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Smart phones permitted: How teachers use text messaging to collaborate

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Abstract The use of smart phones by teachers in K-12 education has been contentious. Although teachers are often instructed to put their phones away during instruction, teachers and students can benefit in many ways from using smart phones in the classroom. The use of information systems such as a smart phone can support knowledge sharing and collaboration opportunities not otherwise available. For example, teachers may use smart phones to collaborate with other teachers, paraprofessionals, related service providers, and parents when face-to-face time is not available. This exploratory pilot study included semi-structured interviews of five teachers at an inclusive school to investigate how smart phones were used to collaborate. Results suggest that teachers used text messaging on a regular basis to work together to make modifications, communicate about student behavior, share student work, and to review student progress regarding goals.

Keywords Smart phones · Collaboration · Inclusive education · Text messaging

Teacher collaboration is essential in inclusive schools (Villa et al. 2008). Teachers have often cited lack of time to collaborate as a major hindrance to the success of inclusive schooling (Cook and Friend 2010). Villa et al. (2008) suggested finding creative ways to increase collaboration time such as rearranging the school day schedule or paying substitutes to provide common release time. Although these strategies can be effective, rearranging the school day may not be realistic and the

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school may not be able to afford release time due to budgetary restrictions. One way of collaborating effectively with teachers, staff, and parents, which deserves more exploration, is the use of text messaging. Smart phones[1], or phones that are capable of sending text messages, photos, video, and email, may allow teachers to collaborate quickly and easily before, during, and after school. Furthermore, such "knowledge sharing" using information systems can support teacher growth and development (Earp et al. 2013). In order to find out more about how teachers use text messaging to collaborate and share knowledge, the researchers conducted an exploratory pilot study by interviewing five teachers (two special education teachers and three general education teachers) at a high-poverty inclusive elementary school in a large urban area in the southwestern United States.

The teachers at the school had been collaborating via an inclusive model of service delivery for 2 years. In this context, "inclusive" means all students with disabilities are educated in classrooms with students without disabilities. Supports and services are provided to students with disabilities by teachers and staff working together in the same classroom. Thus, general education teachers (teachers certified to teach students without disabilities) and special education teachers (teachers certified to teach students with disabilities) work together to plan and implement instruction for all students in a common classroom (Villa and Thousand 2009). Teachers in this particular research site worked in collaborative teams, typically composed of one special educator and two or three general educators. The first team of third grade teachers consisted of one special education teacher and two general education teachers. The second team of fifth grade teachers consisted of one special education teacher and one general education teacher. These teachers worked collaboratively to support students with and without disabilities in general education classrooms. The special education teacher supported students in multiple classrooms throughout the school day. Subsequently, the special education teacher spent a portion of the day in each classroom. The annual school schedule provided the teaching teams a common planning time on a biweekly basis. Although the common planning time was beneficial, these teachers expressed a need to collaborate more frequently. Therefore, they began using their smart phones to text message each other as a way to increase collaboration.

1 The importance of collaboration in schools

Collaboration in schools can carry various meanings (Cook and Friend 2010) and can occur among many stakeholders including teachers, administrators, related service providers, and parents (Villa et al. 2008). Collaboration among teachers in inclusive schools often involves co-planning lessons, discussing student progress and goals, and working together to assist all students in the classroom to access successfully the core curricula (Villa et al. 2008). Although, this collaboration is essential to create successful inclusive classrooms and schools, many teachers have claimed they do not have enough time to collaborate and communicate with their colleagues (Villa and Thousand 2009).

[1] In our study we refer to smart phones instead of cell phones because smart phones have features such as video and email that may be important in information sharing. However, some research used as the basis for this study uses the term "cell phone." Thus, we use "cell phone" when referring to such research.

Therefore, finding ways to improve teacher collaboration may facilitate access to the core curriculum by students who typically have trouble accessing it, such as those with disabilities and those living in poverty.

