THE INFLUENCE OF THE USE OF MOBILE DEVICES IN THE CLASSROOM BY THE UNDERGRADUATE STUDENTS AT A UNIVERSITY IN NIGERIA

A thesis presented
by

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Abstract

Mobile technology has been an emerging technology over the last few decades. This phenomenon presents both opportunities and challenges in higher education, especially in the classroom. The purpose of this study was to explore how students’ use of mobile technology in the classroom affects their classroom engagement and learning. A sample of students from a University in Nigeria was surveyed to assess their perceptions of their use of mobile technology and for what they used it.

Collectively, the majority of the participants reported having access to mobile technology so that they could use the Internet. Most participants indicated that their use of mobile devices in the classroom facilitated their ability to collaborate with other students and concentrate better on their studies. Some of the participants reported that other students’ use of mobile technology in the classroom was a source of distraction. The discussion offers avenues for future research regarding the effects of mobile technology on academic performance and engagement.

Key words: Student engagement, mobile technology, student involvement theory
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Chapter 1: Introduction

Statement of the Problem

With the rapid advancement of information technology, numerous opportunities abound for the utilization of technology in this increasingly globalized world where borders, boundaries, and communication obstacles are becoming almost non-existent. As the world embraces the various resultant innovations of information technology, questions have been raised regarding the challenges that these innovations may present. Today’s highly portable and user-friendly mobile devices are among the most provocative innovations and have evoked both accolades and criticisms, particularly with respect to young users such as university undergraduates.

The current generation has developed the ability to switch between different tasks and various media and as a result, individuals who multitasked performed poorly on particular tasks in comparison to those who performed the tasks one after the other (Greenhow & Askari, 2017). Several researchers support this view, and they have proposed that human beings are truly not adept at multitasking but do have the capacity to change efficiently from one action to the other (Kirschner & De Bruyckere, 2017; Zhang, 2015). Students’ increased access to wireless technology and the Internet suggest the need for schools to pay attention to the influence of mobile technology on multitasking, learning, and student engagement. This increased access becomes a critical factor in classroom dynamics, where students with cell phones can be talking, chatting, browsing, uploading, downloading information, or even recording a lecture in class all at the same time. Against this background, there is a need to investigate student’s use of technology in the classroom and the influence on engagement and performance. The purpose of this study was to explore and assess how mobile devices affect students’ learning and engagement in the classroom. For this study, the term mobile devices were used to refer not only
to cell phones but also mobile phones, smartphones, tablets, laptop computers, and are characterized by three major properties: portability, instant connectivity and context sensitivity (Kearney, Burden, & Rai, 2015; Mac Callum, Jeffrey, & Kinshuk, 2014).

**Research Problem**

Cell phones are valuable tools for sharing information globally, and they have become an essential part of daily life for students living in developing countries. Some educational institutions have observed an enormous increase in students’ mobile phone use (Asongu & Nwachukwu, 2016; Oyeyinka-Oyelaran & Adeya, 2002). In fact, this was the trend across many universities in Nigeria (Shonola, Joy, Oyelere, & Suhonen, 2016). In addition to the noise and distraction caused by cell phone use in the classroom, Shonola *et al.* (2016) identified other closely-associated implications: inattentiveness, disruption, and distraction to effective learning. This study further investigated the students’ use of mobile devices in the classroom and their influence on learning and engagement.

**Justification for the Research Problem**

Whether the effects are positive or negative, technology is affecting teaching and learning. Some researchers have examined the learning and educational opportunities that cell phones bring, while others have revealed the perils of excessive and unregulated use (Ang, 2015; Mango, 2015). For instance, Mango (2015) examined the ways that college students in two foreign language classrooms perceived the influence of the use of iPads on their learning and engagement with classroom activities. The analysis of the data showed that students believed that iPads played a significant role in their learning and engagement, thus promoting active learning in the classroom and paving the way for students’ success. Another study on teen use of
mobile phones pointed to a trend of increasing ownership and dependence on smartphones for online access (Madden, Lenhart, Duggan, Cortesi, & Gasser, 2013).

Other studies focused on students’ attitudes towards the use of mobile phones, including perceived social pressure and likely consequences. For instance, one study observed that while some students saw mobile phone use as pleasant, helpful, and easy, others were worried that they spent too much time on the phone at the expense of school activities (Jumoke, Oloruntoba, & Blessing, 2015). In the light of these findings, it appeared that there was a need to conduct further studies on the challenges and implications of students’ use of cell phones in order to bring to the fore the influence of mobile devices on student learning and engagement.

**Deficiencies in the Evidence**

The United States and other advanced countries have made concerted attempts to address the use of mobile devices in the classroom by studying the works of researchers such as Mango (2015), Purcell, Heaps, Buchanan, and Friedrich (2013), Chen and deNoyelles (2013), Nagel (2014), and Chen, Bauer, Bennett, and Seilhamer (2015). However, developing countries have not addressed the issue adequately. Aside from the work of Haydn (2013), Kolb (2011), and Nielsen and Webb (2011), the implications of incorporating cell phone technology into the classroom as a tool for supporting and improving teaching and learning has not been considerably researched (Warnich & Gordon, 2015).

In Nigeria, past attempts to fill such knowledge gaps have focused more on the status of mobile learning in Nigerian higher educational institutions or the perceived challenges rather than the opportunities presented for effective student engagement. Unfortunately, such analyses fail to present a holistic understanding of the influence of such devices.
One of those studies investigated the distractive impact of mobile phone use among Adekunle Ajasin University undergraduate students in Nigeria. The resultant data showed that there were no significant variations in the mobile phone use among undergraduate students by gender, age, and department (Ojewola & Akinduyo, 2016). Although Ojewola and Akinduyo (2016) helped to establish important differences in mobile device use, their study lacked in-depth information regarding learning and engagement.

In their assessment of the level of mobile learning in higher education institutions in Nigeria, Chaka and Govender (2014) found that despite the advances that were recorded in the implementation of mobile learning throughout the world, the situation is different in Nigeria. The authors reported that there had been little success in the use of mobile devices in the classroom and that there was no evidence of the application or adoption of mobile learning in Colleges of Education in Nigeria. Though Chaka and Govender (2014) focused on the status of mobile learning, their study did not provide in-depth information on the effect of learning and engagement.

Mobile technologies are playing a progressively-important role in college students’ academic lives. Consequently, information is required to better understand how students in developing countries such as Nigeria utilize mobile technology in the classroom, as the findings could support the adoption of mobile technologies across universities in Nigeria. The researcher explored this issue by investigating the influence of mobile devices on students’ learning and engagement at the University of Lagos in Nigeria. In addition, as most of the students in developing countries are found to be spending increased amounts of time on their mobile devices during class than they did in previous years, it was seen as critical to determine how mobile technology impacts their learning and engagement (Onasanya, Ayelaagbe, & Laley, 2012).
Relating the Discussion to Audiences

Mobile devices such as tablets, smartphones, laptops, and e-book readers can instantly connect users to the world, increase their access to information, and enable global interactivity with other students. Mobile devices allow users to not only consume content but also to discover and produce it. These devices continue to change how students learn, as well as shape their learning choices both within and outside of the classroom. Access to technology in school is one way to support students’ efforts to reach their educational goals. Using technology in the classroom appeals to students because it evokes their sense of how technology enhances learning and has a positive impact on other areas of their lives.

The Nigerian higher education system has been consistently criticized for being highly inefficient in both the quality of service delivery and effective student engagement. Thus, this study provides data for policy makers such as the National University Commission as they explore ways of improving the influence of mobile devices in Nigerian university classrooms.

Significance of Research Problem

In Nigeria, mobile phones have become an integral part of daily life among the general population, including university students. A study on smartphone users and smartphone penetration ranked the nation 17th (eMarketer, 2016). This ranking was based on the 23.1 million smartphone users counted in 2015 and the projected increase to 34 million by 2018 (eMarketer, 2016).

Several studies have found that the use of mobile phones among university students has generated a broad and diverse pool of knowledge (Baker, Lusk, & Neuhauser, 2012; Junco, 2012). However, mobile phone use also has adverse effects. The concomitant positive and harmful effects of mobile device use among students in tertiary institutions in Nigeria are
important. Most of the problems indicated are speculative and point to the need for more studies to confirm all of the claims concerning the use of mobile devices in the classroom. For more than two decades, Nigeria has experienced a continuing crisis in education, including limited access to educational resources and support, a lack of highly-qualified teachers, and low level of literacy and basic education skills (Oyelere, Suhonen, Shonola, & Joy, 2016). The rapid growth of mobile phone access in recent years potentially opens new avenues for addressing some of the systemic educational challenges in education in Nigeria. A study such as this one can reveal a way to incorporate mobile devices into the learning environment.

Research has shown that when technology is used properly, students are more engaged and motivated to learn and academic performance can improve (Oyelere et al., 2016). It is important for educators to take note of this and explore safe, productive ways to integrate mobile learning devices into their curriculum. This study examined how mobile devices influence students’ learning and engagement in the classroom. The findings from the study could help policymakers and the curriculum planners of education programs in Nigeria to understand how and why mobile devices need to be incorporated into education curricula.

