a class for which they are enrolled in. 45 students

selected at random participated in the study. A pretest was given to assess vocabulary knowledge

for each participant. The experiment consisted of 16 new vocabulary words to be learned which

were texted to the participants. One word and definition was sent every half hour over an eight

hour period. This was repeated twice over the course of nine days and followed up with a posttest. The mean of pretest scores was <25 with a standard deviation just over 12. Posttest scores showed marked improvements, mean over 89 and standard deviation of just over 7. Texting and learning with the use of a mobile device proved to be effective. In addition, a survey was administered after the fact to assess how students felt about it. Scores indicate they liked it, it was helpful, and unobtrusive. Other relevant survey responses included the students' desire to see this used in future lessons, expanded to summaries of lecture notes, used to distribute grades, and the desire for mobile devices to be somehow incorporated into the lessons themselves (Cavus, & Ibrahim, 2009).

Another study expanded on the closing thoughts of the previous study and used a more interactive approach. It experimented with the use of a smartphone app developed for supplementing and improving performance among undergraduate students. The app provided an interactive learning experience consisting of study guides, practice quizzes with real time feedback, and videos and images as well. The experiment consisted of four differential equations classes. Three of the classes served as the control group utilizing traditional instruction as it had been taking place. One group was given the opportunity to use the experimental app. The results indicate significantly higher grades in the class where the app was offered. The mean was over 10 points higher while the standard deviation was reduced to less than half of that shown by traditional classrooms (Kadry, & Ghazal, 2019).

While multitasking and off target use are key in the smartphone's role as a distractor leading to negative academic performance, these studies indicate that the smartphone can be used for learning and positive benefit. Not only can entire courses be offered online, but supplemental

instruction can be provided as well. Aside from prohibiting them in classrooms, can they be put to use in the classroom? Doing so can provide a means of interactive learning as hinted at by the study done by Kadry, & Ghazal (2019). In addition, it could be a direct means of cutting down the distracting factor of the smartphone in class.

In Class Usage for Learning

One teacher has blamed the smartphone as a distractor taking away from the learning process. He later went on to clarify it isn't the smartphone, it's the kids. Before the smartphone was as ubiquitous as it is today, kids were still distracted in class or failed to be attentive to the lesson at hand. It just so happens that what they were distracted by or diverting their attention to, was something else. He feels the smartphone took a lot of unjustified blame. The same teacher went on to begin using the smartphone as a means to interact with the students during class and keep them on task with great success (Pinner, 2016).

A study was done in an ESL classroom which supported these claims. Analysis revealed incorporating the use of smartphones in the classroom helped participants practice and gain skills in critical thinking, creative thinking, communication, and collaboration on the way to becoming a self-reliant, lifelong learner. While most participants in the study attributed their success to wanting to learn the English language, they did acknowledge the role their smartphone played in supplementing the learning and being able to correct for simple mistakes. It was also said that while the smartphone played a significant role in the learning process, the teacher or instructor remained a key element in facilitating that learning (Ramamuruthy, & Rao, 2015).

Research conducted using questionnaires provided to both administrators and teachers showed agreement in speculating that the cell phone use in the classroom would improve student engagement, that most students have a cell phone capable of such uses, and that, for the most part, students will use their cell phones as directed when employed as tools for learning. The same survey revealed agreement in the fear of it being misused and being a distraction to students at the same time. It also indicated there would be more comfort in incorporating a cell phone with in-class activities if there were formal training on what to do and how (Lockhart, 2017).

Looking at previously discussed research, it is this researcher's opinion that either smartphones are either allowed in class and already a distraction or they are banned and pose no threat. If they are banned, there will be other things to act as distractions to the students (Pinner, 2016). A study looking for positive effects revealed the smartphone can be more of a distraction than a help during class. As such, the researcher suggested, "the best solution for these conditions would be to accept the students together with these devices and to adapt to the cultural change in order to integrate the positive aspects of these devices into education" (KARATAŞ, 2018, p. 618). The technology isn't going anywhere and rather than ban it from the classroom, it makes sense to incorporate its use to teach students how to work with it as opposed to being distracted by it.