1.1 Knowledge sharing and collaboration with information systems

Our research, which deals with the use of smart phones as a collaborative tool, is situated within the larger body of research on the use of information systems (IS) for the purpose of sharing knowledge and ideas (Canole et al. 2011; Earp et al. 2013). In this paper, information systems, also referred to as information and communication technology (ICT), is a term that describes a range of technology recourses and media used in education (Vesisenaho and Dillon 2013). In a closer examination of the term, IS enables the user to use technological tools that display data, which, increases the user's knowledge, facilitates problem solving, and promotes innovative thinking (Karami et al. 2013). Recent research suggests that educators can use a number of IS or ICT platforms to collaborate, communicate, and share information and ideas effectively (Trust 2012; Wake and Modla 2012). For example, Wake and Modla (2012) found that teachers were able to collaborate well with each other and with students through the use of wikis. These researchers used this platform to "discuss learners needs, the contexts of their teaching practices, and the pedagogical practices necessary" to support students in the classrooms (p. 244). A similar study by Wang et al. (2008) explored the use of a range of IS including the use of wikis, blogs, and email. They found these were valuable tools for enhancing and supporting collaboration and communication among teachers. Furthermore, Trust (2012) found online professional learning networks (PLNs) were highly effective for collaboration and knowledge sharing among teachers. The teachers in Trust's study (2012) used PLNs to obtain advice, offer feedback, and find opportunities for collaboration with colleagues around the world. Given the benefits of IS in promoting collaboration and knowledge sharing among educators, it appears that gaining a deeper understanding of IS would benefit teachers and students. Furthermore, smart phones may serve as a type of IS that allow teachers to play an active role in lesson planning and curriculum modification, which also enhances a teacher's ability to communicate and collaborate about issues related to behavior management and instruction.

2 Research on smart phone use as a collaborative tool

Over the past 10 years there has been a significant amount of research regarding how teachers use smart phones and text messaging to communicate with students (Banister 2010; Fortner 2010; Falloon and Pohio 2010). There also has been research regarding how students use smart phones to collaborate with each other (Thomas et al. 2009). For example, Valtonen et al. (2011) conducted a study in which college students used a web-based platform, similar to Twitter, to share notes with each other and the instructor. Such a platform allowed the students and instructor to view the notes being taken by students in "real-time." The authors indicated this was an effective tool for student collaboration during lecture-based teaching. Similarly, Thomas et al. (2009) found that high school students benefited from using text

messaging to communicate with teachers and each other during and after instruction. This body of research suggests that the use of smart phones can be an effective tool in sharing knowledge in the classroom.

Although there is research on how teachers use smart phones to collaborate and communicate with students, as well as how teachers use other IS platforms such as wikis, blogs, or professional learning networks, there is little research dealing with the manner in which teachers use smart phones and text messaging to collaborate with each other, parents, and administrators. At the time of this research, we could not find any peer-reviewed articles about how teachers use text messaging to collaborate in inclusive schools. We suspect this may be due to the fact that many of the IS mentioned in the research such as wikis, blogs, and PLNs, can be accessed via computer, tablet, or smart phone. Thus, in some research, smart phones may be simply considered part of the technology used to access some of these tools used for collaboration. Although numerous possibilities exist for this gap in the research, there certainly is a need for more research in this area. This study seeks to address the gap in research related to how teachers use smart phones and text messaging to collaborate with each other, administrators, and parents.

The purpose of this study was to examine how teachers used text messaging to collaborate. Based on the themes that emerged from the interviews, teachers used text messaging in a variety of ways including modifying work for students with disabilities, communicating about student behavior, and sharing work and/or progress toward goals. The researchers argue that text messaging can be beneficial in supporting teacher collaboration, and more research should be conducted on efficient and effective use of text messaging for the purpose of collaboration.

3 Theoretical framework

The researchers positioned the study in a cultural ecological framework of localizing information and communication technology (ICT) within an educational context (Vesisenaho and Dillon 2013). This model focuses on the relationships between people and suggests that the use of ICT is influenced by not only these relationships, but also the "local" resources and contexts. Furthermore, this theoretical framework supports the assumption of a reciprocal relationship between the user and the environment (Dillon 2008). Thus, there is the assumption of a dynamic and multifaceted relationship between the user and the ICT.

Given the aforementioned framework, we acknowledge that the use of ICT, smart phones in this case, is dependent on the user and local environment and contexts such as the relationships with colleagues as well as factors in the school, classroom, and community. For example, since there are institutional assumptions of collaboration among teachers and parents at this particular research site, we expect such assumptions of collaboration may shape the use of technology. Furthermore, the nature of an inclusive school and the relationships and interactions of the teachers, staff, and parents may also influence the ways in which technology is used. Thus, we assume that this school site has unique features that impact the use of smart phones.

The cultural ecological framework is similar to the social view, which suggests that "knowledge" is constructed through interaction with others' minds and views

(Garcia and Rose 2007). Furthermore, effective learning through IS occurs when there is meaningful interaction between the "people, tools, and content" (Garcia and Rose 2007, p. 248). In order for such use of technology to be effective, it should not simply be used for the transfer of knowledge, but should be used as a way to make meaning and construct new knowledge (Doolittle and Hicks 2003). Therefore, this research focuses not only on how the teachers simply communicate with each other through this IS, but also how smart phones are used to make meaning and construct new knowledge in a collaborative manner.