Research Questions

The purpose of this study is to investigate and assess how mobile devices influence students’ engagement and learning in the classroom in Nigeria. Such an investigation and assessment is conducted in the context of understanding both the issues of multitasking and the views of several researchers who have postulated that human beings are not truly adept at multitasking but instead have the capacity to change efficiently from one action to the other (Hassoun, 2015; Xu, Wang & David, 2016). Students’ increased access to wireless technology
and the Internet suggest the need for schools to pay attention to the influence of mobile
technology on multitasking, learning, and student engagement.

As developing nations such as Nigeria seek to enact effective educational reforms, there
is a need to explore the non-traditional opportunities that information technology advancements
present. Mobile devices, along with other technological innovations, offer various challenges
but can still be used to enable students to be engaged and inspired to learn. For this reason, the
focus of research in education needs to embrace how mobile technology can be effective in the
engagement, learning, and performance of students.

The primary research question is: How does the use of mobile technology (smartphones,
tables, and laptops) by college students in a classroom in Nigeria affect their engagement and
learning? Two hypotheses are:

H0: The use of mobile devices (smartphones, tablets, and laptops) by college students in
a classroom in Nigeria does not affect their engagement and learning.

H1: The use of mobile devices (smartphones, tablets, and laptops) by college students in
a classroom in Nigeria does affect their engagement and learning.

The research sub-question is: What do students primarily use their mobile technology for
during class?

**Theoretical Framework**

The theoretical framework which was utilized in the course of the study is Student
Involvement Theory (Astin, 1984), and the conceptual framework is the Student Engagement
Model (Kuh, 2009). Although believed to have originated from the philosophy of John Dewey
(1897), Student Involvement Theory was introduced to address learning effectiveness and work
output. The theory focuses on students’ behavior and motivation and emphasizes the importance
of the faculty in ensuring that students are fully engaged in the classroom (Astin, 1984). Astin (1984), the principal developer of the theory, argued that “students learn by becoming involved” through engagement in their environment. Such involvement relates to the amount of physical and psychological energy that students devote to their academic experience. Astin (1999) proposed the importance of viewing students’ time as a resource that needs to be nurtured.

Student engagement underscores the view that the time and effort students devote to their educational activities is empirically linked to their desired college outcomes (Kuh, 2009). Astin (1984) stressed these outcomes and suggested that the measured level of student engagement (both quality and quantity) has an impact on the level of student development and learning. Engagement results reveal that individuals participating in tasks related to their proficiency continually learn from the experiences and show persistence because of their commitment to their work. Engagement is thus never a momentous event but a process and an activity that is always ongoing (Quaye & Harper, 2014). Kuh, Kinzie, Buckley, Bridges, and Hayek (2007) defined student engagement as “participation in educationally effective practices, both inside and outside the classroom, which leads to a range of measurable outcomes.”

The study of engagement focuses on academics, student-faculty interactions, student-peer interactions, and involvement with co-curricular activities (Henrie, Halverson, & Graham, 2015; Kuh, 2009). Additionally, student engagement involves the effort that a college student applies to their academic and non-academic experiences (Kuh, 2009). Active engagement is important due to the significant role that both academic and non-academic life play in ensuring students’ success.

The primary determining features of engagement are involvement and learning (Kuh, 2009). There are various ways in which students can become engaged, and there are also
substantially different concepts of student engagement that fit into the definitions above. Engagement requires those positive social contexts and conditions that help activate motivations. Student engagement and its impact on learning have been widely researched in higher education with a plethora of literature suggesting that engagement needs to be connected to meaningful student learning (Fitzgerald, Burns, Sonka, Furco, & Swabson, 2016; Price & Tovar, 2014; Tinto, 2012). Specifically, Newman, Whelage, and Lamborn (1992) defined student engagement as “active involvement, commitment, and concentrated attention, in contrast to superficial participation, apathy, or lack of interest” (p. 11). Engagement is defined as the active involvement a student invests within their academic experience of college, including their interactions with faculty, peers, and participation in co-curricular activities (Henrie, et al., 2015; Veloso, Orellana & Reeves, 2018).

Kuh (2009) emphasized two main elements of engagement in educationally-relevant activities: in-class engagement and out-of-class engagement. Classroom activities create experiences that involve and engage students in their learning. Teachers can ensure that classroom experiences are not only motivating but also less distracting by establishing mobile technology usage policies in the classrooms (Baker et al., 2012). It follows that eliminating behaviors that interfere with students’ desire to learn is necessary for increasing engagement (Lane & Harris, 2015).

Engaging students is a vital step in the learning process. Although there is the possibility of engaging students without the use of technology, technology can augment engagement in “ways that are difficult to achieve otherwise” (Kearlsey & Schneiderman, 1999, p. 28). Technology facilitates the process of engaging students in a meaningful manner through interaction with other students and other significant tasks.
Learning and engagement involve three principles: collaboration, using a project-based approach and learning through the utilization of an external focus (Henrie et al., 2015; Kearsley & Schneiderman, 1999). When these principles are employed, the learning process can be a motivating experience for the learners: retention improves, and knowledge transfer is possible. Engagement may result in students’ involvement in activities that enable them to work collaboratively. Classroom activities should facilitate teamwork, efficient planning, communication, and social skills. Whenever students can stand up and defend their ideas, motivation is bound to increase. Clarke, Mayo, Bryant, & Awadzi, (2017) suggested that the activities should be purposeful and creative, with frequent faculty interaction. Such activities promote engagement because they provide students with the opportunity to innovate, organize, and devise projects, thereby helping to establish a sense of ownership within their learning process. Clarke et al. (2017) suggested that the learning process should employ outside resources and that projects should have an external customer such as a community or government organization. By engaging in projects that are focused on real-life experiences, students shall be better prepared for a real work environment where real life issues are addressed. It was also suggested that the employment of the techniques of this model would lead to improved engagement of learners (Clarke et al., 2017).

Davenport and Prusak (1997) utilized a sliding scale of engagement that begins with passive observation and progresses to discussion, teaching, and practical use. This approach is vital in curtailing the problem of information overload and promoting the advancement of activity and engagement.

The reward-based engagement is similar to that found in intrinsic motivation. The fundamental features of intrinsic motivation include meaningfulness, competence, having
choices, and a clear show of progression. However, the idea of rewards remains the focal point in managing intrinsic motivation. There is usually a desire to stimulate or teach intrinsic motivation. However, this assumption points to the idea that nothing can stimulate engagement into happening. Engagement is a “bottom-up” grassroots phenomenon that the people above can never determine (Filsecker & Hickey, 2014; Thomas, 2009). Engagement becomes successful only if the individual takes the first initiative.

Axelson and Flick (2011) argued that behavioral engagement might not necessarily mean that there is emotional and cognitive learning occurring. Some students may appear to be engaged but are detached, while others who show no outward signs of engagement may be deeply curious or psychologically invested in their learning. Axelson and Flick (2011) aligned with Leamson (1999), who postulated that a student’s interest in a particular task does not necessarily imply that real new learning took place.

Appleton (2012) and Willms et al. (2009) developed a three-tiered framework in which the authors identified academic, social, and intellectual levels of student engagement. The authors defined the academic engagement level as the extent to which students are involved and interested in their academic activities. The social engagement level relates to the student’s sense of belonging while in school, and the intellectual engagement level involves the student’s ability to deal with complex problems and the creation of new knowledge (Willms et al., 2009).

Engagement is an important strategy that supports adjustment, retention in school, and achievement, particularly among vulnerable student populations, such as Latino students (Christenson, Reachly, & Wylie, 2012; Hudley, Daoud, Polanco, Wright-Castro, & Hershberg, 2003). Even in cases where high-quality learning exists, high levels of achievement are to be required for ample engagement on the part of the student. The authors emphasized the
importance of a combination of individual and interpersonal influences on engagement. Hudley et al. (2003) suggested that engagement involves two key components: behavior and effect. Behavioral engagement relates to the student’s commitment to the activities that are less likely to be punished and result in a lower level of absenteeism, while effective engagement involves the attitudes that the students have towards their primary motivation for learning. The authors investigated qualitative and quantitative indicators of student perceptions of teacher support, their expectations for the future, and their behavioral and effective engagement in schools.

Quaye and Harper (2014) found that the engagement of the students and their expectations are related in a specific manner. The authors concluded that the students’ perceptions of the relationships with their educators had a significant influence on their engagement, success, and overall expectations.

Skinner and Pitzer (2012) developed a three-level framework in which they explained student engagement and the outcomes at those levels. At the broadest level is institutional engagement, which focuses on activities in social institutions, such as church, school, and family. Results of this level of engagement are character development and positive social orientation. The second level focuses on engagement in school-related activities, such as involvement in clubs, sports, or other student organizations and activities as well as academic work in the classroom. The outcomes of this level of engagement are a sense of belonging in school and lower risks of dropout. The third level of engagement focuses on student involvement in a specific course, or a specific learning activity, the outcome being academic achievement and learning. Skinner and Pitzer’s framework of student engagement is useful for identifying the purpose and scope of various measures of engagement, from factors specific to a single learning activity to broader institutional concerns.
Engagement framework was useful to this study because it addressed factors that are essential to learning in the classroom. The researcher sought to understand the existing process of student engagement in a university in Nigeria while also exploring students’ perceptions of the use of mobile technology for such purposes. The researcher also sought to learn the extent to which students’ use of mobile technology influences student engagement and learning.

