Smartphones and Pedagogy: Digital Divide Between High School Teachers and Secondary Students

Lisa Black-Fuller

Huntsville Independent School District, Huntsville, TX, USA

Sylvia Taube, Andrey Koptelov, Sam Sullivan

Sam Houston State University, Huntsville, TX, USA

This paper provides a short review of current research on smartphones, such as iPhones, in the classroom and presents preliminary findings from a study involving 22 experienced teachers from one high school in Texas, USA regarding their beliefs and perceptions about integrating smartphones in their teaching. Findings revealed non-users (27%) of smartphones could not identify benefits for these tools in teaching and learning the content, while those who perceived themselves as occasional users (73%) allowed students to use cell phones in their classrooms for researching, taking pictures, and downloading music or videos. Teachers in our study felt unprepared to incorporate smartphones in teaching their specialized field (e.g., math, science, and language arts). Hence, the urgent need for effective as well as sustained professional development on integrating mobile devices in the classroom by content areas in secondary education. In this paper, mobile devices refer to cell phones, smartphones, or cellular devices.

Keywords: technology integration, instruction, mobile devices, cell phones, pedagogy

Introduction

The inevitable and widespread use of mobile devices is here to stay as today's society relies on these devices to conduct personal, social, and work-related affairs. Faure and Orthober (2011) alluded to this phenomenon in the following argument:

Mobile phones are as much a part of this generation's culture as Rap Music and Red Bull. Getting a mobile phone is a teenage rite of passage, of the magnitude once reserved for getting a driver's license. (p. 55)

Mobile technology device (e.g., iPhone) is a generic term used to refer to a variety of tools that allow people to access data and information from wherever they are. For instance, a cellular device is a mobile phone (also known as a cellular phone, cell phone, hand phone, or simply a phone), which can make and receive telephone calls over a radio link, while moving around a wide geographic area.

In a national survey conducted in the United States (U.S.), 69% of elementary, middle, and high school students indicated they would like to use mobile devices more often in the classroom (LaPoint, 2014). However, can every student afford a mobile phone for classroom use? Current trends suggest that students in

Lisa Black-Fuller, M.Ed., Huntsville Independent School District, Huntsville, TX, USA.

Sylvia Taube, Ph.D., associate professor, Curriculum & Instruction Department, Sam Houston State University.

Andrey Koptelov, Ph.D., assistant professor, Curriculum & Instruction Department, Sam Houston State University.

Sam Sullivan, Ed.D., professor, Curriculum & Instruction Department, Sam Houston State University.

economically disadvantaged households are increasingly likely to have access to smartphones even if they do not have computers or Internet connections at home (Watters, 2012, p. 36). Students today have quick access to information and are more comfortable performing multiple tasks at once, especially in a learning situation. Students get easily bored when vast amount of information are forced on them without meaningful connections. They are action driven; in need of a more self-initiated and self-motivated learning process (Jacobs, 2010, p. 7).

Meanwhile, in 2010, the National Education Technology Plan sponsored by the U. S. Department of Education promoted the “bring your own device” (BYOD) program and argued that this could help improve student achievement (LaPoint, 2014, p. 9). It was however noted that very few schools participated in the BYOD programs despite the pervasive use of mobile devices by both teachers and students. Persuading schools and teachers to allow students to use technical devices in classrooms continues to be a challenge (Watters, 2012).

Mitchell (2012) further surmised schools should focus their resources on the utilization of the “powerful computer” that students already have instead of spending money filling classrooms with equipment that may become obsolete in the near future (p. 30). Mitchell underscored the use of mobile phones in an educational environment. For example, he indicated that, when students are instructed to use their cell phones to take pictures as notes or use a video recording for interviewing important persons, the cell phones becomes a learning device.

Brief Review of the Literature

Using a cellular phone as a teaching tool in the classroom provokes mixed reactions from educators depending on their roles in schools. The idea of allowing cell phones adds to the many uncomfortable issues about the use of instructional technology lurking our school system today. Some educators and students view the use of it as a positive addition to the classroom, while others see it as a disruption and not supporting the learning process. Educational studies conducted on cellular phones report positive classroom outcomes, such as observable increase in class participation when cellular phones were used in the class (Engel & Green, 2011, p. 39).

