

Middle School Student Perceptions and Actual Use of Mobile Devices: Highlighting Disconnects in Student Planned and Actual Usage of Mobile Devices in Class

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ABSTRACT

Discussion surrounding the inclusion of mobile devices in K-12 classrooms has escalated since the early 2000s, and the literature base dedicated to mobile devices, mobile-learning, and e-learning has likewise grown. The majority of the research related to mobile devices and their inclusion in educational settings has largely revolved around efficacy and mobile-learning management systems. Additionally, several large-scale surveys have been conducted to assess the perceptions of students, teachers, parents, and administrators concerning mobile devices in educational settings. Despite these efforts, relatively little is known about students' perceptions of how they would use mobile devices, if given the chance, and the realities surrounding their actual use when given the opportunity. This research surveyed 458 middle-school students regarding their perceptions of how they would use mobile devices, if given the opportunity, during school. Students were allowed to use mobile devices during a two-week engineering design unit and asked to report their actual use of mobile devices. Several gaps between perceptions of how mobile devices would be used and the actual use by students emerged. Students did not use mobile-devices as often as they planned and student use, or lack thereof, displayed a potential disconnect between ways mobile devices are being marketed for use in K-12 classrooms and the ways mobile devices will actually be used by students.

Keywords

Mobile devices, Mobile learning, Middle school, K-12 education

Introduction

Today's students, growing up in an electronic age of connectivity, carry more computing power every day to school than previous generations encountered in a lifetime. This powerful computing power—embodied in student's mobile devices—represents one of the great unknowns of today's educational landscape. How do students perceive these devices? Are mobile devices strictly for communication, entertainment, and photo storage? What exactly is the potential of these mobile devices in school settings? If mobile devices were introduced in the classroom, what would students do with them? The purpose of this paper is to share the perceptions and actual usage characteristics of middle-school students who were given the opportunity to use mobile devices in the classroom during a two-week engineering design challenge.

Mobile devices in middle-school classroom settings

The presence of mobile devices among youth ages 4-14 has experienced double-digit growth since 2005 (CommonSense Media, 2013; NPD Group, 2008; Shuler, 2009) and a similar trajectory is expected moving forward. This explosion of mobile devices among school-aged children has led many to argue for, and against, the inclusion of mobile devices in K-12 classroom settings. The possibilities of mobile devices, and their potential for classroom inclusion, is poised for research and exploration (Hwang & Tsai, 2011). In one meta-analysis of research related to mobile learning in K-12 Education (Liu et al., 2014) the authors note that "literature has shown a significant increase in recent years in terms of publications reporting both projects relating to and studies being conducted on mobile technology use in education" (p. 326). In another meta-analysis (Hwang & Tsai, 2011) identified several themes in their review of research trends in mobile and ubiquitous learning:

- Mobile and ubiquitous learning research has greatly advanced (32 articles during 2001-2005 versus 122 articles during 2006-2010).
- The majority of research is being conducted with higher education and elementary school students.
- The majority of studies were not specific to any specific learning domain; instead they mainly focused on the investigation of motivations, perceptions, and attitudes of students toward mobile and ubiquitous learning.

- The majority of research conducted related to mobile learning has been conducted outside of the United States—specifically in Taiwan. The authors cite Taiwan’s national program for e-Learning as a likely source for this disparity.

Liu et al. (2014) specifically looked at the findings from 63 articles related to mobile devices in K-12 settings and found that 21% of the studies compared the effectiveness of mobile learning to traditional learning settings, while 79% represented exploratory investigations of mobile learning in K-12 settings. The majority of these studies took place outside of the United States (89%), with over half of the studies cited originating in Taiwan. Only 14% of the studies related to middle-school students—the majority revolved around elementary school students. For subject matter, the natural sciences, mathematics, social studies, language arts, and English as a second-language were the dominant academic areas researched.