4 Method

4.1 Participants and setting

To explore how teachers use smart phones to collaborate in inclusive schools, the researchers conducted semi-structured interviews with five elementary school teachers, two special education teachers and three general education teachers. These five teachers were organized into two teaching teams. There were three females and two males in the sample. Two teachers were Hispanic, two teachers were Caucasian, and one teacher was Black. Teaching experience ranged from 7 to 25 years (see Table 1). The elementary school was located in a large urban area in the southwestern United States. Nearly all the students (98 %) received free or reduced price lunch. The school is approximately 72 % Hispanic, 15 % Asian, 8 % Black, and 5 % Caucasian.

Purposeful sampling was used in this study. The researchers chose teachers who identified themselves as having previously used text messaging for collaboration, and whom one of the researchers knew used text messaging to collaborate in some way. Interviews were conducted with each individual teacher and each interview lasted from 30 min to an hour. Teachers were asked: (a) Tell me about how you use text messaging to collaborate with your teaching team; (b) Tell me about how you use text messaging to collaborate with others such as related service providers, administrators, and/or parents; (c) Tell me whether you think using text messaging has been beneficial; (d) Tell me about the drawbacks of using text messaging to collaborate; (e) Is there anything else you would like to share about the use of text messaging to collaborate?

Table 1 Participants

Teacher*	Position	Grade Level/Team	Race/Ethnicity	Years Teaching
Erica	Special Educator	3rd grade	White	15
Jane	General Educator	3rd grade	Hispanic	7
Kate	General Educator	3rd grade	Hispanic	10
Mike	Special Educator	5th grade	White	25
Tom	General Educator	5th grade	Black	15

*Names changed to protect anonymity

4.2 Analysis

The researchers used a constant comparison method based on constructivist grounded theory as the framework for the analysis (Charmaz and Mitchell 2001). Built upon grounded theory developed by Glaser and Strauss (1967), use of this method allowed the researchers to analyze data throughout the data collection process (Charmaz 2005). Thus, the prior interview data was used to inform data collection throughout the duration of the research. For example, after the first interview, we found that a teacher had described ways in which she used text messaging to communicate with parents and, therefore, we became interested in determining if other teachers used text messaging in a similar manner. Furthermore, a constructivist grounded theoretical framework was used due to the assumption that each researcher entered the field with his or her own frame of reference and subjectivity, which may have influenced interpretation of the interview data (Charmaz and Mitchell 2001).

Once data was collected, the researchers developed pre-assigned coding systems (Bogdan and Biklen 2007). Pre-assigning coding systems helped the researchers focus on particular areas of interest (Bogdan and Biklen 2007). Specifically, the researchers identified major codes for data analysis including modifications, co-teaching, behavior, administration, planning, goals, student work, parents, and related service providers. After establishing specific portions of the data related to the codes, the researcher identified sub-codes (Bogdan and Biklen 2007) and emerging themes (Glaser and Strauss 1967).

5 Results

Results of this study indicated teachers used text messaging to collaborate in a variety of ways including: (a) making modifications and planning instruction; (b) record keeping and progress monitoring; (c) sharing information about behavior issues or behavior emergencies and (d) communicating with parents. In addition, three teachers reported feeling uneasy about using their smart phone during instruction because the school did not have a formal policy on teacher smart phone use, and they thought they could have been reprimanded by administration for using smart phones.

5.1 Planning and modifying/adapting instruction

Teachers on both teaching teams reported using text messaging to plan instruction or make modifications for students with disabilities. The teachers discussed how they collaborated on instructional planning. Erica (the special educator on the 3rd grade team) stated, “I text Kate (the general education teacher on the third grade team) all the time for planning, like [try] this book to go with this story…especially if I’m in meetings a lot and I don’t have time to go meet with her.” Similarly, Mike (the special educator on the 5th grade team) commented he would text back and forth with his co-teachers at night and on weekends when planning instruction for the upcoming week. By using text messaging, teachers were able to co-plan instruction even when they did not have the time to physically meet and plan with each other.

5.2 Record keeping and progress monitoring

In addition to planning general instruction, many of the teachers indicated communicating with each other via text messaging regarding modifications or adaptations to the curriculum for specific students with disabilities. Kate explained,

> Sometimes when I am planning after school I will be stuck on how to change something so that Marcus [a student with a disability] will be able to do it. So, I take a picture of it and send it to Erica and ask her if she has any ideas. Usually, she will text me back with ideas or lets me know she will make something for him so that he can participate.

