

### Abstract

Although 62% of schools ban cell phones in the classroom, there is no empirical data regarding teachers' perceptions about the necessity for this ban. This study surveyed 79 K-12 teachers about using cell phones for classroom instruction. Findings indicated that the majority of teachers, 69%, support the instructional use of cell phones. In fact, 70% of teachers indicated they were already using their cell phones for school related collaboration and communication. Increased student engagement and motivation were the primary benefits teachers cited to allowing students to use cell phones. Identified barriers included lack of access and class disruption.

Cell Phones in the Classroom: Teachers' Perspectives

Ertmer (1999) identifies two types of barriers to the classroom integration of technology: first-order (external) and second-order (internal) barriers. The first-order barriers include a lack of access, funding, time, and training (Ertmer; Means & Olson, 1997; Rogers, 2000). Teachers' attitudes about specific technologies functions as a second-order barrier to adoption (Ertmer; Means & Olson; Rogers, 2000). Historically, cell phones integration into the classroom has been blocked by second order barriers. As pointed out by Lenhart (2010), teachers have traditionally viewed cell phones to be a disruption in the classroom. Initially, these disruptions were associated with the belief that cell phones were used for gang and drug related activities; however, as cell phones have evolved from simply "mobile phones" to small, portable microcomputers so have the disruptions cell phones cause in the classroom. Although ringing phones are still a distraction, new concerns include texting as well as using cell phones for cheating, sexting and cyberbullying.

On the other hand, the evolution of cell phones has brought instructional benefits as well. Some of the same features that teachers perceive to be of concern in the classroom, for example texting and digital cameras, have been identified to have a number of instructional applications. A growing body of literature about the instructional benefits of cell phones (Daher, 2010; Gadeleta; 2006; Farakas, 2010; Kolb, 2011; Meurant, 2007; Nash & Mackey, 2007; Schachter, 2009; Thomas & McGee, 2012; Thomas & Orthober, 2011; Trembley, 2010; Yengin, Karahoca, Karahoca, Uzumboylu, 2011) would appear to support the conclusion that some teachers' attitudes towards allowing cell phones in to the classroom are beginning to change. Several first order barriers have also been diminished. As the number of features and tools available on cell

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phones has increased, the cost of cell phones has decreased making them more accessible. The combination of low cost and high functionality has resulted in a marked increase in cell phone ownership. The most recent research indicates that 85% of adults and 75% of teens own a cell phone (Smith, 2010). Eighty-two percent of high school aged teens own a cell phone (Lenhart, Purcell, Smith, & Zickuhr, 2010). Teen ownership has increased by 40% since 2004 (Smith, 2010). Increased ownership has greatly reduced access as a barrier to integration. Furthermore, cell phone owners are not simply using their phones to make calls. Rather, they are using them to:

- Take pictures—76% now do this, up from 66% in April 2009
- Send or receive text messages—72% vs. 65%
- Access the internet—38% vs. 25%
- Send or receive email—34% vs. 25%
- Record a video—34% vs. 19%
- Play music—33% vs. 21%
- Send or receive instant messages—30% vs. 20% (Smith, 2010)

Users' proficiency with using their phones has assisted in removing the time needed for training as a barrier. However, despite the changes in cell phones over the last decade that have lessened traditional barriers to integration, schools have been reluctant to accept their use for classroom instruction. In fact, 62% of schools still ban cell phones from use in the classroom (Lenhart, Ling, Campbell, & Purcell, 2010). The purpose of this study was to survey P-12 teachers to see if they still support banning cell phones in the classroom. To learn about teachers attitudes towards the integration of cell phones into the classroom, this study had three research questions:

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- Do teachers support the integration of cell phones into the classroom?
- If so, what classroom benefits do cell phones provide?
- If not, what barriers do you perceive to allowing cell phones in the classroom?

### **REVIEW OF LITERATURE**

The ban on cell phones from the classroom has largely been as a result of second order barriers—teachers' attitudes. As previously stated, teachers have historically viewed cell phones as a disruption in the classroom. This negative perception of cell phones is a result of the fact that the ban on cell phones has not kept students from bringing them into the classroom. A recent survey by the Pew Internet and American Life Project found that teens who take their phones to school are using them in class. In fact, 58% have sent a text message during class, 64% have texted in class (43% text in class at least once a day or more) and 25% have made or received a call during class (Lenhart, Ling, Campbell, & Purcell, 2010). The illicit use of cell phones in the classroom by students has created a number of primary concerns for classroom teachers: disruptions, texting, cheating, sexting and cyberbullying.