Academic Usage and Academic Performance

A case study was performed in Turkey using 29 graduate students. This study was qualitative in nature and sought to discover what positive effects smartphone usage has throughout the duration of a course, both during class and outside of class. Some of the top reported uses identified as positive effects on the academic process included: searching the subject or terms used,

academic research, following course materials, taking notes with the camera or microphone, and communications with classmates and teachers (KARATAŞ, 2018).

A final study conducted recently explored a potential positive role the academic use of a smartphone had on academic performance. This study looked at South Korean college students' communication skills, smartphone self-efficacy, intention to use the smartphone, and academic performance. The intention to use the smartphone was looked at specifically as educational usage of the smartphone. The study showed a significant correlation between those who intended to use the smartphone for educational purposes and their perceived academic performance. It showed those with a high self-efficacy for smartphone usage were more likely to use the smartphone with the specific intent to help in their studies. It showed that those who did perceived that the smartphone played a positive role in their academic performance. The report included the questions used in the survey to come to the findings and conclusions (Han, & Yi, 2019).

The first study was qualitative in nature and no quantification as to how much each use was practiced was sought. In addition, no relationship with academic performance was investigated (KARATAŞ, 2018). The second study also investigated smartphone usage as it pertains to academic purposes. It found a positive relationship with its usage and academic performance. However, it didn't measure academic performance objectively. The academic performance was measured through subjective questioning of whether or not the participant felt each use of a smartphone for academic purposes helped. In addition, the questionnaire only asked which types of behaviors would be used with the smartphone for academic purposes and not how much (Han, &

Yi, 2019). There is room for additional study where academic usage is quantified and academic performance is objectively measured.

Conclusion

Each of the previous studies mentioned used samples with demographics differing from those typically found in a public school setting in the United States. For one, a large number of the studies previously mentioned took place outside of the United States. The study conducted by Winskel et al. (2019) alone shows how similar results aren't found between the demographics of one country and another. The same questionnaire was used to gather data from a sample of South Korean students and a sample of Australian students. While the study indicated both samples had a positive relationship between smartphone usage and problematic smartphone usage, only the sample from Australia showed a negative relationship between problematic smartphone usage and academic performance (Winskel et al., 2019). Given that the sample from South Korea contained heavier usage but did not show the negative correlation to academic performance, there must be more factors at play between the differing demographics than overall usage alone. Also, the majority of these studies were conducted with college students. It is also not clear whether similar results would be found across varying age groups. To illustrate this, a study done using middle and high school aged students in South Korea yielded a significant negative relationship with mobile phone dependency and academic performance (Seo, Park, Kim, & Park, 2016). This seems counter indicative of the study conducted by Winskel et al. where no relationship of problematic smartphone usage and academic performance among college students was found.

It's curious to note that the study conducted by Han, & Yi (2019) found a positive correlation between smartphone usage and academic performance of South Korean college students while Winskel et al.'s (2019) study was looking for a negative correlation amongst its similar sample but didn't find one. The study conducted by Winskel et al. wasn't looking at type of usage, only any usage of the smartphone while studying. This begs the question, if the results were different amongst the two samples, could it be the usage of the smartphone was different amongst the two samples as well? Winskel et al.'s study didn't specify type of smartphone usage during study. Type of usage seems to play a deciding factor in research findings.

To summarize overall cell phone usage and academic performance, a study was conducted to statistically analyze data made available by previous studies conducted from 2008 to 2017. Overall, it was concluded that cell phone usage had a small negative effect on academic performance. Moderation was attempted to determine if any particular group such as age or region of the world showed any significant variations from the generalized findings and none were found. It was suggested that the biggest differences in observed effect among the studies came from research design. In addition, of the 39 studies analyzed, 36 showed a negative relationship while three showed a positive relationship (Kates, Wu, & Coryn, 2018). Again, with only three showing a positive relationship, it would appear more research is needed specifically as smartphone usage would pertain to academics.