Similarly, Erica explained how she could suggest modifications quickly for students when a teacher sent her a photo of what needed to be modified, "I'll just fix it for them, to personalize it for them if they can't do the exact same thing that everybody's doing. [I will ask] what should I do to fix it?" She continued to explain that her colleague could text her "rather than go and try to hunt her down or send [another student] with a message."

This collaboration regarding planning and adapting instruction also translated to communicating about and keeping track of students' progress towards Individualized Education Program (IEP)[2] goals and state curriculum standards. Sending texts regarding performance on assessments or progress on student work allowed teachers to have current and precise data for record keeping. For example, since Erica was not in the same classroom all day, she indicated she did not always get a chance to see what the students with disabilities had done in class when she was not there. Text messaging acted as a quick and easy way for her to remain current on student progress. Erica explained,

> I love getting pictures of the kids doing their work, I love that. Or showing me pictures of what they did because I remember it…then or I can go back and look at my text messages when I'm writing up documentation.

This permitted her to keep a running record of student progress and use this record when developing the IEP. Similarly, Tom indicated he would have the students call Mike to let him know they did well on a test. Mike stated, "I can congratulate them right away. I also make a note to take a look at the test and make a copy for Sam's (a student receiving special education services) portfolio." Ongoing data collection is an integral part of measuring student progress and can be difficult for teachers in inclusive schools who collaborate in numerous classrooms throughout the day. Text messaging and use of smart phones allowed teachers to collaborate and communicate student progress instantaneously. Moreover, in some instances, it provided an instant running record of student work.

5.3 Behavior

Teachers not only reported texting about student progress in academics, they also texted each other about student behavior. Tom indicated when one of his students

[2] An Individualized Education Program is a document required for students with disabilities receiving supports and services in schools in the United States. The document outlines parameters of supports and services, as well as academic and social goals for the student.

with behavioral difficulties was exhibiting disruptive behaviors and Mike was in another classroom supporting other students, he would text Mike to let him know that something was going on with the student. Thus, Mike would try to free himself to come and assist with the situation or suggest a strategy for Tom. For example, a communication between two teachers about a student with attention difficulties read,

General Educator: *Time out needed!*

Special Educator: *Ok. Is Mary [the paraprofessional] there?*

General Educator: *Yes. I think she had too much sugar.*

Special Educator: *Ok. Mary should take her for a run.*

General Educator: *She finally apologized to the class. Very disruptive this morning.*

Special Educator: *Ok can you tell Mary to take her on a run? Then come to my office.*

General Educator: *Mrs. Mary tried, but she is not listening to Ms. Mary either.*

Special Educator: *On my way.*

The texting conversation above is an example of how the teachers communicated and collaborated regarding student behavior even though they were not in the same classroom at the time. Similarly, teachers were able to communicate with each other about behavioral emergencies. Erica mentioned the special educator that had worked with the first grade team had a student who would become violent. If that student started to get out of control, the other special educator who worked with a different team of teachers at the school, would text Jill for support. Via text messaging, Jill would get the message promptly and then would quickly support her colleague.

5.4 Communicating with parents

The special educators in this study discussed how they used text messaging to communicate with parents, and how parents in turn communicated with them. Communication between the educators and parents included of a variety of topics such as student progress, learning, and behavior. For example, Erica indicated she would text parents pictures of some of the student work that the general education teacher texted her throughout the day. Erica was able to use text messaging to give parents an idea of what students accomplished and/or what additional work the student may need to complete. In addition, parents shared information about the skills and content knowledge students brought from school to home. Mike stated, "Lucy's mom showed me today some video of Lucy who goes home and pretends she is the teacher to the plants and teaches the plants about what she learned for the day. Lucy's mother knows what she is learning for the day and can see that she is making progress in her learning."

Parents also communicated with the teachers about student's emotional well-being or behavior. Erica explained, "You get immediate answers about pertinent information like if the student is having bad seizures on a particular day. Or, if you go to the

bus and she's [student] crying and because she has no language she would be unable to tell you the reason that she is crying; therefore, the parent can easily notify you about what happened at home." Text messaging acted as a way for these parents and teachers to communicate with ease throughout the day. Since making phone calls or sending emails during instruction may not have been practical, text messaging provided a faster, more efficient way to communicate.