Engel and Green (2011) evaluated the application of cell phones in the classroom. They examined three specific uses of cell phones in a classroom: (a) audience response system; (b) for research; and (c) for photographs and videos. The first use (audience response system) could involve using different applications, such as wiffiti.com and polleverywhere.com to receive immediate feedback for a quick assessment of student learning. The immediate response system for assessment in a classroom can create a back channel with students —A conversation to receive feedback from students about the lesson (p. 42). The second use was as a research tool to gather information from the Internet. Finally, cellular phones were used by students in developing and editing videos to help them demonstrate solutions to problems or cases presented to them, hence, allowing them to show a deeper understanding of content.

Batista and Barcelos (2014) had a sample of 21 students and nine teachers in their study about considerations on the use of mobile phones in educational context. They found 22% of the teachers agreed that the pedagogical use of mobile phones should be used in high school and university only. These researchers understood the complexity of this issue and they recommended use of common sense and open dialogue to resolve several problems embedded in using mobile phones for teaching and learning (p. 8).

Perceived Barriers to Integrating Smartphones in Teaching

Thomas and O'Bannon (2013) reported barriers, such as disruptions and cheating to the use of cell phones in the classroom. Their study revealed pre-service teachers had a difficult time identifying the benefits of using a cell phone in the classroom. Many of them did not take any technology courses in their teacher preparation program and had no idea how to integrate cell phones in their classroom. The researchers urged for effective teacher training programs that transcend learning of technology skills and knowledge and focused on pedagogical beliefs and attitudes of teachers (p. 18).

Regulating the use of mobile devices in a classroom is another obstacle met by teachers. Charles (2012) found that, even if schools set rules that define appropriate behaviors with social digital networks, "students and teachers frequently negotiate the boundaries and intersections of these tools and discourses through relationships founded on trust and respect" (p. 6). Charles, in his qualitative study involving seven high school students and three high school teachers, followed his sample for one year and found that students and teachers readily admitted to breaking the rules regarding the school's set policy against the use of personal electronic devices. Students sought ways to get around the policy. The younger teachers in Charles' one-year study appeared more understanding of the students breaking the policy and aware of the tricks the students used to conceal the use of the devices.

Perceptions of Teachers and Students

Thomas and O'Bannon (2013) compared perceptions of millennial students by polling pre-service teachers who were either "digital immigrants" or "digital natives." Their goal was to determine whether these two groups differed in their use of cell phones. Their findings revealed both groups gave similar responses on how they used cell phones in the classroom, and these included: (a) using the calculator function; (b) browsing the Internet; and (c) listening to the audio player. Although both groups found the same three components to be useful in a classroom, there was a difference in the order of importance of the applications. Fifty percent of the digital immigrants and natives alike agreed cell phones could support learning by giving students quick access to learning opportunities (e.g., information) which could lead to increased communication and differentiation of instruction. Moreover, digital natives (71%) were significantly higher in their agreement that cell phones could increase student engagement compared to the digital immigrants. Howe and Strauss (2010) provided more explanation and distinctions between digital immigrants and digital natives.

After examining perceptions of teachers and students on their use of mobile phones in the classroom, Baker, Lusk, and Nauhauser (2012) reached the following conclusion:

The baby-boomer professors of today must find a way to peacefully coexist with their millennial students who have fully embraced the technologies that boomers created for them. Therefore, it is incumbent on instructors, and designers of the classroom environment, to adapt to these technologies in so far as possible and to deliver courses in a way that reflects these oftentimes conflicting views concerning the use and usefulness of these technologies. (p. 288)

Baker et al. (2012) studied several variables including: The perceptions of faculty, students, and staff regarding electronic devices in the classroom and demographics that were possibly associated with these perceptions on the use of electronic devices in a classroom. This research was conducted in three northern universities in the U.S.