Benefits associated with mobile devices in classroom settings

Liu et al. (2014) identified four primary affordances of mobile learning from the literature:

- offering students multiple entry points and learning paths and allowed for differentiated learning,
- enabling multiple modality via mobile devices by which students have a tool to create a different learning artifact to suit their needs,
- supporting student improvisation in situ—student may improvise as needed within the context of learning (e.g., take pictures to illustrate learning connections), and
- supporting learning creation on the move with an ease of creating and sharing artifacts. (p. 356)

Additional reported benefits of mobile devices in the classroom included the support for language and content learning, differentiated instructional support, and extended learning time away from the classroom (Liu et al., 2014). Other studies have cited demonstrated better academic achievement and improved learning attitudes (Hwang, Shi, & Chu, 2011), increased student engagement (Huang, Lin, & Hwang, 2010), improved language acquisition (Hwang & Chen, 2012), greater interaction with peers in problem-solving (Sung, Hou, Liu, & Chang 2010), increased motivation, high levels of self-efficacy, high interest in activities, and increased interest in collaboration (Seifert, 2015).

Challenges of mobile devices in K-12 classrooms

As with any new tool or technique introduced into a classroom several challenges associated with the inclusion of mobile devices have been identified. These include, but are not limited to:

- Student distraction (Alberta Education, 2006; Alberta Education, 2012; Project Tomorrow, 2011; Shuler, 2009),
- Potential for harassment (Lenhart, Ling, Campbell, & Purcell, 2010),
- Student privacy concerns (Crichton, Pegler, White, 2012; Project Tomorrow, 2011),
- Potential for cheating (Shuler, 2009),
- Increased student disciplinary problems (Project Tomorrow, 2011; Shuler, 2009; Thomas & McGee, 2012),
- Lower academic achievement (Kitchen, 2014),
- Decreased student engagement (Swan, van’t Hooff, Kratcoski, & Unger, 2005),
- Issues with school technology infrastructures (Liu et al., 2014), and
- The potential for digital inequity situations to arise (Liu et al., 2014).

In addition to challenges directly associated with the inclusion of mobile devices in the classroom other hurdles have been highlighted which may stand in the way of effectively incorporating mobile devices in the classroom. These challenges include: the uniqueness of each class, school, and district and the status quo; for the most part, mobile devices are currently prohibited in public K-12 class settings (CommonSense Media, 2009; Project Tomorrow, 2011; Project Tomorrow, 2012a; Thomas & McGee, 2012) and changing this may be difficult.

Perceptions related to mobile devices in K-12 classrooms

Several surveys related to perceptions of mobile devices in K-12 settings have been conducted (Harris Interactive, 2013; Project Tomorrow, 2011; Project Tomorrow, 2012b). Overall, the excitement, support, and perceptions of including mobile devices appear to be positive. Harris Interactive (2013) report that 69% of students want to use their mobile devices more often in the classroom, seven out of 10 students would like to see

mobile devices used more often in their classrooms, and among students who have used a mobile device for school work this year, 60% have used their device for school work at least a few times a week. The most popular school-related activities on mobile devices were researching, homework, and checking assignments and 44% of students reported using a smartphone for schoolwork.

While teachers, parents, and administrators have traditionally been opposed to the inclusion of mobile devices in the classroom (Project Tomorrow, 2011; Project Tomorrow, 2012b), recent years has seen a shift in these opinions (Project Tomorrow, 2014). In 2010, over 60% of principals said it was unlikely that they would allow students to use their own mobile devices in school. In 2013, however, that number was almost cut in half—down to 32%. Additionally, 41% said they were likely to allow such usage today and 10% said they already do allow students to use their own mobile devices to support schoolwork in class (Project Tomorrow, 2014). Over 86% of parents say that the effective implementation of technology within instruction is important to their child's success and 50% label it as "extremely important." Despite the cited interest, only 64% say that their child's school is doing a good job of using technology to enhance student achievement, and only 12% strongly agree with that statement (Project Tomorrow, 2012b). In the 2013 *Speak Up* survey, completed by more than 400,000 K-12 students, parents, teachers, and administrators (Project Tomorrow, 2014), 60% of all parents surveyed said they would like their children to be in a class where using one's own mobile device was allowed. Furthermore, two thirds said they would purchase a mobile device for their child to use within class, if that was allowed by the school.

Despite the literature related to the benefits, challenges, and perceptions of stakeholders, and possibilities for the inclusion of mobile devices in K-12 education, relatively little is known about students' perceptions and plans for mobile device use when given the opportunity (Project Tomorrow, 2011; Tossell, Kortum, Shepard, Rahmati, & Zhong, 2015). Similarly, a gap remains in how these perceptions of potential mobile device use would translate into reality when students were given access to mobile devices.