The twenty-first-century society makes demands on individuals, due to its fast-changing culture and developments. Technology—including computers, mobile phones, and social networks—were perceived as recreational in the past but now have such a strong impact on the culture that the absence of them could make life miserable (Arkorful & Abaidoo, 2015).

Moreover, society expects its members to match the pace at which the culture is developing (Stromquist & Monkman, 2014). Based on that expectation, the engagement model is an appropriate approach to involving students in the kind of learning that considers these developments.

Educational institutions are expected to produce graduates with interpersonal, problem-solving, and teamwork skills. This necessitates the development of appropriate teaching approaches that would prepare the students for the demands of an ever-changing culture (McLaren, 2018). Some suggested strategies include self-directed learning, collaborative learning, experiential-based learning, and active learning. Teachers should not be limited by a specific teaching approach but should find a way to benefit from all the models. Since no single theory can cover all aspects of teaching and learning, a combination of all existing theories is an appropriate approach.
Chapter 2: Literature Review

Technology has transformed our society and changed many aspects of everyday life over the past twenty-five years. In universities around the world, technology has become an essential tool for the twenty-first-century student. The digital age has caused an increase in access to information, as well as an increase in facilitating the interaction between people. In a study on the state of global information technology, Bilbao-Osorio, Dutta, and Lanvin (2014) reported that the number of mobile subscribers reached 6.9 billion worldwide in the year 2014. The authors indicated that the use of mobile technology in the form of tablets, phones and laptops has been currently widespread in most of the universities and colleges.

Digital natives have spent much of their lives surrounded by and engrossed in technology (Henderson, Selwyn, & Aston, 2017). As a result, technology has shaped the way that students think and learn. Digital culture influences reasoning and the understanding of concepts. Indeed, students insist on using technology in all aspects of their learning experience and, therefore, prefer to multitask and have non-linear access to information quickly. They rely on technology to acquire information and perform social and business interactions (Henderson et al., 2017; McCarthy, 2010). This chapter presents a review of the scholarly literature on the issue of student engagement and students’ use of mobile technology in classrooms of various institutions of learning. This chapter further examines the literature on the role of technology in learning, the influence of mobile technology on academic performance, and the pedagogical benefits of mobile devices.

**Role of Technology in Learning**

To shed light on the role of technology in learning, this section reviews the works of various researchers who explore how technology aids the learning process. Technology plays an
important role in learning, and the trend of mobile device use has redefined the learning process and presented numerous opportunities for effective student engagement.

Technology can be used as a tool to improve student engagement in educational environments (Bannon, Martin, & Nunes-Bufford, 2012). Researchers have indicated that student engagement is the aspect of learning that focuses on the activities in which students are involved during their studies and which promote learning and result in their academic achievement (Astin, 1984; Covington, 2017; Kuh, 2009; Sidelinger, Frisby & Heisler, 2016). Many researchers of student engagement have suggested that the main objective of education is for students to construct their own knowledge (Covington, 2017; Kuh, 2009; Quaye & Harper, 2014; Sidelinger et al., 2016). In line with this viewpoint about learning and engagement, a research study which explores the influence of mobile devices on learning, engagement, and performance shall be relevant and valuable.

Chinese classrooms have suffered from a lack of interactivity, both online and in face-to-face environments (Wang, Shen, Novak, & Pan, 2009). To illustrate this lack in Chinese classrooms, Wang et al. portrayed online classes in which the tutors presented recorded information to the students. The researchers sought to find technological means to improve interactivity in large classroom settings. Consequently, they developed a mobile device learning system that could deliver vital information to the students in real time. The researchers observed that the model enabled the students to customize the ways through which they wanted to receive information, and they were allowed to communicate through text messages as well as carry out instant polls. The mobile device learning system enabled the students to ask questions and make suggestions concerning the learning process in real time. The instructors were also able to address the students’ concerns immediately. The study supported the view that embracing
mobile technology in the classroom can improve interactivity and student engagement. The students in these classes improved their engagement and changed the classroom from a passive to an active environment (Wang et al., 2009).

In related studies on engagement, Greenhow and Lewin (2016) and Hung and Yuen (2010) found that the inclusion of social media in the classroom helped to create a sense of community. This was important because it enhanced student engagement and contributed to students’ overall success. The authors identified common activities showing how students were engaged. This included visiting social media sites to discover what other students were doing, thereby creating closer ties with the instructor and other students, interacting in a setting outside of the classroom, and helping students to feel more connected to their classmates. Several students stated that when they had difficulties with course assignments, they would use social media to turn to their peers for support (Hung & Yuen, 2010). A particular student discovered that her peers responded quickly and constructively, with feedback on questions regarding assignments. Another study concluded that social media use in the classroom strengthened the students’ connectedness to each other, thereby creating a classroom community that increased engagement and facilitated learning (Greenhow & Lewin, 2016; Hung & Yuen, 2010).

Digital technology used in higher learning institutions had an impact on learning and academic achievement (Higgins, Xiso, & Katsipataki, 2012). The authors pointed out that it is notable that technology has positive benefits for learning. Another study on the impact of technology on U.K. institutions revealed that there is a positive association between higher information and communication technology (ICT) levels and students’ school achievement at all key stages in all disciplines (Greenhow & Lewin, 2016). Higgins et al. (2012) argued that the connection that they found between learning and technology was consistent with previous studies
of technology and learning. Those studies indicated an association between technology and learning; on a general basis, students with a higher use of ICT have a slightly higher performance compared to their colleagues who do not embrace technology in their study methods (Higgins et al., 2012). Neier and Zayer (2015) suggested that the adoption of technology and its use in learning helped in the removal of some questionable practices, such as issues of autonomy and control, the psychological barriers, and institutional complexities associated with teaching. Technology enhances student engagement and proves to be highly effective as a short but focused intervention for improving learning (Higgins et al., 2012). However, Higgins et al. stressed that in any case, technology should not replace normal learning but rather should act as a supplement, which implies that students should be cautious in the way that they use technology for learning.

Technology often increases in collaboration, engagement, and learning in higher education (BrckaLorenz, Haeger, Nailos, & Rabourn, 2013). Today’s generation of students has grown up with technology and adopted it from a very early age (Neier & Zayer, 2015). Technology has essentially altered the current generation’s way of reading, learning, information processing, and problem-solving; it is, therefore, important to allow students to make use of what they are accustomed to and what they have considered as the best way to enhance their engagement on campus while collaborating with their peers, acquiring new information, and enhancing their learning (Howe & Nadler, 2010). BrckaLorenz et al. (2013) suggested that technology can work effectively and appropriately in higher education for the improvement and enhancement of learning if the manner in which students currently use technology can be investigated alongside its impact on the students’ educational outcomes.
A survey by Jones, Johnson-Yale, Millermaier, and Perez (2009), based on the responses given by 7,421 respondents from 40 universities and colleges used for the study on the familiarity and use of the Internet, 85% of the students reported that their college experience and learning were positively enhanced because of the Internet. The research also identified some of the ways in which technology is being integrated into those institutions to enhance learning. One of the ways is the use of course management software that increases the efficiency of course material distribution and offers an opportunity for more online interaction between students and lecturers (BrckaLorenz et al., 2013). The increase of student interaction with technology beyond just web pages and email has increased the opportunities for university students to engage with their course material, fellow students, faculty, and college administrators (Howe & Nadler, 2010). In a study by Morrone, Gosney, and Engel (2012) that focused on how technology can enhance the effectiveness of learning, it was found that devices such as iPads increased students’ engagement through the provision of creative and innovative learning environments.

The current trend of utilizing mobile devices for access to and dissemination of information in higher education not only redefined the manner in which teaching and learning takes place but also presented exciting opportunities for effective student engagement. The sense of community that is being created does not make the instructors the primary source of information for the students who are also opportuned to explore vast formal and informal sources of information. However, the opportunities presented by mobile devices are not without risks. There is a need for such risks to be recognized and overcome to avoid the challenge of students’ inability to properly engage with technology, a challenge that Hung and Yuen (2010) classified as “lack of interactivity” (p. 707).

Influence of Mobile Technology on Academic Performance
This section describes the varying perspectives of researchers regarding the influence of mobile technology on student academic performance. It is argued that mobile devices do have a significant influence on academic performance by causing distractions (Jumoke et al. 2015; Radesky, Schumacher & Zuckerman, 2015). However, it was also found in some studies that mobile technology does not have any influence on the student’s academic performance (Ezemenaka, 2013; Heflin, Shewmaker & Nguyen, 2017; Rabiu, Muhammed, Umaru, & Ahmed, 2016).