#### **Barriers to Allowing Cell Phones in the Classroom**

Probably the most common complaint against cell phones in the classroom are the disruption they cause (Campbell, 2006; Galley, 2000; Gilroy, 2004). Possibly the most common classroom disruption is that caused by a ringing phone. In a study with 158 college students, Shelton, Elliott, Lynn and Exner (2011) conducted four experiments with 158 college students to determine the detrimental effects of ringing cell phones on college students. They found that a ringing phone that interrupts instruction can negatively impact student performance when being

tested on the material being covered. In a similar study by End, Worthman, Mathews, Wetterau (2010), 71 students were interrupted by a cell phone ringing during an instructional video. Findings indicated that compared to the control group, participants in the ringing condition performance was significantly worse on the disrupted test items, and students were less likely to include the information that was disrupted in their notes.

Educators also have concerns about the use of cell phones for texting. For example, teachers worry that textese, the abbreviated language and slang used when sending text messages (traditionally text only allowed 120 characters per message), is having a negative impact on students' ability to speak and write proper English. However, these concerns are unfounded. What research that has been conducted on the effect of textese has found the exact opposite. According to researchers at Coventry University in London, students are able to "code switch" between modes of communication (Plester, Wood, & Bell, 2008). They also found that textese is not harmful to students' ability to write. In a study of emerging writers, ages 10 to 12, they found that not only did the use of texting not negatively affect students' writing skills, but that students who texted more often wrote more and had better writing and spelling skills than their peers who texted less (Plester et al., 2008).

Another concern educators have about students' texting is that it is a distraction. Rosen, Lim, Carrier, and Cheever (2011) conducted a study of 185 college students to examine the impact of classroom texting on learning and retention of classroom material. They sent students in class zero, four, or eight texts during a 30-minute videotaped lecture. The text messages were sent to "coincide with the presentation of information that would appear on a posttest immediately following the lecture" (p. 171). In the study, students were required to promptly respond to the text. Results indicated that the texts were not as distracting as originally thought.

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Even when participants were inundated with text messages—receiving and sending 16 or more texts in a 30-minute period—their performance was only slightly (albeit significantly) worse than those receiving no texts or a few texts. The fact that the Moderate Texting Interruption group did no worse than the No/Low Texting Interruption group lends further support to the minimal interference of classroom texting. However, it must be noted that a 10.6% difference between the group receiving the most text messages and the group receiving the least text messages is equivalent to one letter grade. Surprisingly, the Moderate Text group, which sent and received 8 texts in 30 minutes, did not do any worse than those who got essentially no texts. (p. 173)

These findings would appear to indicate that while having to stop class to tell texting students to put away their phones may disrupt class, the act of texting does not negatively impact students learning. One area of concern about texting supported by research is its use by students for cheating.

Research indicates that teens are using their cell phones to cheat in class (CommonSense Media, 2010; Lenhart, Ling, Campbell and Purcell, 2010). A recent study conducted by CommonSense Media (2010) found that one-third of high school students admitted using their cell phones to cheat and 65% of them say others in their school use their phones to cheat with them. Additionally, 26% store information on their phones to retrieve during a test, 25% text a friend about test answers, 17% take pictures of tests to send their friends and 20% search the internet for answers during a test. Not all of the pictures students are taking are of test questions. Students are also using their cell phones to take inappropriate pictures of a sexual nature.

Sexting is the “practice by which teens forward sexually explicit images of themselves or their peers via text messaging” (Soronen, 2010, p. 1). According to Lenhart et al. (2010), 4% of teens have reported sending a sexual image of themselves in a text and 15% report having received a sexual image via text message. Although there is no difference between gender in regard to sending text messages, texting does increase with age: 4% of 12 year-olds send sexts compared to 20% of 16 year-olds and 30% of 17 year-olds (Lenhart et al., 2010). Students have also used mobile phones to secretly take inappropriate photographs of peers and texts these images to someone else (St. Gerard, 2006). Also alarming is the fact that 44% of both teen girls and teen boys acknowledge that it is common for sexually suggestive text messages to be shared with people other than the intended recipient (National Campaign, 2009). The sharing of sexual photos sent via cell phone can often lead to harassment and cyberbullying (Seigle, 2010).