Methodology

With competing ideas related to the inclusion of mobile devices in K-12 classrooms it is important to further investigate student perceptions and practices of use. The purpose of this study was to gather middle-school student perceptions regarding the ways in which they would engage with and use mobile devices if given the opportunity in a K-12 classroom setting. Additional inquiry was conducted related to how students actually used mobile devices when given the opportunity. The research questions guiding this study were:

- What are students' perceptions and beliefs related to the use of mobile devices in K-12 classroom settings?
- When given the opportunity, how do students actually use mobile devices in K-12 classroom settings?
- What differences, if any, exist between student perceptions of mobile device use and actual student use of mobile devices?
- What relationship exists, if any, between student achievement and student perceptions and use of mobile devices?

The study, located in a suburban area of a state in the western United States, used a sample of 442 middle-school students from 5 different schools (6 teachers, 18 total classes). Students were surveyed about their perceptions of personal mobile device use in class as part of a two-week unit involving an engineering design project. This design unit was completed during the students' *Exploring Technology* class—an elective Career and Technical Education (CTE) course (USOE, 2014). The unit, which was uniform across schools and teachers, required the students to work in groups to complete a portfolio and produce a physical solution to a provided engineering design challenge (i.e., design a medicine dispenser for an elderly person). Following the initial survey, all students were given instruction on appropriate mobile device use, privacy, and security following Ribble's (2011) outline for Digital Citizenship. This was done in an effort to lay a suitable groundwork prior to permitting mobile device use in classrooms. Half of the students (3 teachers, 9 classes) were informed that they were allowed to use mobile devices for the remainder of the unit (2 weeks, 5 class periods). Students in this group were permitted to use mobile devices (either their own or one provided by their teacher) in any way they saw fit—as long as it was beneficial to their completion of the provided task. School-provided devices were made available to any students in these classes that did not have access to a personal device. The other 9 classes (3 teachers) proceeded with the design unit but did not permit students access to mobile devices during the task.

At the completion of the unit all student groups submitted group design products and portfolios for grading (see Figures 1 and 2 for examples of completed student work) and completed another questionnaire. Students were asked about their own perceptions of mobile device use in classrooms. Students were also asked to rank several

tasks numerically according to how often they perceived themselves using a mobile device to perform each task if given the opportunity. Separately, the students that were permitted access to mobile devices were asked to self-report how often they actually used a mobile device, what tasks they used the device to accomplish, and how much time they spent with each task on the device. Finally, several qualitative questions were posed to students related to mobile devices in K-12 classrooms—responses to all questions were collected through an online survey collection tool.

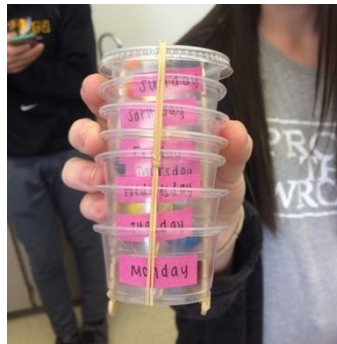


Figure 1. Example of a student product

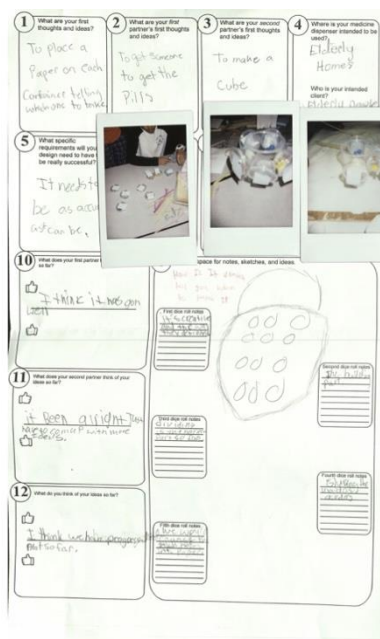


Figure 2. Example of a student portfolio

Student qualitative responses were coded, first descriptively, and second thematically using techniques outlined by Saldaña (2013) and Gibbs (2007). This process was undertaken in an effort to identify overarching themes related to each question. Descriptive coding, also called “topic” coding (Saldaña, 2013), involves reading a response from a participant and identifying the basic topic of the passage. This process is used to identify overarching topics stemming from the qualitative questions. Following this process, a thematic approach was used during a second round of qualitative data analysis. In thematic coding topics and passages are identified that are linked together by a common theme or idea (Gibbs, 2007). The resulting final themes were used, in conjunction with the qualitative responses and quantitative data, to explore students’ perceptions and experience with mobile devices in K-12 settings.