5.5 Smart phones not permitted: The fear of "getting caught"

Although the teachers used text messaging, a few reported being uncomfortable because they thought they would be reprimanded by administration, or a parent would walk in and think they were using the smart phone for personal use. Since the school did not have a clear policy on the use of smart phones, the teachers were not sure if using them was allowed. This finding was particularly interesting because lack of a clear policy seemed to have made teachers hesitant about using smart phones in the classroom.

6 Discussion

The results of this study support similar research regarding the use of technology to collaborate or share knowledge (Trust 2012; Wake and Modla 2012). Similarly to Trust (2012), this research suggests that teachers found that this type of technology supported their ability to plan and implement instruction. The teachers used their smart phones not only to share knowledge with each other, but also to create new knowledge by regularly collaborating and communicating (Doolittle and Hicks 2003). Since teachers used smart phones to plan and implement instruction as well as to collaborate, the use of smart phones created unique opportunities for teachers to learn from each other and gain new knowledge (Wang et al. 2008).

The knowledge sharing and collaboration that occurred via the use of smart phones ultimately supported inclusive education. Many teachers and support staff have cited lack of time for collaboration and communication as a major barrier to providing successful inclusive services (Villa et al. 2008). The use of smart phones allowed the teachers to "fit in" time to work together to develop instruction for *all* students in the classroom. This ultimately promoted students' academic and behavioral success.

6.1 The need for professional development

While the teachers effectively used IS in somewhat systematic ways to share knowledge and collaborate, there was not an identified "system" or "approach" to using smart phones. Karami and colleagues (2013) noted that in order for teachers to effectively incorporate technology into their practice they should receive professional development situated within the method and process of using such technology. Furthermore, teachers should be provided with training that helps them become efficient in the use of IS, and also supports understanding of the objectives behind the use of the IS (Buabeng-Andoh 2012; Karami et al. 2013). Therefore, the school and teachers could benefit from developing a more systematic approach to the use of smart phones that could then be introduced to all teachers and staff. This may

improve the effectiveness of the use of smart phones and encourage teachers not currently using such technology to use it (Buabeng-Andoh 2012).

6.2 Limitations

Despite the pertinent results of this research in regard to collaboration and communication via smart phones, we must acknowledge the limitations of the study. This was an exploratory study with a small sample size and we must be aware of the issue of lack of generalizability. As our theoretical framework suggests, we assume that use of the IS was shaped by the interaction among people, resources and contexts in this particular school setting (Dillon 2008). Therefore, generalizability becomes an issue once more. Given the limitations, we realize that we must be cautious when interpreting how the results of this study relate to teachers and schools in the U.S. and abroad.

7 Implications for practice and future research

Given that time to communicate and collaborate is essential to the success and sustainability of inclusive schools and that teachers often cite lack of planning time as a barrier to inclusive education (Villa and Thousand 2005), text messaging is one way teachers can create precious time to plan instruction, modify curriculum, and support student behavior. Moreover, educators can use text messages of student work to keep a running record of student progress towards goals or standards. This "portfolio" of work, can then be used in developing the IEP and communicating student's strengths and areas of need. In addition, text messaging was a helpful tool in parent communication. Parent-teacher relationships play a role in the success of students with disabilities (Villa and Thousand 2005). Text messaging may be one way to strengthen or support these critical relationships. Lastly, this study suggests the need to revisit smart phone use policies in schools. Many school policies ban students and teachers from using smart phones during instruction (Brindley 2012). However, there are many ways that teachers can use smart phones and text messaging effectively during and after instruction. If teachers are going to use smart phones during instruction, it may be helpful to clarify the "do's and dont's" of use during instruction. This may help teachers feel more comfortable using their smart phones to collaborate and may also dissuade them from using their smart phones inappropriately.

Along with implications for practice, this research has a number of implications for future research. First, a study using a larger sample size across a number of schools and grade levels would provide us with a way to find out more about whether the findings in this study can be generalized. In addition, scholars and practitioners may want to develop systematic approaches for using text messaging in order for this tool to be used most effectively. Lastly, the impact of the use of text messaging to collaborate on student achievement and access to general education should be explored in further detail.

8 Conclusion

In summary, this study explored the use of text messaging in an inclusive school and found that teachers used text messaging to collaborate and communicate in a number

of areas essential to the success and sustainability of an inclusive school. The use of IS has grown significantly over the past several years and demand for continued growth in this area is at the forefront of education (Buabeng-Andoh 2012). As this seems to be an under-researched, but important area of inquiry, future research related to the topic is essential. As we move toward using more technology with our students as a way to improve instruction, it is critical that we begin to take a look at how we can use technology to improve communication and collaboration among teachers, parents, staff, and members of the community.

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