Student performance was significantly correlated with cell phone use during class time in a study by Duncan, Hoekstra, & Wilcox (2012). Duncan et al. found an average negative grade difference of $0.36 \pm 0.08$ (on a four-point scale) for students who reported regular cell phone use in class. Data from the same study derived from observations, interviews, and the survey revealed that students accessed their phones at a rate of seven times per class period, although the students themselves under-reported the number as three times (Duncan et al., 2012). An interesting finding from another study highlighted the impact of this behavior. Tindell and Bohlander (2012) found that other students were distracted by students’ texting in class. Students may claim they are only hurting themselves when texting, but studies show that others are also affected (Ezemenaka 2013; McCoy, 2016; Tindell & Bohlander, 2012).

McCoy (2016) conducted a study to describe students’ behavior and perceptions regarding the classroom use of digital devices for non-class purposes. The respondents included 777 students at six U.S. universities. The average respondent used a digital device for non-class purposes 10.93 times during a typical school day for activities including texting, social networking, and emailing. Most respondents did so to fight boredom, entertain themselves, and stay connected to the outside world. More than 80% of the respondents indicated that such
behavior caused them to pay less attention in the classroom and thereby miss instructions. Most respondents indicated that they favored policies governing digital device distractions in the classroom.

Ezemenaka (2013) conducted a case study on the use and perceived effects of Internet-enabled phones on the educational performance of undergraduate students at the University of Ibadan in Nigeria. The author collected the personal opinions of 200 students via structured questionnaires to obtain the data. In addition, Ezemenaka conducted 15 in-depth interviews to obtain grounded knowledge opinions of the students, along with the data gathered during the study. That author found that Internet-enabled phone use did not affect the academic performance of the students but that distractions caused by phone use were confirmed (Ezemenaka, 2013). Mobile technology is a potential source of distraction in the classroom because using social media networks and other mobile applications during lectures distracted students from learning (Lau, 2003).

Ojewola and Akinduyo (2016) investigated the distractive effects of mobile phone use among Adekunle Ajasin University undergraduate students in Nigeria. The authors employed a descriptive survey design and made use of questionnaires to elicit a response from the respondents. The sample population consisted of 500 students selected from all five of the university’s departments. The data collected were analyzed through a t-test and analysis of variance. All hypotheses were tested at a 0.05 level of significance. The results showed that there was distractive impact of mobile phone use among the undergraduate students, but there were no significant differences based on gender, age, or department.

While Ojewola and Akinduyo (2016) focused on the distractive impact of mobile phone use, Amali, Onche, Bello, and Hassan (2012) focused on how students use mobile phones during
lectures at the University of Ilorin. The goals of their study were to determine how the use of mobile phones affects collaboration in the classroom, as well as its subsequent consequences for the teaching and learning processes. A total of 378 students were randomly selected from two departments using a researcher-drawn questionnaire. The data were analyzed using the arithmetic mean rating and chi-square. Those authors found that students at the university used mobile phones for various purposes in class and that there was no significant difference in mobile phone use between males and females.

In another study of cell phone use by college students, Wargo, Taylor, Alderman, Wargo, Bradley, and Addiss (2012) found that their study participants checked their phones 34 times a day. The authors proposed that though people might check their phones out of impulse or compulsion, it can also be a way to avoid relating with people. They also found out that some people experienced withdrawal symptoms when they were without their smartphones. These withdrawal symptoms were normally connected with substance abuse and include anxiety, insomnia, and depression. All of these symptoms could cause academic challenges. Some students found it hard to believe that they were addicted to their phones and were unaware of the toll that these addictions take on them. This gave more credence to the amount of time spent on mobile phones than on academics.

In a study conducted in India, Sundari (2015) found that a relationship existed between mobile device use and students’ learning skills. Students who used technology performed better than those students who did not use technology. Mobile technology has been the most popular communication channel for individuals in tertiary institutions. However, studies have shown that extensive use of technology such as social networking, chatting, and texting on students’ mobile phones during class time contributed to lower grades and overall poor performance (Sundari,
2015). Sundari (2015) stated that various researchers have shown that a significant number of students had the habit of using their phones during classes and while studying. Sundari observed that this habit extended even to the library, thereby leading to numerous distractions to the users and others.

On the other hand, Sundari (2015) acknowledged that students’ use of technology enhanced their learning because it helped them to exchange important information with their classmates regarding their studies. Thus, while some researchers indicated that technology can negatively impact students’ performance when used in class, other studies have shown that technology can have a positive impact on student performance (Jumoke et al. 2015; Radesky, Schumacher & Zuckerman, 2015; Tindell & Bohlander, 2012). Sundari (2015) found that fewer than half of the respondents attributed their improved performance to the use of technology and that 47% of the students who participated in the survey confirmed that technology improved their contact with classmates. More than 35% of the students agreed that they kept their mobile phones on while in class and that the ringtones caused numerous disturbances (Sundari, 2015). The study also revealed that a significant number of students agreed that writing and sending SMS messages during class time was a waste of their time.

A study conducted in Nigeria to analyze the impact of mobile phones on student academic performance in tertiary institutions concluded that students were negatively influenced by the use of mobile phones in class, as their attention shifted to music and chatting, among other activities, while neglecting the main purpose of attending classes (Jumoke et al., 2015). That study revealed that students’ use of mobile phones could not be controlled. Hence, the challenge remains a major cause of poor student performance. Jumoke et al. (2015) stressed that various researchers have demonstrated that the use of technology, such as mobile phones, in classrooms
is problematic. As Jumoke et al. (2015) argued, mobile phones make room for the conflicting position of students’ need to keep in touch with relatives and friends and distractions and disruptions to students’ academic work. However, mobile devices are key to the promotion of collaborative learning, and they enable various learning types through a wireless Internet connection (Jumoke et al., 2015).

Rabiu et al. (2016) researched the impact of mobile phone use on academic performance. Based on the results they obtained, the researchers demonstrated that the use of mobile phones had a significant effect on students’ academic performance by acting as a source of distractions. On the contrary, a significant number of survey respondents stated that mobile phone use does not have a notable effect on their performance (Rabiu et al., 2016). Rabiu et al. (2016) stated that a large number of studies have shown that the use of mobile technology in class negatively affects students’ academic performance. The idea that the use of mobile technology in class causes distractions and could result in a lower GPA was also supported in a study by Jackson et al. (2008). That study revealed that students who use their mobile technology in most of their classes had a higher chance of having a lower GPA.

Even though there is no direct correlation between mobile technology and the academic performance of students, its influence on student engagement suggests a linkage. Mobile technology provides a platform for interaction between students and collaboration among students. However, it can also be a source of numerous distractions for students in the classroom, which ultimately affect their academic performance by impeding the level of engagement achieved during learning.

**Pedagogical Benefits of Mobile Devices**
This section reviews literature on how mobile devices can benefit the education sector. It shows some of the pedagogical benefits of using mobile technology in the classroom for augmenting class projects, studying for tests, getting tutoring assistance from instructors, increasing learner-content interaction, and promoting classroom accountability.

Al-Emran, Elsherif and Shaalan (2016) suggested it was time to think of cell phones as computers. The description of the word cell phones seemed vague. Some researchers used the term cell phones while others used mobile phones or smartphones. Ally and Prieto-Blázquez (2014) identified cell phones as only one of four types of mobile devices: cell phones, smartphones, portable media players, and tablet computers.

Cell phones can be great learning tools in similar ways as other computing and communication devices (Vázquez-Cano, 2014). There are many valid uses for cell phones, such as augmenting class projects, studying for tests and getting tutoring assistance from instructors (Bull & McCormick, 2012; Docksai, 2009; Tao & Yeh, 2013). In a study of college classrooms with more than 100 students, Scornavacca, Huff and Marshall (2009) found that using cell phones to augment teaching helped increase the quality and quantity of student feedback. Other researchers who used Short Message Service (SMS) and Multi-Media Service (MMS) on polling and feedback for students showed increased interactivity both in and outside the classroom (Lindquist, Denning, Kelly, Malani, Grisworld, & Simon, 2007; Markett, Sánchez, Weber, & Tangney, 2006). Researchers have found that SMS and MMS encourage uncomfortable students to participate, increase learner-content interaction, promote classroom accountability, and encourage student interaction (Markett et al., 2006; Patry, 2009).

Students use their mobile devices to access other media such as the Internet, Facebook, Twitter, YouTube, and other information communication technology. Bannon et al. (2012)
reported the findings of a national survey (N=1,998) and suggested that the use of social media by college students ages 18 to 34 was increasing. Similarly, Duggan and Brenner (2013) reported that 67% of Internet users between the ages of 18 and 29 frequently used social networking sites. The most popular social networking sites included Facebook, followed by Twitter, Pinterest, Instagram, and Tumblr. Participants in the Duggan and Bremer study (2013) mentioned Facebook and Twitter, in particular, as effective platforms that the teaching staff should embrace.