There is a current need to determine if there is a relationship between smartphone usage for academic purposes and academic performance in public schools in the United States. If so, is it a positive or negative relationship? Does it play a significant role? In the majority of previous studies

mentioned, the demographics were not what would be found in the public schools of the United

States: different cultures and different age groups. In addition, overall usage or off target usage was

tied to negative performance in the majority of the studies. Only a handful of studies sought a

positive correlation between smartphone usage and academic performance but failed to quantify

the usage and objectively measure the academic performance. As it was also suggested, academic

usage and not just overall usage also needs to be taken into account when considering smartphone

usage as an independent variable in studies pertaining to academic performance.

Chapter 3

Methodology and Procedures

More kids have access to a smartphone in their home than they do computers. They are receiving this access at younger and younger ages. The purpose of this study was to examine if there was a relationship between smartphone usage and academic performance of high school students. A review of literature has suggested that smartphones can be used for learning and to supplement learning with positive effect (Atchley et al., 2013; Hizer et al., 2017; Cavus, & Ibrahim, 2009; Kadry, & Ghazal, 2019; Pinner, 2016; Ramamuruthy, & Rao, 2015). The studies discuss how this is potentially achieved, and how students perceive the benefits of its use, but there is no mention of a quantifiable measure of smartphone usage as it relates to an objective measure of academic performance. This chapter includes information about the population of the school in which this study was conducted, procedures for selecting the participants, data collection instruments, procedures, and the research questions and hypotheses used to guide this study.

Population

The population for this study was high school students from a public school in northeast Tennessee. The school was made up of 841 students from ninth to twelfth grade. The student body was 51.2% male and 48.8% female. The total minority enrollment was 8.8% of the student body of which the majority was black or African American.

Participants

The participants for this study consisted of English Language Arts (ELA) students. Eight ELA classes, two from each grade nine through twelve, were selected to participate. Every student

in each of the eight classes was invited to participate in the study. ELA classes were chosen as they are required for each year of attendance in high school. This combined with the cluster sample approach of inviting two classes per grade to participate would ensure the best sampling of the population while remaining practical in administering the study.

Data Collection Instruments

There were two measurements associated with the research of this study: smartphone usage and academic performance. Smartphone usage by the participant was measured with a researcher-created survey. The survey utilized a Likert type-scale for statements regarding various uses of smartphones. For each of the 22 statements, the participant was to choose from a subjective, non-quantified scale consisting of: never, seldom, sometimes, frequently, and always. The survey also included a small demographic section where the participant indicated their name, grade, gender, and whether or not they owned a smartphone or had access to one. The participant's name was required to correlate the survey with their cumulative high school GPA thus far as this was the item used to measure their academic performance.

Procedures

Before this study began, it was reviewed and tentatively approved by the Institutional Review Board of Milligan College (IRB). At this point, permission to conduct the study using the described participants was obtained from the school board of the school chosen. After which, the final approval to proceed was given by the IRB. Packets put together were handed out to each participant. Each packet contained a cover letter explaining the research, a survey to be completed by the participant, and an informed consent form to be completed by the participant's parent or

guardian. The informed consent form explained that all participant records would be kept confidential, that no mental or physical harm would come to the participants, and what the key points and purpose of the study were. Parents and guardians were also informed of their right to withdraw from the study at any point and that they or the participant would not be penalized in any way. The participants were given a school week to complete the packets and return them to the teacher whose class they had been handed out in. When all participant packets had been returned, cumulative GPAs were obtained from the school for those participants which turned in completed packets. Analysis of the data began once all was collected.

Research Questions and Hypotheses

RQ1: Is there a relationship between smartphone usage and academic performance of high school students?

H1: There is a positive relationship between smartphone usage and academic performance of high school students.

RQ2: Is there a difference between smartphone usage and academic performance for boys?

H2: There is no difference between smartphone usage and academic performance for boys.

RQ3: Is there a difference between smartphone usage and academic performance for girls?

H3: There is no difference between smartphone usage and academic performance for girls.

