

# Preparing Special Educators to use Mobile Technology: A Review of the Literature

Lindsey Balderaz<sup>1</sup>, Kara Rosenblatt<sup>1</sup>,

<sup>1</sup> Special Education Department, University of Texas of the Permian Basin, United States

[balderaz\\_l@utpb.edu](mailto:balderaz_l@utpb.edu)

**Abstract.** Since mobile devices, such as smartphones and tablets, have become ubiquitous in our daily lives, their use in the modern public classrooms is an ever increasing occurrence. In order to meet the demands of the rising technology needs, teachers must be well versed in the pedagogical and curriculum uses of mobile devices. However, general and special education pre-service teacher education programs rarely provide the knowledge, skills and practice that are necessary to integrate mobile technology in ways that will affect positive changes in student learning. The purpose of this systematic literature review was to determine the prevalence of and current trends in mobile technology training in teacher preparation programs, especially as it applies to pre-service special education teachers. Results of the review revealed a paucity of research on the topic in both special and general education.

**Keywords:** Mobile learning, mobile technology, teacher preparation, pre-service teachers, mlearning, mobile device,

## 1 Introduction

Each year approximately 190,000 teacher candidates graduate from teacher preparation programs in the United States and prepare to begin the demanding career of teaching[1]. A majority of the individuals in the teacher preparation programs across the nation were born after 1980 and are commonly referred to as Millennials [2], the Net Generation [3] [4], or digital natives [5]. This group of teacher candidates is the first generation to grow up with technology - beginning with computers, then the Internet and game consoles and finally, cell phones, PDAs, iPods and mobile devices. While Millennials are said to be

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<sup>1</sup> Please note that it is assumed that all authors have used the western naming convention, with given names preceding surnames. This determines the structure of the names in the running heads and the author index.

more comfortable using technology than previous generations [6], researchers also speculate that their exposure to and use of technology influenced their learning styles in such a way that traditional pedagogical methods of instruction do not meet their unique learning needs. Although millennials are often viewed as innovative users of technology and eager adapters of new technology [6], recently questions have surfaced about whether teacher preparation programs are able to provide teacher candidates with the necessary learning experiences to work in increasingly diverse environments [7]. Initially, questions revolved around a program's ability to provide sufficient instruction. However, several mitigating factors have been brought to light that challenge the assumption that pre-service Millennial teachers, because of their comfort with and early exposure to technology, are *all* technologically competent users. Instead, current research indicates that pre-service educators' proficiency with technology use and adoption does not translate into effective learning and teaching practices with technology. Therefore, teacher preparation programs must commit to providing pre-service experiences that will facilitate effective use in practice [8].

For more than three decades, critics of teacher preparation programs have questioned both the academic rigor and noted the disconnect between the coursework and the actual act of teaching students [8]. The field of teacher preparation has been likened to the Wild West and cited as disorderly and unruly [9]. Researchers argue that without reaching to the heart of the matter and defining rigor and effectiveness, teacher preparation programs are not likely to make great strides in preparing a workforce that is capable of educating students who have grown up using technology [10] [11]. While we agree that defining rigor and effectiveness are important, we believe that in order to prepare teachers to engage 21<sup>st</sup> century students in meaningful learning, we must teach them to use technology, specifically mobile devices, as instructional tools instead of a supplemental teaching tool [11].

Teacher preparation programs have an obligation to prepare educators who can teach students to be prepared for jobs that do not yet exist, despite the reduction of resources and ever increasing demands. When used effectively, mobile technology can reengage students and make educational experiences more meaningful. A novel mobile device, such as tablet or smart table, promises to improve student learning and enable a more enriching learning environment as it allows students to answer questions at their own pace, and receive immediate feedback. Some experts argue that mobile devices could enable students to cover more than two times the information when compared to traditional classroom techniques. The concept of immediate feedback and self-paced instruction was first theorized by B.F. Skinner and then implemented as he developed his "teaching machine" of 1954. Though this first machine was large and clunky, the use of certain mobile devices today enable students to multi-task, collaborate, and even teach one another, which are all critical skills for performing in the modern workplace. Mobile learning offers a novel approach to reach digital natives by personalizing content and

teaching relevant skills for the future at a rigorous pace that has proven to keep their interest [12].