Besides the pedagogical benefits of the use of mobile devices in the classroom, student performance was also affected (Duncan et al., 2012; Ezemenaka, 2013). Gikas and Grant (2013) investigated the process of incorporating mobile technologies, such as tablets and smartphones, into teaching and learning. The authors sampled students from three universities in the United States. In these institutions, the faculty members often incorporated mobile technologies into their courses. Data were collected through group interviews; findings included that the use of mobile technologies in learning enabled students to interact, collaborate, and engage in activities such as content creation. Gikas and Grant (2013) found that the use of such technologies in institutions of learning was accompanied by positive outcomes that would make learning a meaningful and fruitful experience for the students.

Blankenship (2011) illustrated the benefits of using social media sites in enhancing learning in the classroom. Students were more engaged, which ensured that they were persistent in pursuing their college careers; social media allowed students to assume direct control of their education and take responsibility for their actions, and incorporating social media in the classroom inspired students and their instructors to become more creative. Blankenship (2011)
argued that social media is an asset in the classroom because it allows those students who feel uneasy talking in class to communicate with the instructor and their peers.

Another study by George and Dellasega (2011) on the use of social media networking in learning provided results that were in agreement with Blankenship’s (2011) study. In that study, the researchers used Twitter, YouTube, Flickr, various blogs, and Skype to encourage students to engage in learning. At the end of the study, all of the students were required to provide an assessment of the course proceedings. The students reported that they preferred the approach because it “augmented learning and collaboration” (George & Dellasega, 2011, p. 433). However, other students reported challenges such as a lack of facility with technology, demands on time, and concerns regarding the privacy of the process. George and Dellasega (2011) concluded that the inclusion of social media in educational activities was important because it provided several advantages over traditional methods of instruction. The advantages included communication in real time even outside the classroom, better connection between teachers and students, and room for more creativity.

The findings of a study by Batista and Barcelos (2014) indicated that mobile devices are capable of contributing to increased access to digital educational content. Due to the portability of these devices, they can support learning both inside educational institutions’ physical space and beyond. Buck, McInnis, and Randolph (2013) mentioned that using mobile devices in the teaching process can enhance different learning styles such as video learning and audio learning styles. Based on their research findings, Buck et al. (2013) concluded that mobile devices could be used to make learning more collaborative, accessible, and relevant. Ndafenongo (2011) also investigated the pedagogical benefits of mobile devices and focused on the use of these devices in the teaching of mathematics. In that study, the researcher used video clips on the Pythagorean
Theorem. The videos were used in class and sent to students’ phones to support their understanding of the topic. The results of the study showed that the video clips sent to students’ mobile phones played a vital role in improving their concentration, participation, and content development, as well as stimulating peer interaction and collaboration and promoting student autonomy.

Rikala and Kankaanranta (2012) noted that mobile device use is increasing across every educational sector in both the developed and developing worlds. The use of mobile devices in education has grown in terms of its importance and its visibility. However, Koole (2009) argued that mobile devices do not guarantee learning and teaching effectiveness by themselves. Teaching methods and the teachers’ views on learning play an important role in educational technology use.

Augmented reality is the use of technology to enhance one’s current perception of reality. It is considered to be one of the major characteristics of mobile learning, as the applications involved the use of mobile devices’ built-in camera, GPS, and compass features for information gathering in relation to the students’ surroundings before projecting additional information to the student. Therefore, in an educational context, augmented realities can be used to facilitate knowledge and skills transfer while increasing student engagement in real-life situations (Fritschi & Wolf, 2012).

The benefits of mobile devices in education vary greatly with respect to the situation, devices, and context. Keane, Lang, and Pilgrim (2012) categorized the pedagogical benefits of mobile devices into seven types. One of the benefits is that mobile devices serve as a multimedia access tools, thus helping to obtain access to multimedia resources. Additionally, mobile
technology plays the role of a communication tool, and it helps to capture media and data and can also be used in content co-creation.

Mobile devices serve as a representational tool whereby they demonstrate students’ ideas, thinking, knowledge, and experiences. Students can benefit from mobile devices by using the devices as analytical tools, hence manipulating variables and data. Mobile devices can also be used as assessment tools in the completion of examinations, questions, and quizzes.

Another category of pedagogical benefits of mobile devices is their use as managing tools (Keane et al. 2012). As such, students can manage their personal information such as address book, calendar attendance rates, and task lists. Other benefits were highlighted by Suhr, Hernandez, Grimes, & Warschauer (2010), who found that mobile devices can help students in the class to conduct research, write with a word processor, create presentations, and complete quizzes or tests. However, Keane et al. (2012) concluded that the presence of mobile devices is not as important as having a dedicated curriculum program. Nonetheless, the researchers acknowledged that it is evident that mobile devices act as a source of motivation and engagement (Keane et al., 2012).

Despite the benefits of the use of mobile devices in the classroom as described by many researchers, some studies have identified other influences on academic performance. Researchers have highlighted the need to consider the role played by academic performance influencers such as nutrition, study habits, parental involvement, teachers’ adopted classroom practices, time spent on educational tasks (Henry, Bryan, & Zalaquett, 2017; Kristsonis & Nickerson, 2006; Wenlinksy, 2001). The use of mobile technologies for learning enables students to study, interact, collaborate, and engage in various educational activities (Keane et al., 2012; Suhr et al., 2010; Tao, & Yeh, 2013). Scholars have further advised on the need to
recognize other factors that may also affect student performance. While this may present a challenge in the review of the pedagogical benefits of mobile devices, the proper consideration of such factors in every research process can also facilitate the holistic analysis of the role that mobile technology plays (Koole, 2009; Kristonis & Nickerson, 2006; Wenlinksy, 2001).

**Summary**

The reviews of literature in this chapter revealed that the use of mobile devices in the classroom environment remains a topic of debate. Some instructors and students have expressed the belief that it could increase student engagement and academic performance (Bannon et al., 2012; Wang et al., 2009). Nevertheless, a large number of participants in the studies reviewed reported the perception that the use of mobile phones in the classroom results in students being less engaged and that their academic performance might not be affected (Duncan et al., 2012; Ezemenaka, 2013). As a result, further research on the topic is needed to address the ways that mobile devices can be effectively utilized in the classroom. Such research can help to provide relevant information regarding the creative ways in which teachers and students can use mobile devices to enhance the learning environment and student engagement.

**Conclusion**

Guided by various scholars’ opinions on the impact of mobile technology use on the process of academic instruction, as well as students’ learning, engagement, and academic performance, this researcher argues that mobile devices can be highly beneficial to learning. The researcher recognizes that the current trend of utilizing mobile devices for the facilitation of information access and dissemination in higher education has not only redefined the manner in which learning takes place but has also presented exciting opportunities for effective student
engagement. Mobile phone devices are now an essential part of daily life and a valuable means of information dissemination around the world, especially in most developing countries.

The effects of the use of mobile devices in the classroom by students cannot be denied. Research suggests the need for colleges to pay attention to the influence of mobile technology on student engagement (Ang, 2015). Such influence includes both the educational opportunities and the distractions which can be detrimental to students’ academic performance.

Nonetheless, the challenges that the various forms of technological innovations may present to students’ academic performance remains a topic viewed as highly worrisome due to the significant knowledge gap on the subject. With this in mind, further exploration into understanding students’ uses of mobile devices in the classroom and the influence on engagement and learning was needed. Thus, this researcher sought to investigate and assess how the use of mobile devices may affect the academic performance of students by focusing on its impact on student learning and engagement in the classroom.
Chapter 3: Methodology

The methodology selected for this study was descriptive survey research; it involved surveying students in the education department at a university in West Africa. The goal was to obtain completed surveys from the students to understand how the use of mobile devices in the classroom influences their engagement and learning in the classroom.

Descriptive studies are generally used to collect data that would reveal relationships and describe characteristics of the population being studied. The research often relies on instruments such as surveys and interviews or the use of observations to collect data. Best and Kahn, (2016) suggested that descriptive studies can answer questions such as “what is” or “what was.” Information is collected without changing or manipulating the environment. Sometimes these studies are referred to as “correlational” or “observational” studies, and the data gathered can be quantitative or qualitative, or both. The Office of Human Research Protections (OHRP, 2016) defined a descriptive study as “Any study that is not truly experimental.” As a result, descriptive research often cannot be replicated, and findings can be open to interpretation.

Purpose

The purpose of this study was to explore and assess how mobile devices influence students’ engagement and learning in the classroom. The main research question was: How does the use of mobile technology (smartphones, tablets, and laptops) by college students in a classroom at a university in West Africa affect their engagement and learning? Two hypothesis were stated:

H0: The use of mobile devices (smartphones, tablets, and laptops) by college students in a classroom in Nigeria does not affect their engagement and learning.
H1: The use of mobile devices (smartphones, tablets, and laptops) by college students in a classroom in Nigeria does affect their engagement and learning.

To adequately address this research problem, the following research sub-question was formulated: What do students primarily use their mobile technology for during class?