Chapter 4

Data Analysis

The purpose of this study was to examine if there was a relationship between smartphone usage and academic performance of high school students. This study also examined whether or not there was a difference between smartphone usage and academic performance for boys. Finally, this study examined whether or not there was a difference between smartphone usage and academic performance for girls. The purpose of this chapter is to share the results found from the analyzed data that answered the research questions presented in chapter three.

The participants for this study consisted of English Language Arts (ELA) students. Eight ELA classes, two from each grade nine through twelve, were selected to participate. Every student in each of the eight classes was invited to participate in the study. Smartphone usage by the participant was measured with a researcher-created survey. The survey utilized a Likert type-scale for statements regarding various uses of smartphones. Academic performance was measured using the cumulative high school GPA of each participant.

When scoring the questions for each participant's survey on smartphone usage, a score of 0 was given for a response of 'never,' a score of 1 was given for a response of 'seldom,' a score of 2 was given for a response of 'sometimes,' a score of 3 was given for a response of 'frequently,' and a score of 4 was given for a response of 'always.' The score for each of the 22 questions was totalled. The range of possible scores for the survey was 0 through 88. A score of 0 was given for students who indicated they did not have their own smartphone or access to one. The higher a score, the more a student perceived to use their smartphone for academic purposes.

The cumulative high school GPA was used to measure academic performance. When computing a student's GPA, a score of 4.000 is assigned to a class grade of A, 3.667 is assigned to a class grade of A-, 3.333 is assigned to a class grade of B+, 3.000 is assigned to a class grade of B, 2.667 is assigned to a class grade of B-, 2.333 is assigned to a class grade of C+, 2.000 is assigned to a class grade of C, 1.667 is assigned to a class grade of C-, 1.333 is assigned to a class grade of D+, 1.000 is assigned to a class grade of D, .667 is assigned to a class grade of D-, and .000 is assigned for anything lower. The scores are weighted based on the number of credits a class is worth and averaged based on total credits attempted. As a result, the range for possible GPAs is 0 through 4.000. The higher the GPA, the better academic performance of the student.

Findings

Three research questions were used to guide the analysis of data. Each research question was associated with a research hypothesis. IBM SPSS was used in the analysis of data. All data were analyzed using .05 level of significance. Research questions were investigated using a simple correlation and paired-samples *t* tests.

Research Question 1

RQ1: Is there a relationship between smartphone usage and academic performance of high school students?

H1: There is a positive relationship between smartphone usage and academic performance of high school students.

A Pearson correlation was calculated examining the relationship between smartphone usage and academic performance of high school students. A negative, weak correlation that was

not significant was found (r (38) = -.163, $p > $ .05). Smartphone usage is not related to academic

performance. The results are displayed in Table 1.

Table 1

Correlation Coefficients for Smartphone Usage and Academic Performance

Category	*M*	*r*	*p*	r^2
Smartphone Usage	34.6	-.163	.314	.027
Academic Performance	3.617			

Note. p >.05

Research Question 2

RQ2: Is there a difference between smartphone usage and academic performance for boys?

H2: There is no difference between smartphone usage and academic performance for boys.

A paired-samples *t* test was calculated to compare the mean smartphone usage to the mean

academic performance for boys. A significant difference between the means of smartphone usage

and academic performance (t(14) =6.515, $p <$.05) was found. The mean for the academic

performance was significantly lower (*M* =3.753, *sd* =.326) than the mean for smartphone usage (*M*

=30.33, *sd* =15.751). The calculated effect size was 1.682. The null hypothesis was rejected. The

results are displayed in Table 2.

Table 2

Paired-samples t test for Smartphone Usage and Academic Performance for Boys

Variable	M	SD	df	t	p	ES
Smartphone Usage	30.33	15.751	14	6.515	.001	1.682
Academic Performance	3.753	.326				

Note. p <.05

Research Question 3

RQ3: Is there a difference between smartphone usage and academic performance for girls?

H3: There is no difference between smartphone usage and academic performance for girls.