Cyberbullying can be defined as the "willful and repeated harm inflicted through the use of computers, cell phones, and other electronic devices" (Cyberbully Research Center, 2011). A recent study by the Pew Internet and American Life Project found that 26% of teens have been harassed through their mobile phone either by calls or text messages (Lenhart et al., 2010). Often times, the sharing of sexually explicit photos by the recipient and others leads to cyberbullying of the sender (Cyberbully Research Center, 2011; Seigle, 2010).

### **Benefits to Allowing Cell Phones in the Classroom**

As cell phones have evolved from “mobile” phones to small, inexpensive, portable microcomputers so have teachers’ attitudes. A growing body of literature on the instructional applications of cell phones has begun to shift perspectives on their integration into the classroom. In addition, as ownership of cell phones has increased, other traditional barriers to integration—access, time and training—have decreased.

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Today's smartphones can support teachers and instruction in a growing number of ways. For example, they can be used for content creation (Hartnell-Young & Vetere 2008), student-centered learning, collaboration (Corbeil & Valdes-Corbeil, 2007), authentic learning (Brown & Duguid, 1996), and differentiation of instruction (Kukulska-Hulme, 2007) as well as assessment and reflection (Markett, Sanchez, Weber, & Tangney, 2006). Additionally, the portability of cell phones allows anywhere/anytime access to course material for both teachers and students. Teachers and students can use cell phones to communicate and interact. Research indicates that this interaction can assist in creating a more active and continuous learning environment which facilitates the building of a learning community and increases student motivation (Markett et al., 2006). From a student perspective, cell phones allow them to multitask (Lu, 2008; Yerushalmy & Ben-Zaken, 2004) by accessing course material, conducting research via the Internet, and communicating with peers and teachers in what could otherwise be periods of dead time (Kolb, 2011; Motiwalla, 2007; Yengina, Karahoca, Karahoca, & Uzunboyla, 2011).

There are also a number of specific cell phone features that support instruction. For example, texting has a number of classroom applications. Texting can be used for interaction and communication between teachers, students and content (Prensky, 2005; Thomas & Orthober, 2011). Texting can also be employed for student assessment. Whattananarong (2006) found that cell phones can be utilized for assessing student performance. Students in his study who took tests by cell phone performed comparably with students who did so by conventional methods. The free online assessment site Poll Everywhere ([polleverywhere.com](http://polleverywhere.com)) allows cell phones to be used in the same manner as student response systems, (e.g. clickers). Classroom response systems (CRS) are beneficial for assessment, can enrich classroom discussion and provide anonymous, fast response collection (Roschelle, 2004; Naismith, Lonsdale, Vavoula, & Sharples,

2004). Additionally, CRS improve student interaction, engagement and attention (Draper & Brown, 2004; Hinde & Hunt, 2006) as well as learning performance (El-Rady, 2006).

Another cell phone feature with classroom applications is the digital camera; 83% of teens report having taken a picture with their cell phone (Lenhart, 2010). Digital cameras can be used in the classroom for: 1) the collection of data, scientific visualization, communication in science, 2) facilitation of reading, writing, and visual communication in language arts, 3) mathematical analyses, transformations, and providing a context for problem solving in mathematics, 4) and as a tool for inquiry in social studies (Bull & Thompson, 2004).

Teachers and students can also create podcast using cell phones; podcasts are audio or video files, usually in an mp3 format, that can be downloaded for listening on either a computer or more often on an mp3 player. Student-produced podcasts can increase motivation, higher-order thinking and improve student's writing and listening skills (Dlott, 2007; Halderson, 2006). Podcast also increase students' sense of ownership and meaningfulness in their learning (Anderson, 2005). Teachers can create instructional podcast to augment instruction and provide students with anytime/anywhere access to class content (Bongey, Cizadlo, & Kalnback, 2006; Gay et al., 2006; Rose & Rosin). Finally, podcasts also differentiate instruction by appealing to audio or visual learners (Gatewood 2008; Smaldino, Russell, Heinich, & Molenda, 2005) as well as students with language or cognitive special needs (Molina, 2006).