Findings

Utilizing student responses to both the pre—and post—study questionnaires several ideas related to the research questions emerged. Themes arising from the qualitative responses of students and the subsequent coding were used to illuminate and clarify the findings from the quantitative survey responses. Findings related to each question are presented here:

Research question #1: What are students' perceptions and beliefs related to the use of mobile devices in K-12 classroom settings?

Students believe that mobile devices can and should be integrated into K-12 classrooms—over 80% of students surveyed (80.5%, $N = 451$) responded that they believed students should be allowed to use mobile devices in their K-12 classrooms. Students were asked to clarify the ways in which they would use mobile devices if they were given access to them in the classroom (see Table 1). Students answered that they were most likely to use mobile devices to send files (audio, video, and photo) to someone else (80.8%), access the Internet for information (79.7%), and learn new skills (68.8%). Less than half of students (39.5%) reported they would use mobile devices for communicating with others (via text message or phone call) while only 21.6% of surveyed students reported that they would use a mobile device to create, edit, manipulate, or manage photo or video files.

Table 1. If you had access to mobile devices during all your classes in school how would you use it? ($N = 458$)

Possible use of mobile devices	Yes	No
To send audio, video, or photo files to someone else	80.8% ($n = 370$)	19.2% ($n = 88$)
To access information via the Internet	79.7% ($n = 365$)	20.3% ($n = 93$)
To learn new skills	68.8% ($n = 315$)	31.2% ($n = 143$)
To communicate with someone else (i.e., text message, phone call, etc.)	39.5% ($n = 181$)	60.5% ($n = 277$)
To create, edit, manipulate, or manage photos and/or videos	21.6% ($n = 99$)	78.4% ($n = 359$)
I would not use it	11.6% ($n = 53$)	88.4% ($n = 405$)

Student qualitative responses appear to align with these quantitative findings. When asked about potential advantages of mobile devices in K-12 classrooms, students overwhelmingly cited access to information as the chief advantage (coded 293 times). As an example one student noted:

If someone were to have a question about the subject, he/she could quickly look up the answer on the presentation.

Two students commented that access to information would help prepare students for future, out-of-school opportunities, where restrictions on mobile devices do not exist:

They can get used to what life will be like when they have their own jobs. They can get used to the unlimited knowledge and information on the internet.

They get to learn how to use it for their future jobs, because a lot of teachers that I know use their phone a lot.

Another common theme from the student responses was “improved learning” for students through mobile devices in classrooms (coded 100 times). Students mentioned a variety of ways mobile devices could improve learning, including supplementing classroom instruction, access to a variety of learning tools online and through apps, and ability to learn through a variety of medium (e.g., pictures, videos, text). One illustrative comment related to improved learning scenarios related:

[Students] can use them to supplement the info the teachers is teaching with pictures because some people learn better with pictures, or something like that.

Not all students perceive mobile devices as beneficial for classrooms with several disadvantages highlighted by students. When questioned about potential disadvantages of mobile devices in K-12 classrooms students identified distraction (374 coded times), cheating (coded 25 times), and viewing inappropriate material (coded 25 times) as the three biggest disadvantages of including mobile devices in K-12 classrooms. Students highlighted the lack of control, by the teacher or school, inherent with allowing access to mobile devices in their comments:

Teachers really have no real control in what students do on their device.

Students can use their devices for things other than their school work. The good thing about having computers and using them in school is that the teacher is able to see what every student is doing online and monitor their devices. With phones and other mobile devices, this is not possible for them to monitor and make sure that they are on task at all times.

Everyone will get distracted with their cell phone, either with social media or communicating with others. There is no way for teachers to tell if they are misusing their phone.

Interestingly, some students also seemed to identify how mobile device could potentially remove the onus for learning from the students by allowing them to rely completely on the device:

They may also take advantage of the ease to look up an answer so they won't have to do work. It seems to make them not need creativity because they don't have to think hard and solve their own problems because someone on google probably already did

I think if mobile devices were allowed [sic] in class people wouldn't work they would ask Siri.