**Research Design**

The researcher utilized the descriptive method of research, which aims to cast light on current problems or issues through a data collection process that enables the researcher to describe the situation more completely after descriptive data analysis than before applying the method (Lambert & Lambert, 2012). Descriptive research describes a certain present condition of a situation. The method was appropriate for this study because it enabled the researcher to describe how mobile devices influence students’ engagement and learning in the classroom.

Surveys are used to collect biographical data from individuals about themselves, their households, or about larger social issues. Sample surveys are a valuable tool for collecting and analyzing information from selected individuals. Surveys are widely accepted as a key tool for conducting and applying basic social science research (Nardi, 2018). In this study, the researcher administered a survey to a selected sample of students from various departments in the Faculty of Education at a West African university.

The questionnaire was relevant to this study for many reasons. Questionnaires lend themselves to group administration and ensure confidentiality (Sitnikova, Dijkstra-Kersten, Mokkink, Terluin, & Van Der Wouden, 2017). Surveys are quite efficient at providing information in a short time frame at a minimal cost (Huang, Liu & Bowling, 2015). For these reasons, the researcher chose a descriptive research methodology utilizing a survey questionnaire instrument to investigate the research questions and hypotheses posed in this study.
Among the different approaches of data collection for research purposes, many researchers favor the survey method due to its various strengths and benefits (Sincero, 2012). The researcher carefully considered various pros and cons when choosing the descriptive research methodology and while designing the survey instrument for this study. The advantages and disadvantages are listed below.

**High Representativeness**

Surveys provide a general capability in representing a large population. Due to the usual large number of participants, the data being gathered enables a description of the relevant characteristics of the general population involved in the study.

**Low Cost**

In the process of conducting surveys, cost can be a barrier to researchers. The cost of the production and distribution of survey questionnaires is negligible when compared to the cost of other data gathering methods, such as focus groups and personal interviews.

**Convenient Data Gathering**

Surveys can be administered to the participants in a variety of ways. They can be distributed by postal mail, e-mail, and fax, or they can be administered through the Internet. In recent years, online survey methods have been the most popular way of gathering data from participants. Aside from the convenience, researchers are able to obtain data from people around the globe.

**Good Statistical Significance**

Due to the high representation, it is often easier to find statistically-significant results, compared to other data gathering methods. Multiple variables can also be analyzed efficiently using surveys.
**Little or No Observer Subjectivity**

Surveys are ideal for scientific research studies because they provide all the participants with the same questionnaires, thereby ensuring that the data obtained are highly reliable and biases by the researcher are minimized in the study.

**Precise Results**

Generally, the questions in the survey undergo scrutiny and standardization; They provide uniform definitions for all of the survey participants and as a result, permit greater precision in measuring the data gathered.

Despite all of the advantages stated above, there are challenges that must be considered when using the survey method (Sincero, 2012). The challenges are listed below.

**Inflexible Design**

The survey instrument used by the researcher and the method of administration cannot be changed during the data gathering process. Although this rigidity can be viewed as a weakness of the survey method, it can, however, be seen as a strength because of the precision and fairness exercised in the study.

**Not Ideal for Controversial Issues**

The participants may not precisely answer questions that bear controversies because of the probable difficulty in relating to the topic. Controversies may not be accurately reported when compared to different data collecting methods such as face-to-face interviews and focus groups.

**Possible Inappropriateness of Questions**

Questions in surveys are always homogeneous before they are administered to the participants. This means that the researcher needs to generate questions that are general enough
to accommodate the general population, even though the questions may not be suitable for all the participants.

As indicated above, the advantages of using the survey method outweigh the disadvantages associated with it. As such, the method is reliable and can produce accurate results.

**Population and Sampling**

The population for this study consisted of all students enrolled in a federal government university located in West Africa. The university has approximately 45,000 students and has one of the largest student populations of any university in Nigeria (UniLag, 2010). The university is among the first generation of universities in Nigeria and is accredited by the National Universities Commission.

The researcher used convenience sampling technique to select participants for the study. Convenience sampling is a method involving data collection from members of the population who can be recruited for the study (Robinson, 2014). The method relies on the convenience of the respondents to participate in the study. This is a type of sampling in which the first available primary data source is used for the study without any additional requirements. Researchers prefer convenience sampling not only because of its ease of use but also because of its additional advantages. Convenience sampling can be used to document that a certain quality of a phenomenon or substance occurs within a particular sample. Some of the advantages of using convenience sampling as a data collection technique are:

i. Sampling simplicity and the ease of carrying out research;

ii. Helpful for generation of hypotheses and pilot studies;

iii. Data collection can be done in a short duration; and
iv. This sampling helps to collect useful data conveniently as the data to be collected from the participants are within easy reach of the researcher (Brewis, 2014).

Despite the numerous benefits stated above, there are some disadvantages associated with the convenience sampling technique: They are as follows:

i. The method is highly vulnerable to selection biases and influences, which in most cases is beyond the researcher’s control.

ii. The sampling error level of this method is relatively high (Johnston, Trummal, Lohmus, & Ravalepik, 2009).

Instrument

By drawing on various theorists, the survey instrument was developed and tested on 20 students, after which it was found that changes needed to be made to some questions for clarity and ease of coding (see Appendix A). During the development of the instrument, the following process was undertaken:

i. Literature search was conducted on previously-used validated questionnaires that could be administered in a similar setting and that captured variables of interest.

ii. Familiar words, uncomplicated sentence structures, and the use of the minimum number of words were possible. The reading level of the instrument was checked to ensure that it was appropriate for the study’s audience. With the use of Microsoft Word, the instrument’s grammar, spelling, and readability statistics were checked.

iii. One concept was asked at a time while avoiding double-barreled questions.
iv. Response options were checked to ensure it aligns with the item stem. For
instance, when asking about the respondent’s comfort level, the response options
were made to include the word “comfortable,” not words like “sometimes.”

v. Response categories were reviewed to ensure that they were exhaustive and
mutually exclusive.

The research instrument was entitled, “Mobile Phone Usage in the Classroom.” It is a
printed self-report form designed to draw information from the written responses of the subjects.
Although evidence gathered through a questionnaire is similar to the evidence collected through
interviews, they tend to have less depth (Rea & Parker, 2014). The questionnaire consisted of
twenty items with two sections (see Appendix A). Section A dealt with the collection of the
respondents’ demographic information. Section B consisted of items related to mobile phone use
in the classroom during lectures. A five-point Likert-type response format for the questions was
used. Questionnaires were the chosen instrument based on the following:

1. They ensure a high response rate because the questionnaires were distributed to
   respondents to complete and were personally collected by the researcher.

2. They offered the opportunity for anonymity because subjects’ names were not
   required on the questionnaires.

It is important to note that despite the advantages listed above, questionnaires have
limitations. For example, there is the issue of validity and accuracy (Burns & Grove, 1993; Rea,
& Parker, 2014). The subjects might answer the question with what they think the researcher
wants to hear and not reflect their true opinions. It is also possible that valuable information may
be lost as answers are usually brief.

Validity and Reliability
Various methods were used to ensure the validity and reliability of the instrument. The methods included translational validity (content validity and face validity). These are explained below:

**Content validity.** Content validity was examined to ascertain whether the content of the questionnaire was relevant and appropriate for the study. To examine the content validity, the researcher defined the theoretical framework for this study by undertaking a thorough literature review. Once the frameworks were established, three purposely-chosen experts identified in the university in the areas of technology, measurement, and evaluation were asked to review the draft of 20 items to ensure consistency with the purpose of the study. Each reviewer independently rated the relevance of each item on the questionnaire for this study using a 4-point Likert scale (1=not relevant, 2=somewhat relevant, 3=relevant, 4=very relevant). **Face validity.** Face validity was defined as the extent to which a procedure appears effective in relation to the concept it measures (Rea, & Parker, 2014). Face validity is done to ensure that the instrument is appropriate for the purpose of the study and content area. Although this is the easiest validation process to undertake, it is in actual sense the weakest form of validity. It, however, evaluates the appearance of the questionnaire regarding feasibility, readability, consistency of style, formatting, and the lucidity of the language used (Rea, & Parker, 2014). Thus, it is a form of usability rather than reliability. To determine the face validity of the questionnaire, a pilot study was conducted. The researcher focused on participants’ responses based on:

1. The clarity of the wording of the items,
2. The likelihood that the target audience would be able to answer the questions, and
3. The layout and style of the questionnaire.

In general, the validation procedure for the instrument used in this study was as follows::
i. Clearly identified the object of measurement.

ii. Defined the object’s relevant elements. At this stage, the literature was reviewed, and experts were consulted.

iii. Developed measures such as survey questions for the relevant elements defined in step two.

iv. Reviewed and pilot tested the survey.

The Pilot Study

The pilot study refers to mini versions of a full-scale study as well as the specific pre-testing of the research instrument for this study. The researcher piloted the questionnaire with a small group of volunteers who were as similar to the target population as possible.

The researcher distributed the questionnaire to 20 randomly-selected students who were undergoing a course in Introduction to Education Technology at the Department of Education at the University of Lagos. There were fifty students in this class. Two researchers went to the class after obtaining the lecturer’s approval and administered the questionnaires to the 20 randomly selected students. The names of the participants were not recorded, to maintain confidentiality. The pilot study revealed likely problems that could affect the research process.