Cell phones also have the ability to allow teachers and students to go online. Digital natives are most likely to access the Internet wirelessly with a laptop or mobile phone (Zickuhr, 2010). Instructionally, the internet can support communication, collaboration, the collection and analysis of information and individual and cooperative problem solving (Harris, 2002). The Internet can be used to access any number of tools for classroom use. For example, students can

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use their cell phones to use Google Earth, a Geographic Information System (GIS) and virtual globe (Baker, 2005; Bodzin, 2008). GIS are computer-based systems that allow users to collect, organize, manipulate, analyze and display data with a geographic or spatial component (Baker & Case, 2000; Lamb & Johnson, 2010). The visual nature of the program has also been shown to engage, motivate and communicate to a variety of learners (Patterson, 2007). Students can also use the Internet, camera and a number of free applications (Picassa, Panoramio, Flickr, Google Earth, Flagr) for geotagging—assigning a unique geo-spatial location to a photograph. In other words, students can be on a field trip and use their cell phones to take a picture and then upload the picture using the app for Picassa, Panoramio or Flickr. Pictures can then be placed on a map with their location and a description. Many of the new smartphones have geotagging built in to them and automatically tag pictures on maps including latitude and longitude.

The increasing ubiquity of cell phones means that an increasing number of teachers and students have access. For example, 22% of six to nine year olds 60% of 10-14 year olds own a cell phone. 84% of 15-18 year olds own a phone (Youth Beat, 2009) and 70% are using them for school work (Lenhart, Ling, Campbell & Purcell, 2010). 85% of American adults own a cell phone (Lenhart, 2010), and 35% of adults own a smartphone (Smith, 2011). Much of the growth in access to mobile phones can be attributed to lower prices for phones and service as well as the increased capabilities of phones. The combination of lower cost and increased capabilities are allowing cell phones to bridge the digital divide. Teens from low socio-economic homes often use their cell phones to go online. In fact, 41% of teens from homes earning less than \$30,000 per year say they use their cell phones to access the internet (Lenhart, Ling, Campbell, Purcell, 2010). Furthermore, more African Americans, 44%, and Hispanics, 35%, teens use their cell

phones to go online more than their Caucasian counterparts, 21% (Lenhart, Ling, Campbell, Purcell, 2010).

## **Research Methods**

### **Participants**

Participants were attendees at the Imagining the Future of Learning (IFL) conference held annually at Bellarmine University in Louisville, KY. IFL is a small but high-quality professional development opportunity for teachers from the greater Louisville metropolitan area. The conference offers attendees a vision of learning for the future through the use of technology as well as the opportunity to explore with experts, in hands-on experiences, the effective methods for integrating technology in the twenty-first century (Imagining the Future of Learning, 2011). The 2011 conference was attended by 101 teachers. Of the 101 teachers at the conference, 79 (78%) participated in the study by completing the cell phone survey, 53 (67.1%) female and 26 (32.9%) male. Of these 79 teachers, 30 (38%) were elementary, 19 (24.1%) were middle and 30 (38%) were high school. Finally, 16 (20.3%) had 1-5 years' experience, 16 (20.3%) had 6-10 years' experience and 47 (59.5) had 11+ years' experience teaching. All of the participants worked at schools with policies against the use of cell phones in the classroom.

### **Survey Instrument**

The *Imagining the Future of Learning Conference: Mobile Learning Survey* was created to measure teachers' perceptions of the use of cell phones in the classroom. The survey gathered basic demographic information as well as participants' beliefs regarding the appropriateness of cell phones in the classroom, perceived benefits, and barriers to using cell phones in the classroom and potential classroom uses (see Appendix A for survey instrument). The choices

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presented in the survey as potential barriers, benefits, and uses were identified in the review of literature on cell phones in education. Participants completed the survey online. All survey data was coded as categorical. The Cronbach's alpha for the survey items was  $\alpha = .73$  suggesting that the survey is reliable because items have relatively high internal consistency (Tables 1 and 2).

Table 1: Reliability Scale: Case Processing Summary

### Case Processing Summary

	N	%
Cases Valid	76	96.2
Excluded <sup>a</sup>	3	3.8
Total	79	100.0

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Cases	Valid	76	96.2
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	Total	79	100.0

a. Listwise deletion based on all variables in the procedure.