A paired-samples *t* test was calculated to compare the mean smartphone usage to the mean academic performance for girls. A significant difference between the means of smartphone usage and academic performance ($t(24)$ =10.147, *p* <.05) was found. The mean for the academic performance was significantly lower (*M* =3.535, *sd* =.577) than the mean for smartphone usage (*M* =37.16, *sd* =16.489). The calculated effect size was 2.029. The null hypothesis was rejected. The results are displayed in Table 3.

Table 3

Paired-samples t test for Smartphone Usage and Academic Performance for Girls

Variable	M	SD	df	t	p	ES
Smartphone Usage	37.16	16.489	24	10.147	.001	2.029
Academic Performance	3.535	.577				

Note. p <.05

Chapter 5

Findings, Conclusion, and Recommendations

The purpose of this study was to examine if there was a relationship between smartphone

usage and academic performance of high school students. This study also examined whether or not

there was a difference between smartphone usage and academic performance for boys. Finally, this

study examined whether or not there was a difference between smartphone usage and academic

performance for girls. The purpose of this chapter is to discuss the findings of the study in regards

to the results presented in chapter four, conclude the study, and provide recommendations for

further study and practice.

Summary of Findings

The first research question examined if there was a relationship between smartphone usage

and academic performance of high school students. The Pearson correlation calculated in chapter

four would suggest there is a weak, negative relationship between smartphone usage and academic

performance of high school students (r (38) = -.163, p > .05). This implies the more a student

perceives to use a smartphone for academic purposes, the lower the academic performance of the

student. However, the results were insignificant as p = .314 in the data analysis. Smartphone usage

is not related to academic performance. One possible explanation could be that the smartphone acts

as a distraction leading to off-task behavior and multitasking during times in which a student is

intending to be engaged in academic activities (Barker, 2017; Jacobsen et al., 2011; Duncan et al.,

2012; Rosen et al., 2018). If the smartphone is present for academic activity engagement, it's also

present for off-task behavior and distractions. Another explanation could be there are simply other

ways to engage in academic activities without a smartphone. Afterall, the smartphone is relatively new compared to high school students engaging in academic activities.

The final two research questions compared the mean smartphone usage to the mean academic performance of boys and girls independently. In both cases the mean for academic performance was found to be significantly lower than the mean for smartphone usage. However, the difference was greater for girls than boys: $t(24) =10.147$, $p <.05$ for girls and $t(14) =6.515$, $p <.05$ for boys. The mean for academic performance was lower for girls than boys ($M =3.535$, $sd =.577$ for girls compared to $M =3.753$, $sd =.326$ for boys). At the same time, the smartphone usage was higher for girls than boys ($M =37.16$, $sd =16.489$ for girls compared to $M =30.33$, $sd =15.751$ for boys). This data suggest girls use smartphones for academic purposes more than boys while boys achieve higher academic performance than girls.

Conclusion

The majority of today's youth have or have access to a smartphone. In addition, people are obtaining access to a smartphone at younger and younger ages. Screen time among today's youth is increasing with the biggest increases coming from the use of the smartphone. Smartphones are highly functional devices which offer a myriad of features including entertainment, internet connectivity, communication, and organization. While it has been shown that electronic devices can both be used for learning purposes as well as distract and pull students off-task from academic activities, this study suggests there is no relationship between a student's use of a smartphone for academic purposes and his or her academic performance. Students have always had distractions to pull them off-task. They have also had new methods, practices, and tools to use for academic

purposes. It could just be that the smartphone is the current item in the spotlight serving as both a tool and as a distraction.

Recommendations

This study examined three research questions. The relationship between smartphone usage and academic performance was examined. In addition, the differences between smartphone usage and academic performance were examined for both boys and girls independently. After discussing the findings, recommendations for future research were made. Additionally, recommendations for practice were addressed.

Recommendations for Further Study

Studies have indicated electronic device use in general can be a cause for poor academic performance in students. In addition, it has been shown that electronic devices can be used for learning and academic purposes with good results. While this study showed no relationship between smartphone usage for academic purposes and academic performance, is there a relationship or a predictor between overall usage and academic usage of the smartphone? In other words, could it be that students who use a smartphone more for academic purposes also use a smartphone more in general and the increased overall usage offsets the benefits realized?