Essentially, we believe that educational experiences are meant to prepare students for real life and should, as much as possible, reflect the realities of the real world. That being said, teachers are the bridge between formal education and the real world. In order to successfully create that bridge for students, we believe that teacher candidates must have numerous opportunities to apply their skills incorporating mobile technology into the many facets of teaching, including instructional planning, instructional delivery, data-based decision making, and reflective practices, in realistic settings in order to have the knowledge and resources needed to successfully meet the challenges of teaching [13] [14].

In this paper, we conducted a systematic review of literature on the use of mobile technology in teacher preparation programs across the United States. We chose to focus our search only in the United States for several reasons. First, we wanted to understand the current state of mobile technology use in teacher preparation programs in our backyard. Second, the educational system in the United States is very different than the educational systems in other countries and the majority of pre-service teachers are prepared to teach in their native country. Therefore, it is likely that the experiences and preparation foci of foreign teacher preparation programs would be, or are, dissimilar to the preparation, foci, and experiences of US pre-service educators. Ultimately, a majority of the teachers we prepare will become teachers within the United States and we felt that comparing the programs and resources would be similar to comparing apples to oranges. Therefore, this paper is structured as follows: in section 2 we discuss the current state of mobile technology use and ownership for adults (ages 18+) in the United States, followed by an overview of mobile learning in institutes of higher education, and finally general and special education teacher preparation programs; in section 3 we describe the methods we used to review and analyze the research base; in section 4 we discuss what we learned from the literature review regarding the research studies that have been conducted on mobile technology and teacher preparation programs, including the methodologies used, the various study implementations, the perceptions of the teacher candidates and the outcomes of the studies; in section 5 we discuss the growing concerns around developing teachers who are not only proficient technology users themselves, but competent at integrating mobile learning throughout instruction and we propose critical future trajectories of research, pedagogical elements, and training.

## **2 Literature Review**

### **2.1 Mobile Learning**

The definition of mobile learning used in this literature review is, "...the experience and opportunity afforded by the evolution of educational technologies. It is anytime, anywhere learning, enabled by instant, on-demand access to a personalized world filled

with tools and resources we prefer for creating our own knowledge; experiences otherwise unattainable” [15].

Mobile devices are already ensconced into our daily lives [16][17] as evidenced by recent statistics which reveal that there are approximately 327,577,529 cellphones, or 1.03 cellphones for every person in the United States [15]. Young adults between the ages of 18-29, have higher than average smartphone ownership rates (85% compared to 64% of all Americans) and almost half of them have used their smartphone to consume educational content [15]. These statistics should indicate that the momentum to change the way learning takes place is gaining speed. Further evidence of these changes can be seen by the increased number of K-12 students who come to school with a mobile device and parents who support the use of mobile devices during the school day [18]. Moreover, in *Project Tomorrow's 2014 Report, Trends in Digital Learning: Students' Views on Innovative Classroom Models*, high school students noted that an environment that allows them to use their mobile devices in the classroom and on schoolwork replicates the way they use their digital tools outside of school and has made their work processes more efficient and transformed the way they approach learning. Unlike classrooms and technology learning tools of the past, mobile devices and mobile learning remove the time and place barriers and have changed the way we teach and learn. With these barriers removed, a chain-reaction of learning occurs - beginning with individual ownership of learning, which leads to informal and formal learning anytime, anywhere, and promotes interest and lifelong learning [19].

Since only 1% of college students do not own a mobile device [20] [21], Millennial college students (ages 18-34) are truly able to provide researchers and practitioners with an abundance of quality information on mobile learning from a unique perspective. Through this lens, we can see that college students are enthusiastic about the use of mobile devices in learning. While the mobile learning tool most utilized by this group is a laptop (89%), the use of smartphones and tablets as the primary device for schoolwork has increased from 83% to 86% and 45% to 51% since 2014 respectively. Reported in the Pearson Mobile Device Survey [22], more than 8 out of 10 students believed that tablets will transform the way they learn in the future, 79% claimed that tablets make learning more fun and 68% felt tablets helped them perform better in class. Overall, 40% of the respondents agreed that they would like to use mobile devices more frequently in class than they currently do. Further, when asked about the devices that they would like to use for schoolwork on a weekly basis, 40% of the students responded that they would like to use a tablet *a lot/a great deal* for school work [22]. Clearly, college students, including pre-service teachers, are ready and willing to take advantage of the ubiquity and the provision of anytime, anywhere learning that mobile devices afford learners.