Table 2: Reliability Scale: All Variables

**Reliability Statistics**

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.726	.759	39

**Data Analysis**

The *Imagining the Future of Learning Conference: Mobile Learning Survey* was analyzed to see if there were differences between teacher responses on cell phone use in the classroom based on gender, grade level, and years of experience, and if so, whether the

differences were statistically significant. Frequencies were calculated for all variables and Pearson Chi-squares were computed to determine if the frequency patterns were statistically significant. Cross tabulations were used to examine the percent of responses by gender, grade level, and years of experience with appropriateness of cell phones in the classroom, perceived benefits, and barriers to using cell phones in the classroom. Pearson Chi-squares were computed to ascertain whether the patterns identified in the cross tabulations were statistically significant. Additionally, Kruskal-Wallis tests for independent samples, a nonparametric analysis, were run to see whether gender, grade level, or years of experience had an effect on appropriateness of cell phones in the classroom, perceived benefits, and barriers to using cell phones in the classroom mean rank ratings. Data were reported as frequencies, cross tabulations, Pearson Chi-squares, and Kruskal-Wallis Chi-squares.

## RESULTS

Descriptive analysis of the survey data reporting frequencies followed by quantitative analysis using Pearson Chi-square to determine if frequency patterns were statistically significant are reported below. Additionally, statistically significant Pearson Chi-squares for cross tabulations and Kruskal-Wallis Chi-squares for mean ranks are reported.

### **Do Teachers Support the Use of Cell Phones in the Classroom?**

The first research question asked: "Do P-12 classroom teachers support the use of cell phones in the classroom?" The majority of surveyed teachers (69.6%) stated that they, in fact, did support the use of cell phones in the classroom. The Pearson Chi-square showed that the frequency pattern was statistically significant,  $X^2 = 13.13$ ,  $df = 1$ ,  $p < .05$ . The cross tabulation showed that the association between gender and support use of cell phones in the classroom are

not the same. Females support the use (74.5%) of cell phones over males (25.5%). The Pearson Chi-square showed there is a statistically significant association between gender and support use of cell phones in the classroom,  $X^2 = 5.21$ ,  $df = 1$ ,  $p < .05$ . Kruskal-Wallis tests for mean ranks of support of use of cell phones in the classroom with gender (females 42.75 and males 33.00) was statistically significant,  $X^2 = 5.14$ ,  $df = 1$ ,  $p < .05$ . Cross tabulations and Kruskal-Wallis tests for mean ranks were not statistically significant for grade level or years of experience and support use of cell phones in the classroom.

### **What Barriers to Cell Phone Use Do Teachers Perceive?**

The second research question asked: "What barriers to Cell Phone Use Do Teachers Perceive?" Only one (lack of access and or cost of cell phones) of the seven potential barriers to use of cell phones in the classroom that was gleaned from a review of the literature was seen as a barrier by the majority of the participating teachers (Table 3).

Table 3: Barriers to Adoption of Cell Phones in the Classroom

<b>Barrier</b>	<b># of Teachers</b>	<b>% of Teachers</b>	<b>Pearson Chi-square</b>
<i>Lack of Access/Cost</i>	48	60.8	3.66
<i>Class Disruptions</i>	40	50.6	.01
<i>Sexting</i>	20	25	19.25*
<i>Cyberbullying</i>	27	34.2	7.91*

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<i>Cheating</i>	30	38	4.57*
<i>Negative impact of texting on students' writing</i>	20	25.3	19.25*
<i>Students accessing inappropriate content on the Internet</i>	37	46.8	.32

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\*  $p < .05$ ,  $df = 1$

Lack of access and or cost were the only barriers identified by the majority of the teachers with 60.8% of the teachers identifying this as an obstacle to the integration of cell phones into the classroom. Half (50.6%) of those surveyed identified the potential of cell phones to be a disruption in the classroom as a barrier to adoption. Teachers (46.8%) saw the ability of students to access inappropriate content from the Internet as a barrier. Although each of these items showed the greatest frequency patterns, none of these patterns were statistically significant at  $p < .05$  based on reviewing Pearson Chi-square results. However, the frequency patterns of the remaining items (i.e., sexting, cyberbullying, cheating, and negative impact of texting on students' writing) had statistically significant Pearson Chi-square results. None of the cross tabulations or Kruskal-Wallis tests for mean ranks was statistically significant for gender, grade level, or years of experience with any of the survey items related to barriers to adoption of cell phones in the classroom.