Data Collection

In this study, the researcher collected data through self-administered questionnaires that were distributed personally to the subjects. The researcher visited six classrooms while lectures were in progress. The students were informed of the purpose of the study prior to the distribution of the questionnaires and were encouraged to participate voluntarily. This was to ensure that the students did not feel pressurized to complete the survey. The questionnaires were subsequently distributed to every student who was willing to take the survey.
The reason for using convenience sampling was that it allowed for the collection of useful data conveniently. It also offered the advantage of speed in data collection, as seen in the ease of distribution and collection of questionnaires at the end of classes. Thus, sampling saved time while being representative of the larger population. The participants were given clear instructions on how to complete the questionnaire. The time required for the completion of the survey was approximately 15 minutes.

**Data Analysis**

Data analysis is the process of breaking up the whole study into its constituent parts, grouped according to the research questions, which were based on the statement of the problem. This process brought focus on the essential features of the study.

The data analysis consisted of investigating the surveys for correctness and completeness, coding and keying data into a database in SPSS, and performing an analysis of descriptive responses to all of Section One (Items 1-8) and Section Two (Items 9-20) using frequency distributions and descriptive statistics. The coding consisted of an analytical process in which data, in quantitative form (such as questionnaire results), were categorized to facilitate analysis. It was expected that the number of incomplete surveys would be minimal because a clear and proper explanation was provided to the respondents before engaging in the exercise.

Statistical treatment usually involves using the Likert scale to interpret items in the questionnaire. A Likert scale is a psychometric scale frequently involved in research employing questionnaires (Rea & Parker, 2014). Self-reporting is the most widely used method to scaling responses in survey research. The range and interpretation of the five-point scale are shown in Table 1 below.
The weighted mean was used to measure the general response of the survey samples, whether subjects agreed with a given statement or not (Rea, & Parker, 2014). The survey results were analyzed with the use of a statistical approach, Statistical Package for the Social Sciences (SPSS). Frequency tables and descriptive statistics were constructed to display the results of each of the research questions, and chi-square was used to test the hypothesis.

Table 1

*The Five-Point Likert Scale*

<table>
<thead>
<tr>
<th>Scale</th>
<th>Range</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>4.01 – 5.00</td>
<td>Strongly Agree</td>
</tr>
<tr>
<td>4</td>
<td>3.01 – 4.00</td>
<td>Agree</td>
</tr>
<tr>
<td>3</td>
<td>2.01 – 3.00</td>
<td>Uncertain</td>
</tr>
<tr>
<td>2</td>
<td>1.01 – 2.00</td>
<td>Disagree</td>
</tr>
<tr>
<td>1</td>
<td>0.01 – 1.00</td>
<td>Strongly Disagree</td>
</tr>
</tbody>
</table>

Validity of the Study

The validity of the research is a critical concept that many researchers overlook. Many scientific studies are unreliable, and, as such, it is important to be able to determine which studies are conclusive and dependable (Leung, 2015). Whenever possible, reliable studies use random samples, avoid biases, use appropriate sample sizes, and are conducted by researchers who are not swayed by funding or the desire to seek certain results (Leung, 2015). For any inference or conclusion, there are always possible threats to validity and reasons why the conclusion or inference might be wrong. Despite efforts to avoid biases, there are always opportunities for threats to validity to happen (Rea, & Parker, 2014). Ideally, the researcher
intends to reduce the most likely threats to validity, thereby leaving the most plausible conclusions reached in the study. This study’s setting was completely natural, with all variables present.

**Limitations**

The primary concern in conducting this study was the sampling, because the researcher requested that only a small portion of the university’s students participate in the survey. The sample size may not exactly represent all of the students at the university, which affects the generalization of the results. There may be underrepresentation or overrepresentation of certain groups within the sample.

In the course of this study, some students who participated in the study had unclear motives, while others were clear. There is always the possibility of encountering outliers, which are isolated extreme low or high values in the data set. Outliers can have a significant effect on the mean and standard deviation and skew the results.

These represent types of biases that are attached to this sampling technique, which further explains the study’s limitations. Due to the high self-selection possibility involved in non-probability sampling, the consequence of outliers can be problematic (Battaglia, 2008; Rea, & Parker, 2014).

**Protection of Human Subjects**

The fundamental principle of human subjects protection is that of informed consent. Subjects should not incur an increased risk of harm from their research involvement beyond the usual risks inherent in everyday life (NSF, 1976). Informed consent is handled differently in different countries. As part of the research requirements, the researcher obtained appropriate consent to conduct this study from Northeastern University’s Office of Human Subject Research
Protection/Institutional Review Board. In most universities in Nigeria, the procedure is to write a letter of permission to the administrator of the institution and obtain their permission before students can be invited to participate in any study. In compliance with this procedure, a letter was written to the Dean of the Faculty of Education at the university asking for permission to collect data from students for this study.

Summary

This chapter described the research methodology and the research design, including the population, sampling, instrument, methods of data collection, the type of data analysis, and the ethical considerations.

The researcher collected face-to-face data from students in the classroom using a survey. The data were expressed in a sensible form by using a descriptive method to analyze the data and to ensure its authenticity. In line with the principles of fairness and human dignity, the researcher also ensured that the participants were protected as human subjects in the study.

In recognition of the views already expressed by various scholars on the subject and the opinions of randomly-selected respondents who contributed towards this research analysis on how the use of mobile technology in classrooms impacts students’ learning and engagement in the Faculty of Education at a university in West Africa. In Nigeria, the term “faculty” is used to mean the education area or department of the university; (in other countries this might be the “Department of Education” or the “School of Education”). This research shall add to the body of knowledge on students’ perceptions of their use of mobile technology in the classroom.
Chapter 4: Reporting the Findings and Analysis

This chapter focuses on the presentation of findings and analysis of the study data. It is divided into three sections. Section one provides the demographic information of the participants. Section two describes the research findings in response to students’ comfort level using mobile technology in the classroom and the research findings in response to the research questions and hypothesis. The chapter concludes with a summary of the findings.

This research focused on how mobile devices influence students’ engagement and learning in the classroom, and the data were reviewed to answer the primary research question developed at the beginning of this study: How does the use of mobile technology (smartphones, tablets, and laptops) by college students in a classroom in Nigeria affect their engagement and learning? The research study tested the hypothesis H0: The use of mobile devices (smartphones, tablets, and laptops) by college students in a classroom in Nigeria does not affect their engagement and learning, and the hypothesis H1: The use of mobile devices (smartphones, tablets, and laptops) by college students in a classroom in Nigeria does affect their engagement and learning. A research sub-question was addressed: What do students primarily use their mobile technology for during class?

Participants in this study consisted of 700 college students from 21 different majors studying at a university located in Lagos, Nigeria. The group of students included both males and females, ages 16 to 38, and in levels 100 through 500 (first year through 5th-year students). Not all participants responded to every question; therefore, the reported percentages correspond to the total number of participants who answered the questions.

Study Context
This quantitative study was conducted to investigate students’ perceptions of their use of mobile technology in the classroom and how it affects their engagement and learning. The data were also reviewed to determine their relationship to the framework of Student Involvement Theory and the Student Engagement Model. The study site is a public research university located in an urban area in southwestern Nigeria with over 40,000 students and 12 departments (or faculties, as it is referred to in Nigeria). All of the subjects volunteered to participate in the study. Of the 1000 survey instruments printed, 700 completed surveys were collected from participants.

**Demographics**

Although it was not part of the purpose of the study, the data presented here are intended to describe the demographics of the sample population, including gender, age, institution, department, major, and academic status. Table 2 presents the demographic information of the participants.

<table>
<thead>
<tr>
<th>Table 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Demographic Information of Participants by Gender and Age</strong></td>
</tr>
<tr>
<td>Variables</td>
</tr>
<tr>
<td>Gender</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>16-21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22-27</td>
<td>185</td>
<td>26.4</td>
</tr>
<tr>
<td>28-33</td>
<td>264</td>
<td>37.7</td>
</tr>
</tbody>
</table>
The participants were asked to specify their gender by checking off the appropriate option (male or female). All 700 participants (100%) responded. Among the 700 students who participated in the study, 52.6% were female, and 47.4% were male. Most of the participants were between 16 to 38 years old. They were as follows: 16-21 years old (26.4%), 22-27 years old (37.7%), 28-33 years old (25.7%), and 34-38 years old (2.1%), which is consistent with the general age of college students in Nigeria. The demographic data indicated that the participants were from various departments and represented 50 major areas of study. The responses to the question about the departments from which the participants came are summarized in Table 3.

In Table 3, the total number of students is shown as 649 because some of the participants either omitted this question or entered the wrong information. This table reveals that participants who used mobile devices the most were from Biology, Computer Science, Christian Religious Studies, Early Childhood, English, Physics, and Science and Technology.