## 2. Mobile Technology and Teacher Preparation

As stated earlier, today's pre-service educators are among the first to grow up in a 1:1 society, where there is one computer or mobile device for every student. [20]. Millennial teacher candidates view technology as an "essential and preferred component of every aspect of their lives" [23], and their digital experiences have altered the way they communicate, socialize, entertain, and approach learning [24] [6] [25]. Therefore, it is no surprise that the current generation of millennial teacher candidates express an overwhelming desire to incorporate mobile learning into their future classrooms, preferring mobile learning tools to traditional computer-based technologies [25] [20] [26]. Further, their future employability is dependent on their capacity to incorporate mobile technology into pedagogical practices. Project Tomorrow [27] found that, "School administrators state that when they hire new faculty, they are specifically looking for teachers who are capable of effectively using mobile technologies in their classrooms (p.21)". Unfortunately, in order to provide the support and training Millennial teacher candidates need, pre-service programs need to integrate mobile technologies into teacher preparation curriculums; a practice that is only being pursued and implemented to varying degrees by 59 institutions of higher learning in the United States [18]. Most teacher preparation programs that have addressed the growing technology needs have only integrated a basic course in educational technology into their teacher preparation programs. Without methods courses and field experiences that intergrate mobile technology into the K-12, teacher candidates will not be prepared to integrate mobile learning into the classroom and affect student learning. This experience is critical for demonstrating how effective use of technology can influence student learning and is driven by faculty members who are as knowledgeable about the sweet spot between technology and pedagogy as they are their content area of expertise.

Research within the last decade suggests that mobile devices can support learning experiences in a range of students, including students with disabilities [28] [10] [29]. Mobile devices have been used as "cognitive prosthesis" to support the learning needs of individuals with cognitive disabilities [30]. For students with intellectual disability and learning or behavior problems, a cognitive prosetheis is highly customizable and can be an equalizer that helps a student overcome or compensate for his or her disability. Through this lens, mobile devices used as cognitive prosthetics, can contribute to conditions that allow for equal opportunity to learn[31]. Since approximately 6 million K-12 students in the United States have a disability and receive academic, emotional, and/or social services under the Individuals with Disabilities Education Improvement Act of 2004 (IDEA) [32], teacher candidates must be prepared to leverage the capabilities of mobile devices to address the needs of students with disabilities. Many of pedagogical processes that can be used with mobile devices are conducive to making academic, social and emotional skill gains in students with disabilities, including: (a) immediate feedback, which can be provided through a student response system; (b) gaming, which provides motivation and scaffolded learning and can be conducted on the user's mobile device; (c) authentic learning experiences, which provides explicit practice and strategy cues and can

be achieved through interactive experiences in learning environments in and outside of the classroom; (d) collaborative learning, which can be achieved through the use of apps on mobile devices, and (e) personalized learning, in which mobile devices can be used to make accommodations or modifications to assignments. However, research on using mobile technology in special education teacher preparation programs is extremely limited.

To date, little research has examined current mobile technology/device integration practices of teacher education programs and their impact on the classroom experiences of special education teacher candidates. The number of students with disabilities who are included in the general education classroom has increased over the past ten years, and with the passage of the *Every Student Succeeds Act*, it is likely that the number of students with disabilities served in the general education setting will continue to increase [33]. Since the *Every Student Succeeds Act* also renewed the federal government's commitment to funding educational technology and technology integration at the school level, it would behoove special education teacher preparation programs to be at the forefront of extensive revision to the technology dimensions in their teacher education programs [34].

### 3 Method

A systematic review of the literature was conducted to identify empirical research studies that focused on special education teacher preparation programs that utilized or incorporated mobile technology. The systematic review included three stages. First, an electronic database search was conducted to identify potential studies. Initially, databases including ERIC (2007-2016), PsychInfo (2007-2015), Academic Search Complete (2007-2015), Humanities Full Text (2007-2015), Psychology and Behavioral Sciences Collection (2007-2015) and Google Scholar Full Text (2007-2015) were searched. Search terms included in the first round of investigation included "special education", "special education teacher preparation", "pre-service special education" and "mobile learning", "M-learning", "iPhone", "iPad", "tablet" or "notebook". The publication year parameters were set to coincide with the iPhone debut in 2007. This initial search produced three results. The abstract of each article was screened and after the two researchers confirmed the inclusion/exclusion criteria and removed theoretical articles or reports/studies that revolved around the K-12 setting, only one article met the inclusion criteria for the literature review. At which point both researchers agreed to expand the search by removing the focus on special education teacher preparation and expanding it to include all pre-service educator/teacher preparation programs. In the second stage, again an electronic database search was conducted using the ERIC, PsychInfo, Academic Search Complete, Humanities Full Text, Psychology and Behavioral Sciences Collection and Google Scholar Full Text databases. During the second stage, the search terms used to identify potential studies was expanded to include all teacher preparation and pre-service programs. Key search phrases used included "teacher preparation", "pre-service educator", "mobile learning", "M-learning", "iPhone", "iPad", "iPod", "tablet", and "notebook". In this stage, 10 articles were identified. The abstract of each article was reviewed by the