The short review of the literature outlined above revealed gaps as well as scarcity of studies on effective

instructional uses of smartphones which are accessible to millennial students today (Howe & Strauss, 2000). In particular, there is a lack of research on in-service teachers who are critical in promoting and adapting mobile technology in the actual classroom. Further study is needed especially in secondary schools where “college readiness” and supporting 21st century skills are overarching goals.

Method

The following questions were addressed in this study:

1. What are secondary teachers’ perceptions about using smartphones in the classroom for educational purposes?
2. What prompts secondary teachers to be more or less supportive of the use of smartphones in a classroom for educational purposes?

Subjects

The participants included 22 experienced teachers at one high school serving 1,800 students from Texas, USA. Subjects were selected by content area using clustered sampling and name drawing. From this sample, 13 participants volunteered for a follow-up one-on-one interview using a set of structured interview questions. The other nine teachers were asked to answer the same questions without a one-on-one interview. They simply wrote their answer on the questionnaire and dropped it in a box in the faculty lounge.

Instrument

The structured interview (see Appendix A) was based on seven open-ended and two demographics items. These questions were pre-determined and each interview took about 15 minutes. The same order of the questions was consistently followed.

Procedure

During the one-on-one interview, a voice recorder was used to record subjects’ responses. Subjects who did not use cellular devices in their classrooms were prompted to elaborate why they chose not to incorporate these devices. Subjects who claimed they were “users” of smartphones in their classroom were asked how often they used them, what issues they had with students using the devices, training(s) they had on the use of cell phones in teaching the content, student engagement, and computer programs or applications they were using.

Analysis of data

Using an “audit trail,” open-ended responses were tallied and transformed into descriptive data comparing factors, such as content area, teaching experience, frequency of use, and digital natives versus immigrants. Qualitative data were analyzed from the one-on-one interviews to substantiate, triangulate, and clarify the written responses on the questionnaire.

Findings

This qualitative study involved 22 teachers, 13 of whom were interviewed individually, about their use or non-use of cellular devices in their classrooms and reasons for their decisions. Of those interviewed, nine were female and four were male teachers. The total sample had teaching experience ranging from 2 to 45 years old, while the average years of teaching experience is 17 years old. About a fourth of the sample was considered digital natives and the rest were digital immigrants.

The three teachers who have not used smartphones in the classroom gave reasons for not using these devices: no way to teach their content area on a cellular device; smartphones were not useful in their content area with phrases, such as “What do you need a phone for in this subject?” “It is hard to get a reason to use a phone...,” and “Not everyone has a phone....” All of the English teachers interviewed did not use smartphones within their content area. The teachers indicated they had not received any training pertaining to the use of cellular devices or the use of cellular devices within their content area.

While these non-users (respondents) were aware of applications programs (Apps), such as “Remind101,” “Celly,” and “Twitter,” they have not used these for instruction in their classroom. Occasionally, they would use one of these to send reminders to students of upcoming activities outside of the classroom.

How Cellular Devices Are Being Utilized?

Only three of the 13 teachers interviewed indicated they used smartphones regularly in their classroom and that they used smartphones in three ways: (1) content specific applications or Website; (2) as a tool for research; and (3) to find or post pictures on Websites. Science teachers use smartphones for students to research and find information needed for their assignments. Mathematics teachers use content specific applications, such as the calculator in their classrooms. Social Studies teachers allowed their students to use the mobile device for researching topics within their lessons. Foreign language teachers used smartphones as a research tool and some recommended specific applications that students can use for help in translation. Fine arts teachers used smartphones in two different ways: One class used the devices to find images and the other used it in conjunction with a content specific applications. Respondents teaching English as a subject did not use smartphones at all. Career and technology education teachers were split: A respondent used the device to take and post pictures to a specific Website and the other did not use the device at all.

Teacher participants were asked if they could name any available mobile technology devices that can be used in conjunction with smartphones and their classrooms. Three of the teachers interviewed indicated they knew about the Polleverywhere and Kahoot program. However, none of the teachers interviewed was able to describe any of these as beneficial in specific content areas in secondary schools.