Overall students appear to view the ability to access information as the chief benefit on including mobile devices in the classroom. The distraction that accompanies this access to mobile devices was perceived by students as the largest detractor.

Research question #2: When give the opportunity, how do students actually use mobile devices in K-12 classroom settings?

All students provided with access to mobile devices as part of the study were asked to self-report their own access and uses of mobile devices during the study. Interestingly, despite wanting access to mobile devices, less than half of the students actually used a mobile device for longer than 20 minutes during the study and the study took place over a total of 400 minutes (i.e., —five 90-minute class periods). The remaining students chose to not use a device or use a mobile device for less than 20 minutes total (see Table 2). In light of these lower usage reports it should be noted that every student in the experimental group was given access to either a personal or a school-provided mobile device as part of this study.

Table 2. How many minutes total did you use a mobile device during this unit in class (if ever)? (N = 346)

Mobile device use in class	Frequency
I didn't ever use a mobile device	16.0% (n = 36)
0-10 Minutes total	20.4% (n = 46)
11-20 Minutes total	14.2% (n = 32)
21-30 Minutes total	16.4% (n = 37)
31-40 Minutes total	8.9% (n = 20)
41-50 Minutes total	4.4% (n = 10)
51-60 Minutes total	8.0% (n = 18)
More than 1 hour total	11.6% (n = 26)

In addition to quantifying the amount of time spent using a mobile device during the design unit students were also asked to identify the ways in which they actually used a mobile device during this unit in class. Table 3 demonstrates the ways students, as a group, actually utilized mobile devices in class during this unit. The most popular ways to employ mobile devices were learning new skills ($\bar{x} = 22.48$ minutes) and accessing information via the internet ($\bar{x} = 17.32$ minutes).

Table 3. How much time (in minutes) did you spend doing the following on a mobile device during this study?

Mobile device use in class	Mean time spent by students (in minutes)
To communicate with someone else (i.e., text message, phone call, etc.)	$\bar{x} = 12.24$ minutes
To access information via the internet	$\bar{x} = 17.32$ minutes
To create, edit, or manage photos or videos	$\bar{x} = 14.29$ minutes
To learn new skills	$\bar{x} = 22.48$ minutes
To send audio, video, or photo files to someone else	$\bar{x} = 10.15$ minutes

Using a one-way ANOVA, the total number of minutes spent using a mobile device was compared with the different ways mobile devices were utilized. The analysis revealed a significant relationship between number of total minutes spent using a mobile device in class and using a mobile device to create, edit, or manage photos or videos [$F(7, 144) = 2.13, p = .044$], suggesting students were significantly more likely to use a mobile device to create, edit, or manage photos or videos. Similarly, a one-way ANOVA comparing the number of minutes spent in total using a mobile device during class and using a mobile device to learn new skills was significant [$F(7, 159) = 5.62, p < .001$], demonstrating a significant relationship between high users of mobile devices and those that used mobile devices to learn new skills. All other relationships were not significant.

Research question #3: What difference, if any, exist between student perceptions of mobile device use and actual student use of mobile devices?

While 80.5% of students ($N = 451$) involved in the study responded that they believed students should be allowed to use mobile devices in their K-12 classrooms the average number of minutes that mobile devices were used by students that had access to them was less than 30 minutes ($\bar{x} = 28.5$ minutes). Students were asked to identify specific ways in which they would use mobile devices in the future if they were given access to these devices in K-12 classrooms. These responses were compared with the actual time values reported by these students for using mobile devices during class. Using correlational techniques each possible relationship was analyzed (see Table 4), with the only significant correlation related to communicating with others, $r(134) = .209$, $p < .05$. This suggests a possible disconnect between student planned and actual use of mobile devices related to these tasks.

Table 4. Comparison of student plans to use mobile devices and actual reported use of mobile devices

If you had access to a mobile device during all your classes in school, how would you use it?	Correlation with student reported use (in minutes) for each task
To communicate with someone else (i.e., text message, phone call, etc.)	$r(134) = .209$
To access information via the internet	$r(134) = .019$
To create, edit, or manage photos or videos	$r(134) = .107$
To learn new skills	$r(134) = .098$
To send audio, video, or photo files to someone else	$r(134) = .113$

Using one-way ANOVA techniques, the total number of minutes, and the number of minutes spent using mobile devices for each reportable task, was compared with student beliefs about whether mobile devices should be allowed during class in school. The results were not significant indicating student beliefs about whether mobile devices should be allowed in school during class were independent of their actual usage.