researchers. In the third stage, a hand search of the reference lists from relevant literature reviews and all identified reports that passed the second state of screening was conducted. No additional studies were identified as a result of the hand search. Two researchers then independently confirmed the inclusion/exclusion criteria for each study; intercoder agreement was 100%. In total, 5 studies met the inclusion criteria and were used in the systematic review.

For this review a study had to meet specific criteria. First, a study was included only if it was empirically based research that focused on a teacher preparation program that utilized at least one aspect of mobile technology. Only single subject research or quantitative analyses were included because our research is focused on examining and quantifying the behavior patterns of teacher preparation programs in the United States. Through quantitative and single subject research, we start to uncover patterns within teacher preparation programs and build a basis of knowledge which can then be generalized to other teacher education programs. Second, the study had to be published in a peer-reviewed journal. Articles that were not included were those that reported on theories, case studies, qualitative studies, studies that focused on K-12 learners, or literature reviews. Studies conducted prior to 2007, the year the iPhone debuted, were also not included. Search strategies varied depending on the tool used, search terms included the keywords "mobile learning", "M-learning", "iPhone", "iPad", "tablet" or "netbook" with "teacher preparation" or "pre-service educator".

Both researchers read the five studies that qualified for the review in their entirety and determined the themes, or sections, that emerged from the synthesis. The first section included the characteristics of the participants (e.g., pre-service teachers, teacher preparation faculty members). The second section described the instructional setting of the participant (e.g. general education setting or special education setting). In the third section, the content areas or instructional focus were described. The fourth section described the method of empirical research that was used in the study. The fifth section described the research tool(s) that were used in data collection. Finally, the sixth section described the type of technology tool that was used in the study.

## **4 Results**

A variety of themes emerged as a result of the synthesis of the 5 research articles which met inclusionary criteria. Below is a review of the teacher preparation program trends, methodologies, implementation, perceptions, and outcomes.

**Table 1.** Analysis of studies on mobile technology and teacher preparation (n=5).

Study	Participants	Gen Ed/ Spec Ed	Content Area	Method	Research Tool	Technology Used
Ainsa, T. (2013)	Pre-service teachers	Gen Ed	Early Childhood	Mixed Methods	Questionnaire, Open ended questions	Mobile devices
Burton, E. et al. (2011)	Pre-service teachers	Gen Ed	STEM	Mixed Methods	Questionnaire, Open ended questions	AR games on Mobile device
Foulger, et al. (2013)	Teacher Preparation Faculty	Gen Ed	Multiple	Mixed Methods	Questionnaire, Open ended questions	Mobile devices
O'Bannon, B. et al (2015)	Pre-service Teachers	Gen Ed	Multiple	Quantita tive	Questionnaire	Mobile phone
Rock, M. et al (2009)	Pre-service Teachers	Spec Ed	Multiple	Mixed Methods	Direct observation	Bug-In-Ear (BIE)

#### 4.1 Teacher Preparation Programs

Of the 5 articles reviewed, there was a wide variety of course content and focuses included in each study. Burton and colleagues (2011) evaluated students in an elementary and secondary 'methods in science' class. Ainsa (2013) focused on a group of pre-service teachers in an early childhood program while another study focused on a senior level course in curriculum development [35]. Rock and associates (2009) were the only group to focus on the use of mobile technology during field experience using pre-service teachers in the field of special education. Two of the article were not related to a specific



course but a broader surveying of the perceptions and practices in teacher preparation programs [37], [38]. Based on these results it was clear that the use of mobile technology was not specific to one field of training, one type of course, or one content area within the pre-service programs.

**General Education v. Special Education.** It was important for the evaluation of these articles to include a discernment between implementation of mobile technology training with general education pre-service teachers compared to special education pre-service teachers. Of the 5 articles reviewed, only one included the training of special educators [36]. The remaining 4 articles focused specifically on the use of mobile technology in the general education classroom or did not specify the setting because they were focused on the general perceptions and attitudes of pre-service teachers [37], [38].