**Are Teachers Using Cell Phones In Their Classrooms?**

Teachers, 70% (n=56), responded that they had used their cell phone in their “work as a teacher.” The possible instructional uses of cell phones listed on the survey were identified in the literature, not only on cell phones, but also the literature about some of the features available on phones (e.g., Internet, digital camera, podcasting, etc.). Although the majority of teachers reported using their phones in the course of their work, the ways in which they were using them were limited (Table 2).

Table 2: How Many Teachers Are Using Their Cell Phone for School Related Purposes

<b>How Teachers are Using their Cell Phones</b>	<b># of Teachers</b>	<b>% of Teachers</b>	<b>Pearson Chi-square</b>
<i>To collaborate with other teachers</i>	25	30.4	12.17*
<i>To plan, do research for class assignments</i>	13	16.5	35.56*
<i>To remind myself, colleagues or students of deadlines, tasks</i>	22	27.8	15.51*
<i>To assign or collect student work</i>	6	7.6	56.82*
<i>To record student work, grades</i>	3	3.8	67.46*
<i>To communicate with colleagues, students, parents</i>	28	35.4	6.70

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Teachers identified three main ways they are using their phones in their jobs: 1) communicating with colleagues, students and parents, 2) collaborating with other teachers and 3) creating reminders. All frequency patterns were statistically significant at  $p < .05$  based on reviewing Pearson Chi-square results with the exception of one item, to communicate with colleagues, students, and parents.

Cross tabulation results showed that the association between grade level and using cell phones to collaborate with other teachers for school related purposes and for reminding themselves, colleagues or students of deadlines, tasks were not the same. Elementary teachers support collaborating by cell phone with teachers (45.8%), middle school teachers' support (37.5%) and high school teachers' data cannot be reported due to less than five teachers reporting they support the use of cell phones with teachers for collaboration. The Pearson Chi-square showed there is a statistically significant association between grade level and support collaborating by cell phone with teachers,  $X^2 = 7.28$ ,  $df = 2$ ,  $p < .05$ . Elementary teachers support using cell phones for reminders (50%), middle school teachers support (40.9%) and high school teachers' data cannot be reported due to less than five teachers reporting they support the use of cell phones for reminders. The Pearson Chi-square showed there is a statistically significant association between grade level and support using cell phones for reminder,  $X^2 = 11.46$ ,  $df = 2$ ,  $p < .05$ .

Kruskal-Wallis tests were statistically significant with mean ranks of gender (females 43.14 and males 33.60) of teachers using cell phones in the classroom to communicate,  $X^2 = 4.40$ ,  $df = 1$ ,  $p < .05$ , and planning research (females 42.44 and males 35.02),  $X^2 = 4.43$ ,  $df = 1$ ,  $p < .05$ . When analyzing the relationship with grade level, Kruskal-Wallis tests were statistically significant for mean ranks of using cell phones for collaboration (elementary 42.48, middle

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46.71, high school 33.27),  $X^2 = 7.18$ ,  $df = 1$ ,  $p < .05$ , and planning research (elementary 44.03, middle 41.82, high school 34.82),  $X^2 = 6.23$ ,  $df = 1$ ,  $p < .05$ . Kruskal-Wallis tests were also statistically significant with mean rankings of years of experience and using cell phone for reminders (1-5 years 48.75, 6-10 years 43.81, 11+ years 35.72),  $X^2 = 7.30$ ,  $df = 1$ ,  $p < .05$ .

**How Do Teachers Think Cell Phones could be used to Support Students Learning?**

Teachers identified two main instructional benefits of cell phones (Table 4).

Table 4: How Do Teachers Think Cell Phones could be used to Support Students Learning?

<b>Instructional Benefits</b>	<b># of Teachers</b>	<b>% of Teachers</b>	<b>Pearson Chi-square</b>
<i>Increase student engagement</i>	46	58.2	2.14
<i>Increase student motivation</i>	20	25.3	19.25*
<i>Facilitative student creativity</i>	1	1.3	75.05*
<i>Increase student/teacher productivity</i>	2	2.5	71.20*
<i>Reduce the digital divide for students who may not have computers at home</i>	2	2.5	71.20*
<i>Increase collaboration</i>	1	1.3	75.05*
<i>Increase communication</i>	0	0	
<i>Develop digital fluency</i>	2	2.5	71.20*
<i>Provide anywhere/anytime learning</i>	4	5.1	63.81*

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<i>opportunities</i>			
<i>Provide opportunities for differentiation of instruction</i>	0	0	

Over half (58%) of the teachers perceived the ability of cell phones to increase student engagement as the number one instructional benefit of cell phones. The second choice of teachers was increased student motivation with (25%) of teachers identifying this as the number one benefit of cell phones in the classroom. The next choice, anytime/anywhere learning opportunities, was selected by only 5% of the teachers. All frequency patterns were statistically significant at  $p < .05$  based on reviewing Pearson Chi-square results for items with responses with the exception of one item, increase student engagement. Two items increase communication and provide opportunities for differentiation of instruction had no responses.