Students have always had distractions available to take time and attention away from academic activities. There has also been a continuous evolution in methods, practices, and tools available to use for academic activities. Another area for future research involves what activities, both in general and for academic purposes, are being replaced with smartphone use. Could it be that the presence of a smartphone is just a sign of the times?

Recommendations for Practice

As a student, since no relationship between smartphone usage and academic performance was found, the smartphone should be utilized as seen fit or as needed by the student. If they are more comfortable using one method over another, that method should be the one employed. The smartphone and its uses are becoming an ever present sign of the times in work and life in general. As teachers, it would be best to incorporate its use into the learning process to better familiarize students with their use and better prepare them for life after high school. For parents, teachers, and students, the detrimental effects to smartphone usage shouldn't be ignored and if a smartphone is to be used for academic purposes, care and guidance should be offered to students to help keep the smartphone from becoming a distraction yielding to off-task activities.

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Appendices

Participant Survey

Survey for students

Part I - Demographics

Name: _____

Grade (circle one):   9   10   11   12

Gender (circle one):   Male   Female

Do you have your own smartphone? (circle one):   Yes   No

If not, do you have access to someone else's smartphone at home? (circle one): Yes   No

If you answered yes to either of the previous two questions, please complete Part II.
If you answered no to both of the previous two questions, you're done. Thank you.

_____

Part II - Academic Smartphone Usage

For each statement, circle the response that most closely matches how often you perform the activity.

1. With a smartphone, I email friends about classes.

    Never   Seldom   Sometimes   Frequently   Always

2. With a smartphone, I make phone calls to friends about classes.

    Never   Seldom   Sometimes   Frequently   Always

3. With a smartphone, I send text messages (text messages, Google Hangouts, WhatsApp) to friends about classes.

    Never   Seldom   Sometimes   Frequently   Always

4. With a smartphone, I use social media (Twitter, Facebook, Instagram) to talk about classes with my friends.

        Never   Seldom   Sometimes   Frequently   Always

5. With a smartphone, I email a teacher.

        Never   Seldom   Sometimes   Frequently   Always

6. With a smartphone, I make a phone call to a teacher.

        Never   Seldom   Sometimes   Frequently   Always

7. With a smartphone, I send a text message (text messages, Google Hangouts, WhatsApp) to a teacher.

        Never   Seldom   Sometimes   Frequently   Always

8. With a smartphone, I use social media (Twitter, Facebook, Instagram) to talk about a class with a teacher.

        Never   Seldom   Sometimes   Frequently   Always

9. With a smartphone, I search the internet for information about things covered in class.

        Never   Seldom   Sometimes   Frequently   Always

10. With a smartphone, I watch class-related video files.

        Never   Seldom   Sometimes   Frequently   Always

11. With a smartphone, I listen to class-related audio files.

        Never   Seldom   Sometimes   Frequently   Always

12. With a smartphone, I take notes for class.

        Never   Seldom   Sometimes   Frequently   Always

13. With a smartphone, I take photos/videos for class.

Never   Seldom   Sometimes   Frequently   Always

14. With a smartphone, I make voice recordings for class.

Never   Seldom   Sometimes   Frequently   Always

15. With a smartphone, I take tests.

Never   Seldom   Sometimes   Frequently   Always

16. With a smartphone, I submit assignments.

Never   Seldom   Sometimes   Frequently   Always

17. With a smartphone, I navigate class websites.

Never   Seldom   Sometimes   Frequently   Always

18. With a smartphone, I read class materials.

Never   Seldom   Sometimes   Frequently   Always

19. With a smartphone, I work on assignments.

Never   Seldom   Sometimes   Frequently   Always

20. With a smartphone, I work on projects.

Never   Seldom   Sometimes   Frequently   Always

21. With a smartphone, I use it as a calendar/reminder/things to do list.

Never   Seldom   Sometimes   Frequently   Always

22. With a smartphone, I manage files.

Never   Seldom   Sometimes   Frequently   Always

You're done. Thank you.