Teachers’ Challenges in Using Smartphones

None of the teacher respondents who were users of smartphones regularly in their content area received any training on the use of these devices for use in their classroom. The teachers indicated they have been to workshops or professional development events which quickly showed a program, such as “Celly,” “Remind 101,” and “Polleverywhere.” However, no specific training to illustrate how to use them in their specific content area had been provided. For instance, Teacher A explained, “Honestly, I want to be able to do things where I can project it and show students’ answer, or do things on their phones.”

Overall, the teacher respondents indicated using cell phones in the classroom for instructional purposes did not cause disruptions or student misuse of the device. Teacher respondents who utilized cellular devices in their content areas mentioned some minor issues arising from the use of cell phones. For example, Teacher D noted, “I am sure they are off-task at times, but for the most part they know I am moving around, so it does not happen as frequently.” Teacher L elaborated her experience with students using cellular devices in her classroom:

When we first started the technology, there were no parameters on it; so they felt the need to get out the phone whenever they wanted and use it for whatever they wanted. This year, I set it up that you are not allowed to use your

technology at any time unless you ask my permission. They are very good at saying, “Teacher, can I get out my phone and look up so and so and I say yes, but I do not want you Facebooking or tweeting or utilizing ‘Vine’ apps; just use it specifically for what you are supposed to, if I see you doing it, I am going to take it away.”

Teacher participants using mobile devices noted that contrary to their prior assumptions about the use of cellular devices which were mostly negative, they now viewed these devices as more useful tools. Teacher L reiterated, “I do not think it is a bad thing, I used to think it was a bad thing. I just think that when you set up rules and procedures for it and you are consistent about follow through, that it is not such a bad thing after all.”

Student Engagement and Behavior

Teachers using smartphones were asked if they had experienced negative issues pertaining to student behavior when they used cellular devices in their classrooms. All of the teacher respondents who claimed they were users of smartphones responded they occasionally had students who would “veer off-task,” while they send text messages on social media. However, with deliberate monitoring, students mostly stayed on task.

Teachers using smartphones in their classrooms were further asked about the level of student engagement when using smartphones in the scope of a lesson. Eight out of the 10 teachers using cellular devices responded student engagement increased when cellphones were used during lessons. Two of the 10 teachers using cellular devices responded that student engagement did not change when using cellular devices within their lessons.

Conclusion and Recommendation

The interview data provided tentative answers to the research questions addressed in this study. Twenty-three percent of the teacher respondents ($n = 22$) did not use smartphones in their classrooms for educational purposes. Seventy-seven percent of them used cellular devices within their classrooms for instructional purposes on a regular basis. Those teacher respondents who did use cellular devices for educational purposes did not experience serious issues other than establishing clear classroom management procedures.

Additionally, the teachers who did not use or support smartphones in their classrooms admitted they saw no use for the device in their content area. The educators who used cellular devices had indicated they did not have any problems incorporating these tools. However, they were not as “educated” or skillful as they would like to be.

Student’s use of cellular devices in a secondary classroom setting evoked different views from teachers. Teachers were split in numbers—some feeling excited about having yet another learning tool available to them and some finding this tool a nuisance or distraction in the classroom. Many teachers in high schools set rules requiring students to put away cellular devices during instruction. Teachers verbally described behavior problems from students who do not comply with cell phone policies. On the other hand, many teachers in high schools also saw cellular devices as useful tools and tried incorporating them in their lessons.

Overall, many teachers in our study were utilizing smartphones in their classrooms to the best of their knowledge. Smartphones were being infused in teaching content areas, however, with limited use. Some of the teachers experienced success in using such devices as research tools and managed to use these devices at least once a week on average. Teachers who utilized mobile devices have set up monitoring systems within their classrooms to stop students from misusing these devices. No subjects had been trained on smartphones specific to their content area.