## 4.2 Methodology

The studies examined in this review employed a variety of methodologies with the majority being a mixed methods design. There was a noted exclusion of the use of random control trial or single case research design in the literature search which are two of the arguably more rigorous and controlled experimental methods. Three studies used mixed methods in which researchers used a pre and posttest to identify change in opinions and perceptions and interviews or open-ended questions to identify common trends in topics and ideas [35],[37]. Two studies used questionnaires to investigate perceptions and willingness to implement a variety of mobile learning tools [37],[38]. Concerns have been raised about the reliability of questionnaires caused by sampling bias and other confounding factors. Therefore the results presented through these methods alone, while they may add useful information to the field, should be interpreted with caution.

## 4.3 Implementation

A variety of mobile devices and technologies were evaluated within the 5 studies. Three studies focused on specific mobile technologies and 2 studies included a review of mobile devices in general. Of the specific devices explored one study evaluated the use of an augmented reality game used on a mobile phone to teach STEM concepts [35]. Rock and colleagues (2009) evaluated the use of Bug in Ear (BIE) technology which included the use of a webcam, Bluetooth headphones, and Skype to provide immediate feedback to pre-service teachers participating in field experience. Finally, two studies evaluated the perception of teachers regarding the implementation of mobile phones in the classroom [37],[38]. Based on these findings, there does not seem to be a clear pattern or preference for how mobile technology is being implemented in the higher education setting. While the use of smart phones seems to be easiest due to their ubiquity amongst college students, tablets provide a larger surface area for reading text or inserting text into pre-established fields and therefore are another promising tool. BIE technology also has its many

advantages, however it does not allow for access of other tools such as internet or applications in the same way that smart phones and tablets do.

#### **4.4 Perceptions**

One common theme within each of the 5 studies reviewed was an evaluation of pre-service teachers' perceptions regarding the use of mobile technology in the classroom. Burton and colleagues (2011) found that after the use of an augmented reality program, pre-service teachers were much more positive and gave higher endorsement to the use of mobile learning in the classroom. Foulger and associates (2013) found that 53% of university programs surveyed were actively trying to implement mobile technology training within their teacher education programs. O'Bannon and colleagues (2015) both reported that some pre-service participants found mobile devices to be distracting to student learning. O'Bannon and colleagues (2015) reported that 45% of pre-service teachers indicated support for the use of mobile phones in the classroom while 25% disagreed with mobile phone implementation. Their participants most frequently reported that mobile phones could improve digital fluency, unlimited access to information, and differentiated instruction. These pre-service teachers also reported that mobile phones were most stifling to student creativity, collaboration, student engagement, and productivity. Generally O'Bannon and colleagues found that as pre-service teachers' personal use of mobile phones increased, their attitudes about implementation of mobile phones in the classroom became increasingly positive. Additionally, as their expertise increases, they reported more benefits in the implementation of mobile technology in the classroom. Finally, Rock and colleagues (2009) evaluated perceptions of pre-service teachers who were coached through mobile technology during their field experience and reported positive findings in regards to improvement in instructional practices, student engagement, and academic performance. However, contrary to the positive findings of the previous articles, Ainsa (2013) reported that the majority (73%) of pre-service teachers in their study chose not to attend a training which provided information on mobile devices and mobile learning. These participants also stated that they would have been more willing to attend training if it was made mandatory by their future employing school district. So, while the general perception of mobile technology is positive for personal use, and many pre-service teachers reported a positive outlook on the implementation of its use in their classroom, there appear to be many hurdles to overcome in reaching a fully positive perception.

#### **4.5 Outcomes**

The outcomes reported by these six groups of researchers were both positive and negative regarding the implementation of mobile technology training in higher education. Rock and colleagues (2009) reported that the BIE technology generally improved the use of high level instructional strategies, increased the use of praise statements, and resulted in a

decrease of blurting out in the general and special education classroom for pre-service teachers during field experience. Burton and colleagues (2011) found that the when pre-service teachers participated in one 3 hour session of an augmented reality game which focused on STEM goals, they were much more likely to regard AR games as a useful instructional tool. Additionally, these pre-service teachers reported that the AR games successfully helped them reach their learning goals. O'Bannon and colleagues (2015) gathered information regarding perceptions of a variety of mobile technology tools from 245 pre-service teachers. These teachers reported that the MT tools they believed to be the most useful for school-related activities were internet, clicker/polling devices, educational apps, reading books, email, calculator, podcasts, and the calendar. They also reported that texting, tweeting, and social networking were the least useful for school use. The barriers they were most concerned about included cheating, disruptions to class, cyber bullying, access to inappropriate information, sexting, and the negative impact of texting on writing skills while having access to their phone was the least concerning barrier. Additionally, pre-service teachers reported that they perceived the most disruptive features of mobile phones to be texting, playing games, tweeting, searching the internet, the phone ringing during class, or students listening to music during class.