Several students chose not to use a mobile device, despite being given access to mobile devices in class. These students were asked to why they chose to not use a mobile device despite access. Student qualitative responses generally revolved around not needing a mobile device for the assignment (coded 21 times) and the worry that they would become distracted by the devices (coded 5 times). Two students noted that they did not use a mobile device, despite having access: “because I didn’t need to.” Another student echoed a similar sentiment: “[We] didn’t really need to use [a mobile device] since we had everything provided for us.”

Research question #4: What relationship exists, if any, between student achievement and student perceptions and use of mobile devices?

The students involved in this study were assessed through their design portfolios and the design products turned in by each group. All portfolios and products were assessed using a method of assessment called Adaptive Comparative Judgment (ACJ). ACJ is a method of assessment where products are compared in various combinations until a rank order is produced (see Bartholomew, Reeve, Veon, Goodridge, Stewardson, Lee, & Nadelson (in press) for a discussion of the ranking process). In order to evaluate the possible relationship between student achievement, as measured by rank received on portfolios and products, a variety of possible correlations were explored for both the products and the portfolios. There were no significant correlations between the final student product score, as demonstrated by their rank ordering, and any of the student perceptions or uses of mobile devices. There were several significant correlations between the student portfolio rank and the student perceptions and use of mobile devices (Table 5). Student beliefs regarding whether or not mobile devices should be allowed in classes during school were negatively correlated with the student rank orders—signifying that students who did not believe mobile devices should be allowed in schools performed better on the portfolios (lower rank order). Relatedly, students that marked that they would not use mobile devices in school, even with permission, were significantly correlated with higher scores on the portfolio (lower rank order). Student who marked that they would use mobile devices in school to access tutorials on video-hosting platforms demonstrated a significant correlation with better portfolios. Conversely, students which planned on creating, editing, manipulating, or managing photos and students which planned on accessing written instructions or informational websites were both significantly correlated with lower portfolio scores (higher rank order).

Table 5. Student portfolio score and student perceptions and use of mobile devices

Student portfolio rank	Pearson correlation	Sig. (2-tailed)	N
Do you believe students should be allowed to use mobile devices during classes in school?	-.164**	.000	449
If you had access to a mobile device during all your classes in school would you use it to communicate with someone else (i.e., text message, phone call)?	.088	.060	456
If you had access to a mobile device during all your classes in school would you use it to access information via the Internet	.019	.690	456
If you had access to a mobile device during all your classes in school would you use it to create, edit, manipulate, or manage photos and/or videos	.129**	.006	456
If you had access to a mobile device during all your classes in school would you use it to learn new skills	.029	.537	456
If you had access to a mobile device during all your classes in school would you use it to send audio, video, or photo files to someone else	.076	.106	456
If you had access to a mobile device during all your classes in school would you use it? I would not use it	-.099*	.035	456
If you were using a mobile device to access information on the Internet during school how would you use it? Access information via a search engine (i.e., Google)	.060	.227	410
If you were using a mobile device to access information on the Internet during school how would you use it? Access tutorials on a video-hosting platform (i.e., Youtube)	-.170**	.001	410
If you were using a mobile device to access information on the Internet during school how would you use it? Access written instructions or informational websites	.120*	.015	410
If you were using a mobile device to access information on the Internet during school how would you use it? Access images via a search engine (i.e., Google)	.019	.699	410
If you were using a mobile device to access information on the Internet during school how would you use it? Access message boards, forums, or other community information-sharing platforms	.002	.968	410
How many minutes total did you use a mobile device during this unit in class (if ever)?	.106	.084	267
How much time (in minutes) did you spend communicating with someone else (i.e., text message, phone call)?	.138	.076	166
How much time (in minutes) did you spend accessing information via the Internet?	.081	.253	200
How much time (in minutes) did you spend creating, editing, or managing photos or videos?	.118	.116	179
How much time (in minutes) did you spend learning new skills?	.125	.076	201
How much time (in minutes) did you spend sending audio, video, or photo files to someone else?	.090	.291	139

Note. *Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed).