Would training have any effect on the perceptions of teachers regarding the use of mobile devices in classrooms? Since none of the respondents have had extensive training on how to use smartphones for instructional purposes, no data were secured that can elucidate this question. While three-fourths of the high school teachers in our sample were incorporating smartphones into their classrooms, the others were quite reluctant. No teacher in our sample received any specific training pertaining to the integration of smartphones in their classrooms. Nevertheless, all teachers agreed that they would like to receive professional development specific to smartphones and instruction.

Our findings support prior studies which argued teachers' comfort level and lack of training are barriers to using technology in the classroom. These findings are also supported by the literature on using mobile devices to teach the content. We strongly recommend that research be conducted in secondary schools, by department, on the use of smartphones to help support and meet both content and technology-integration standards.

Future Research on Technology Integration

The limited research on the use of mobile devices indicates the urgent need for professional development by teachers in different content areas. An important research area for curriculum and instruction would be helping teachers adapt and infuse mobile devices like smartphones in their teaching and finding effective ways to support them in this effort. Many of our experienced teachers today are digital immigrants, hence, they have to keep up with their high school students (digital natives). How should school leaders and classroom teachers design instructional tasks and assessments, so that smartphones are intrinsic parts of the learning toolbox for both teachers and students? Longitudinal studies on mobile devices and pedagogy are needed by content area (e.g., mathematics, science, and social studies). Developing non-traditional assessments to measure student achievement as well as teacher effectiveness in the use of mobile devices should be worthwhile efforts. As society continues to interact with our world that is being shaped by technological advancements, classroom teaching needs to change.

References

- Baker, W., Lusk, E., & Neuhauser, K. (2012). On the use of cell phones and other electronic devices in the classroom: Evidence from a survey of faculty and students. *Journal of Education for Business*, 87(5), 275-289. doi:10.1080/08832323.2011.622814.
- Batista, F., & Barcelos, T. (2014). Considerations on the use of mobile phones in educational context. *International Journal on New Trends in Education and Their Implications*, 5(1), 1-10.
- Charles, A. S. (2012). Cell phones: Rule-setting, rule-breaking, and relationships in classrooms. *American Secondary Education*, 40(3), 4-16.
- Engel, G., & Green, T. (2011). Cell phones in the classroom: Are we dialing up disaster? *Techtrends: Linking Research and Practice to Improve Learning*, 55(2), 39-45. doi:10.1007/s11528-011-0482-z
- Faure, C., & Orthober, C. (2011). Using text-messaging in the secondary classroom. *American Secondary Education*, 39(2), 55-76.
- Howe, N., & Strauss, W. (2000). *Millennials rising: The next great generation*. New York, N.Y.: Vintage Books.
- Jacobs, H. H. (Ed.). (2010). *Curriculum 21 essential education for a changing world*. Alexandria, V.A.: ASCD.
- LaPoint, C. (2014). Blazing a mobile trail: Four things districts must consider for BYOD. *School Business Affairs*, 80(4), 8-10.
- Mitchell, S. (2012). Don't put your phones away. *NATE Classroom*, 18, 30-32.
- Thomas, K., & O'Bannon, B. (2013). Cell phones in the classroom: Pre-service teachers' perceptions. *Journal of Digital Learning in Teacher Education (International Society for Technology in Education)*, 30(1), 11-20.
- Watters, A. (2012). To have and have not. *School Library Journal*, 58(5), 34-37.

Appendix A**Interview Questions**

1. What subject area do you teach? _____

2. How many years have you been teaching? _____

3. Do you use smartphones within your content area for instructional purposes? _____

If No

(1) Why not? _____

(2) Have you had any instructional training pertaining to the use of smartphones for use within the content area of your class?

Explain. _____

(3) Do you know of any programs available to you utilizing smartphones within your classroom? _____

If Yes

(1) When using cellular devices what issues arise within the class with the students and their smartphones?

(2) Have you had any instructional training pertaining to the use of smartphones for use within the content area of your class?

(3) What do you find happens with the students and their engagement within the class when smartphones are used during instruction?

(4) What programs are you aware of that facilitate the use of smartphones for instructional purposes in a secondary classroom?