Dissimilar to findings of the Foulger and colleagues (2013) study, not all reported findings were positive. In the study by Ainsa (2013) pre-service teachers in an early childhood education program were given the option to attend training to learn more about devices and mobile learning and had the freedom to be as active or inactive as they chose. Of the 70 pre-service teachers in the study, only 27% attended the training and participated in a discussion about the training. Beyond these initial steps, only 7% of participants used their training to develop a sample lesson plan and only 4% of participants implemented their lesson plan with actual students. Foulger and associates (2013) found similar lack of interest in the implementation of mobile technology for pre-service teacher programs in Universities across the country. Out of 83 faculty members who completed the survey regarding the extent to which they implement mobile technology into their program, 69 reported that they were in the beginning, planning, or isolated instances phase. Only 32 faculty members reported that mobile technology was used in several instances school wide to develop and deliver lessons, and only 6 reported that mobile technology was fully integrated into the school through provided devices, encouragement for BYOD (bring your own device), and had a faculty who were fully trained to implement the use of mobile technology in the classroom.

## 5 Discussion

The systematic review of these five studies on the use of mobile technology in teacher preparation programs is timely in light of the increasing interest in mobile learning. There is growing concern about the training and preparation of pre-service teachers who are given the task of teaching 21<sup>st</sup> century learners with a growing need to seamlessly implement mobile devices in the classroom. There is also a growing concern in the lack of

synthesized information in regards to mobile technology in teacher preparation programs. Findings are drawn in regards to the approaches, strategies, and contexts for implementing mobile learning and mobile tools in different teacher education contexts. First, this review revealed an astounding lack in published empirical research which focused specifically on the use of mobile technology devices in teacher preparation programs. While previously published reviews may have included many more studies [39],[40] the exclusionary criteria of limiting studies to those conducted in the U.S. and only reviewing empirical studies significantly reduced the amount of studies included in this review, which leads to the next point. While the majority of studies utilized a mixed methods design there was not a single study which employed a randomized control trial (RCT) or single case research (SCR) which are arguably two of the more controlled methods for conducting empirical research. While questionnaires can provide perceptions and opinions, there was only one study conducted that evaluated the impact of implementing mobile devices into the pre-service teacher programs on their actual practice or skill set.

Another revelation from this systematic review was the continued hesitance to fully implement mobile technology into higher education. The review revealed that personal use of a mobile device was a good predictor for a positive perception and willingness to implement mobile devices into their own teaching at the higher education level. Similarly, pre-service teachers who had more expertise in using mobile devices were much more likely to have favorable attitudes about the use of mobile phones in schools. It is clear that when individuals feel uncomfortable or unskilled in using a device, they are less likely to find it favorable and more likely to be resistant in the implementation. This can be overcome by providing more hands-on training. Just as in all things, people tend to resist change. They are more likely to continue using tools and pedagogy with which they are comfortable. It is important that the pre-service teachers we are preparing to enter the classrooms of the future are comfortable with the tools their students are using on a regular basis.

One final concern was the sparsity of training for special education pre-service teachers. There is mounting research to support the use of mobile devices for individuals with disabilities. MT affords teachers with a flexible tool to increase communication, provide immediate feedback, and allow seamless differentiation of instruction; this is one of the key tools in Universal Design for Learning. Only one of the studies reviewed included pre-services teachers in the field of special education. It is concerning that teachers are not being prepared to use the tools that might be most helpful in allowing students with disabilities to have equitable access to their environment.

Through this review of research it is clear that there are many positive developments in the field of mobile learning but also many opportunities for further exploration. In particular, future research should address the limited methodology by exploring new methods to empirically evaluate the impact of integrating mobile technology in the higher education classroom. Additionally, more research is needed to determine the most important pedagogical elements of mobile learning and teaching. Finally, it is critical that the field address the need for special educators to be trained in the use of mobile devices in order to effectively provide instruction to their students with disabilities.

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