Cross tabulations were not statistically significant for gender, grade level, or years of experience with any of the survey items related to instructional benefits of cell phones in the classroom on student learning. Two survey items reduce the digital divide for students who may not have computers at home and increase student/teacher productivity had statistically significant Kruskal-Wallis tests. Mean ranks of reducing the digital divide were statistically significant with gender (females 39.00 and males 42.04),  $X^2 = 4.13$ ,  $df = 1$ ,  $p < .05$ , and grade level (elementary 39.00, middle 43.16, high school 39.00),  $X^2 = 6.40$ ,  $df = 1$ ,  $p < .05$ . Mean ranks of increasing student/teacher productivity were statistically significant with grade level (elementary 39.00, middle 43.16, high school 39.00),  $X^2 = 6.40$ ,  $df = 1$ ,  $p < .05$ .

## DISCUSSION

While first and second order barriers have resulted in a ban on cell phones in the classroom by the majority of schools in the country, the growing instructional benefits associated with new cell phone technologies as well as their increasing ubiquity has prompted some educators to ask if the benefits of allowing these small, portable computers into the classrooms outweigh the potential negatives. The purpose of this study was to determine the extent to which P-12 teachers 1) think cell phones should be allowed in the classroom, 2) what teachers perceive to be the barriers to integration and 3) what instructional benefits they see in cell phones. An analysis the findings provide some insights into teachers' viewpoint on this topic.

Study findings showed that a majority of teachers, 69%, support allowing cell phones into the classroom. Presently, 62% of schools ban cell phones (Lenhart, Ling, Campbell, & Purcell, 2010). Only 31% of participants in this study think cell phones should be banned. This would indicate a softening of second degree barriers to integrating instructional uses of cell phones into the classroom.

Surprisingly, the potential for cell phones to disrupt was not the main barrier identified by teachers. Lack of access/cost was the number one barrier identified by teachers, and the only barrier on which the majority of the participants agreed. It is noteworthy that there was no statistical significance between elementary, middle and high school teachers in this area. Considering 82% of high school aged teens have a cell phone, it would be reasonable to expect that high school teachers would have perceived access to be less of a barrier than the elementary or middle school participants. Considering the rate at which ownership is increasing and cost is decreasing, this is a barrier that should decrease in the coming years.

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Despite being identified as the main problem associated with having cell phones in the classroom (Campbell, 2006; Galley, 2000; Gilroy, 2004; Lenhart, 2010), teachers were split 50/50 on the disruptive nature of cell phones in the classroom being a barrier. Even fewer participants were concerned about students accessing inappropriate content, and with all of the attention given to the use of cell phone by student for sexting, texting, cheating and cyberbullying, only slightly more than a third of the teachers identified anyone of these as a real concern. Also worth noting, is the lack of statistical significance between the grade level of the respondents (elementary, middle and high) and the identification of sexting as a barrier. This finding indicates that elementary teachers are just as concerned about the use of cell phones to sext as high school teachers.

Findings indicate that the majority of teachers (70%) are already using their cell phones for class related activities. Primarily they indicated using their cell phones to communicate (35.4%) and collaborate (30.4%) with their colleagues and for reminders (27.8%). Communication (Kolb, 2011; Motiwalla, 2007; Moore, 1989; Prensky, 2005; Yengina, Karahoca, Karahoca, & Uzunboyla, 2011), collaboration (Corbeil & Valdes-Corbeil, 2007; Harris, 2002) and reminders (Thomas & Orthober, 2011) are all benefits noted in the literature on the classroom integration of cell phones. However, there could be another explanation for why teachers are using their phones for these specific activities. First, all three of these uses can take place on non-smartphones; only 35% of adults own a smartphone. Teachers can communicate with colleagues and parents by phone and place reminders on their cell phone calendar. Basic cell phones without the smartphone features are less expensive and less technologically challenging both of which are identified first order barriers. Furthermore, the survey choice "*To collaborate with other teachers*" does not include communication with

*students*. Also, although it is impossible to say based on the wording of the questions, teachers could have selected the options “*To communicate with colleagues, students, parents*” and “*To remind myself, colleagues or students of deadlines, tasks*” and not communicated with or reminded students. In other words, all of these selections could have permitted teachers to use their cell phones without communicating with students and breaking school policy banning the use of cell phones.