Discussion

While the overwhelming consensus among students surveyed suggests that students want mobile devices in the classroom our findings suggest that mobile devices may not be a positive influence in middle school classrooms. While there was no significant correlation between increased time with mobile devices and higher grades, the correlation between lower final student grades on the portfolio and the amount of time spent using a mobile device ($r = .106, p = .084$) did approach significance. This suggests that time on mobile devices may actually be correlated with lower achievement by students. Additional findings from this study appear to show that despite

wanting these devices in classrooms, students were aware and fully recognized that the potential negatives associated with mobile devices could be detrimental to their learning.

Students cited distraction as the main factor mobile devices could have negative consequences in K-12 classrooms. Relatedly, a correlation was found between higher grades and a students' belief that mobile devices should *not* be included in the classroom. These findings build off of similar ideas shared in the recent literature related to mobile-devices (Alberta Education, 2006; Alberta Education, 2012; Project Tomorrow, 2011; Shuler, 2009).

Student perceptions of how they would use mobile devices and the actual student practices of using mobile devices demonstrated a possible disconnect and area for further research. Over 80% of students said that mobile devices should be allowed in K-12 classrooms, yet, when given the opportunity, the majority of students used mobile devices less than 5% of the time. While students identified sending audio, video, or photo files and accessing information as the most likely uses for mobile devices the students reported different actual usage of the mobile devices—learning new skills was the most commonly reported use of mobile devices by students during this study. The correlational analysis revealed several incongruences between students' planned use and actual use of mobile devices.

In the study, students were asked to describe measures a school could take to make mobile device use in class effective. The themes emerging from these qualitative responses revolved around implementing restrictions (coded 226 times), either at a district, school, or classroom level. Students expressed comments such as:

Make sure that everyone is on task. Like, randomly calling on students to answer a question and rewarding them if they get it right. Motivation I guess is the key here. Also, mobile devices open up the whole internet. This gives us so many more opportunities to learn new skills.

They could possibly use an app that allows teachers to monitor their devices when they are logged into that specific application. This way, they can see what they are doing to make sure they are on task but they won't have full responsibility over the device.

Have an app that you sign into and that app only allows you to do things that are appropriate or related school. And if you want to use your device you have to sign in to the app.

They would stand at the back of the classroom watching what the students are doing to prevent them from doing something that they should not be doing.

Other student suggestions revolved around a theme of using mobile devices to improve learning through new and innovative activities. One student suggested:

One thing that would take some time is have a state or district wide app that allows you to select your classes and have all the notes, explanations of the classes and what you did and work that will help you understand what you are doing better. That way you can connect to the internet it will update and then you have all the information and if you want to study and you don't have internet you are allowed to still study. Maybe even it could allow you to turn in assignments.

Conclusion and recommendations

While mobile devices may be a “hot-topic” on the educational agenda, it appears that introducing them into K-12 classrooms may actually be detrimental to student achievement. Although mobile-devices are largely hailed as catalysts for communication, findings from this study suggest that further exploration is needed into the actual usage of mobile-devices by students (e.g., the students in this study used mobile devices in ways other than communication more frequently than solely for communication purposes). Furthermore, although students almost unanimously report wanting these devices, access to mobile devices may not always translate into use and utility in K-12 classroom settings. Before teachers, administrators, parents, or professionals introduce mobile devices into K-12 classrooms further research should look to clarify a variety of important questions. For example, further inquiry should focus on identifying specific ways mobile device improve or harm student learning. Research related to the classroom impacts of mobile devices (e.g., student achievement, student demeanor, classroom environment) needs additional exploration and emphasis is needed on the apparent disconnect between student plans and practices for the use of mobile devices. Ways that mobile devices can balance restriction and freedom of access in classroom settings is another promising area for future research. Inasmuch as mobile devices provide access to a variety of information the issues surrounding data and personal

privacy and mobile device integration should be studied. Additionally, inquiry exploring why students do not choose to use mobile devices in all classroom and lesson settings despite the overwhelming desire to have access to these devices would help decision-makers and key stakeholders as the increasingly ubiquitous presence of mobile devices demands answers to these questions.

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