The small percentage of teachers using their cell phones to plan, do research for class assignments, record student work, grades and assign or collect student work can be explained in a number of ways. As previously noted, access and training are barriers to integration (Ertmer, 1999), and to accomplish all of the previously noted tasks, teachers would need the more expensive and technologically challenging smartphone; these phones provide Internet access. Also, to assign and collect students' work, teachers would have to communicate via cell phones with students and this most likely would be a violation of any school policy regulating such communication.

The limitations of the study along with the findings offer several opportunities for future research. One limitation of the study was that the population was made up of attendants at a technology conference. Also, the majority of participants were female (this is not uncommon with any random collection of teachers). Future research would benefit from utilizing a sample of teachers with no discernible connection to technology and with an equal number of males and females.

Another limitation was the failure to identify the age of the participants through the survey. There were two areas of statistically significant differences based on the number of years teaching. Participants who had taught 1-5 years were more likely to use their phones for

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communication and reminders than more participants with more years teaching. Based on years teaching, these participants could be younger, digital natives, than the other participants with more teaching experience. Determining the age of the participants in future research would provide researchers with insight into the discussion surrounding digital natives and digital immigrants.

In regards to the findings on access, it would have been prudent to have included several additional questions on the survey: 1) do you have a cell phone or smartphone, 2) what features do you use on your cell phone (e. g. texting, Internet, email, etc.). Survey responses to this questions would have provide additional insight into the participants own use of technology. This information could also shed additional light on whether technological skills or a lack thereof was a possible barrier to integration.

Finally, additional research is needed to understand why more females than males support the use of cell phones in the classroom and use their cell phone for school communication.

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**APPENDIX A**

Imaging the Future of Learning Conference: Mobile Learning Survey

1. Are you
  - a. Male
  - b. Female
2. I am a
  - a. Teacher
  - b. Administrator
  - c. Classroom aid
  - d. Preservice teacher
  - e. School or district IT person
  - f. Other
3. I work in
  - a. Elementary school
  - b. Middle school
  - c. High school
  - d. Post-secondary
  - e. Other
4. I have been working in education
  - a. 1-3 years
  - b. 4-5 years
  - c. 5-10 years
  - d. More than ten years

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- e. I am preservice.
  - f. Other
5. Do you support the use of cell phones in the classroom?
- a. Yes
  - b. No
  - c. I am not sure.
6. What do you see as barriers to the use of cell phones?
- (Pick up to three.)
- a. Access/Cost
  - b. Disruption of class
  - c. Sexting
  - d. Cyberbullying
  - e. Cheating
  - f. Negative impact of texting on students' writing
  - g. Students accessing inappropriate content on the Internet
7. Have you ever used your cell phone in any way in your work as a teacher?
- a. Yes
  - b. No
8. If you answered "yes" to question 7, how did you use your cell phone in your as a teacher?
- a. To collaborate with other teachers
  - b. To plan, do research for class assignments
  - c. To remind myself, colleagues or students of deadlines, tasks

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- d. To assign or collect student work
  - e. To record student work, grades
  - f. To communicate with colleagues, students, parents
9. What features of a cell phone have you used for school related work? (Circle as many as are applicable.)
- a. Email
  - b. Internet
  - c. Camera
  - d. Audio recorder/player
  - e. Video recorder/player
  - f. Calculator
  - g. Texting
  - h. Apps
  - i. Clock, alarm, timer
  - j. Access social networks
  - k. Other
10. How do you think cell phones could be used to support student learning? (Circle as many as are applicable.)
- a. Increase student engagement
  - b. Increase student motivation
  - c. Facilitative student creativity
  - d. Increase student/teacher productivity
  - e. Reduce the digital divide for students who may not have computers at home

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- f. Increase collaboration
- g. Increase communication
- h. Develop digital fluency
- i. Provide anywhere/anytime learning opportunities
- j. Provide opportunities for differentiation of instruction