<table>
<thead>
<tr>
<th>Department</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounting</td>
<td>16</td>
<td>2.5</td>
</tr>
<tr>
<td>Adult Education</td>
<td>16</td>
<td>2.5</td>
</tr>
<tr>
<td>Architecture</td>
<td>20</td>
<td>3.1</td>
</tr>
<tr>
<td>Arts and Social Sciences</td>
<td>11</td>
<td>1.7</td>
</tr>
<tr>
<td>Biology</td>
<td>28</td>
<td>4.3</td>
</tr>
<tr>
<td>Field</td>
<td>Credits</td>
<td>GPA</td>
</tr>
<tr>
<td>-------------------------------------------</td>
<td>---------</td>
<td>------</td>
</tr>
<tr>
<td>Business Administration</td>
<td>23</td>
<td>3.5</td>
</tr>
<tr>
<td>Business Education</td>
<td>20</td>
<td>3.1</td>
</tr>
<tr>
<td>Chemistry</td>
<td>10</td>
<td>1.5</td>
</tr>
<tr>
<td>Computer Science</td>
<td>65</td>
<td>10.0</td>
</tr>
<tr>
<td>Creative Arts</td>
<td>20</td>
<td>3.1</td>
</tr>
<tr>
<td>Christian Religious Studies</td>
<td>50</td>
<td>7.7</td>
</tr>
<tr>
<td>Early Childhood</td>
<td>30</td>
<td>4.6</td>
</tr>
<tr>
<td>Educational Mgt</td>
<td>10</td>
<td>1.5</td>
</tr>
<tr>
<td>Educational Foundation</td>
<td>20</td>
<td>3.1</td>
</tr>
<tr>
<td>English</td>
<td>57</td>
<td>8.9</td>
</tr>
<tr>
<td>French</td>
<td>20</td>
<td>3.1</td>
</tr>
<tr>
<td>History</td>
<td>11</td>
<td>1.7</td>
</tr>
<tr>
<td>Home Economics</td>
<td>10</td>
<td>1.5</td>
</tr>
<tr>
<td>Human Kinetics Education</td>
<td>10</td>
<td>1.5</td>
</tr>
<tr>
<td>Islamic Religious Studies</td>
<td>16</td>
<td>2.5</td>
</tr>
<tr>
<td>Law</td>
<td>17</td>
<td>2.6</td>
</tr>
<tr>
<td>Mass Communication</td>
<td>15</td>
<td>2.3</td>
</tr>
<tr>
<td>Mathematics</td>
<td>15</td>
<td>2.3</td>
</tr>
<tr>
<td>Physics</td>
<td>65</td>
<td>10.0</td>
</tr>
<tr>
<td>Science and Technology</td>
<td>74</td>
<td>11.4</td>
</tr>
<tr>
<td></td>
<td>649</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 4 presents the educational level or academic year of the participants. Table 4 shows frequency and percentage of use of mobile devices in the classroom, comparing students in levels 100, 200, 300, 400, and 500.

<table>
<thead>
<tr>
<th>Level/Year</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>65</td>
<td>9.3</td>
</tr>
<tr>
<td>200</td>
<td>254</td>
<td>36.3</td>
</tr>
<tr>
<td>300</td>
<td>226</td>
<td>32.3</td>
</tr>
<tr>
<td>400</td>
<td>139</td>
<td>19.9</td>
</tr>
<tr>
<td>500</td>
<td>16</td>
<td>2.2</td>
</tr>
<tr>
<td></td>
<td>700</td>
<td>100</td>
</tr>
</tbody>
</table>

**Research Findings In Response To The Research Questions**

This section addresses the following research question:

How does the use of mobile technology (smartphones, tablets, and laptops) by college students in a classroom in Nigeria affect their engagement and learning?

The research sub-question is:

What do students primarily use their mobile technology for during class?

The two hypothesis addressed are:

H0: The use of mobile devices (smartphones, tablets, and laptops) by college students in a classroom in Nigeria does not affect their engagement and learning.

H1: The use of mobile devices (smartphones, tablets, and laptops) by college students in a classroom in Nigeria does affect their engagement and learning.
Most of the students indicated that they owned smartphones, tablets, or personal computers that they could use to access the Internet and were comfortable using them in class. Table 5 presents the types of mobile devices that the participants in this study owned. According to the data, 97.7% of the participants indicated that they owned smartphones, tablets, or personal computers and used them often.

Table 5

*Types of Mobile Devices Owned by the Student Participants*

<table>
<thead>
<tr>
<th>Devices</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smartphones</td>
<td>591</td>
<td>84.4</td>
</tr>
<tr>
<td>Tablets</td>
<td>73</td>
<td>10.4</td>
</tr>
<tr>
<td>Laptops</td>
<td>20</td>
<td>2.9</td>
</tr>
<tr>
<td>None</td>
<td>14</td>
<td>2.0</td>
</tr>
<tr>
<td>Total</td>
<td>698</td>
<td>99.7</td>
</tr>
</tbody>
</table>

n=698

Table 6 presents participants comfort level with using mobile technology in the classroom. According to the data, 79.6% of the participants were fairly comfortable or very comfortable using mobile technology, which could be attributed to the fact that 97.7% of participants owned and used mobile technology.
Table 6

<table>
<thead>
<tr>
<th>Comfort with the Use of Mobile Devices in the classroom</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
</tr>
<tr>
<td>Not comfortable</td>
</tr>
<tr>
<td>Fairly comfortable</td>
</tr>
<tr>
<td>Very comfortable</td>
</tr>
</tbody>
</table>

This section presents the results of participants’ responses to questions based on the participants’ level of agreement and disagreement regarding the primary research question developed at the beginning of this study: How does the use of mobile technology (smartphones, tablets, and laptops) by college students in a classroom in Nigeria affect their engagement and learning?

**RQ 1: How does the use of mobile technology (smartphones, tablets, and laptops) by college students in a classroom in Nigeria affect their engagement and learning?**

Table 7 provides a summary of the participants’ perceptions of the impact of their use of mobile devices in the classroom on their level of engagement and learning. As presented in Table 8, the majority of participants (63.3%) indicated that it helped them to concentrate, while 64.9% of the participants indicated that using mobile technology facilitated their engagement in the classroom and 64.1% indicated that it was distracting when other students used mobile technology in class.
### Table 7

**Participants’ Perceptions of the Impact of the Use of Mobile Devices**

<table>
<thead>
<tr>
<th>Perceptions</th>
<th>Agree</th>
<th>Uncertain</th>
<th>Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other students’ use of mobile devices distracts me from paying attention in class</td>
<td>64.1%</td>
<td>8.0%</td>
<td>26.7%</td>
</tr>
<tr>
<td>I play games every day on my mobile devices during class</td>
<td>44.9%</td>
<td>11.7%</td>
<td>42.4%</td>
</tr>
<tr>
<td>My use of mobile devices distracted me from doing my classwork</td>
<td>47.9%</td>
<td>20.0%</td>
<td>31.4%</td>
</tr>
<tr>
<td>I enjoy using mobile devices for in-class activities</td>
<td>66.7%</td>
<td>23.1%</td>
<td>9.3%</td>
</tr>
<tr>
<td>Use of mobile devices in the classroom facilitated my collaboration with other students</td>
<td>64.9%</td>
<td>21.9%</td>
<td>12.6%</td>
</tr>
<tr>
<td>I concentrate better on my studies when using mobile devices</td>
<td>63.3%</td>
<td>20.9%</td>
<td>15.0%</td>
</tr>
<tr>
<td>Mobile devices do not allow me to engage in in-class activities</td>
<td>41.0%</td>
<td>17.6%</td>
<td>40.6%</td>
</tr>
</tbody>
</table>

The following is the report of the data analysis:

1. 64.1% of the participants indicated that other students’ use of mobile devices distracted them from paying attention in class, while 26.7% disagreed with this notion and 8% of the participants were uncertain. This finding indicated that other students use of mobile technology in class distracted other classmates from paying attention in class.
2. 44.9% of the participants indicated that they played games every day on their mobile devices during class, while 42.4% disagreed with this notion and 11.7% of the participants were uncertain. This finding indicated that almost half of the participants were not consistently focusing on learning in class, which they indicated hindered their ability to engage in in-class activities and learn effectively.

3. 47.9% of the participants indicated that their use of mobile devices distracted them from doing their classwork, while 31.4% disagreed with this notion and 20% of the participants were uncertain. This finding indicated that almost half of the participants were distracted by their classmates’ mobile devices in class, which they indicated consequently hindered their ability to learn and engage effectively.

4. 64.9% of the participants indicated that the use of mobile devices in the classroom facilitated their ability to collaborate with other students, while 12.6% disagreed with this notion and 21.9% of the participants were uncertain. This finding indicated that many of the participants were able to collaborate with others, using mobile devices in class.

5. 63.3% of the participants indicated that they concentrated better on their studies when using mobile devices, while 15% disagreed and 20.9% were uncertain. The participants who indicated that mobile devices helped them to concentrate more on their studies substantiated this by stating that they could confirm the authenticity of the information received while learning, they could easily connect with their peer groups, take notes in the class and get informed videos for better understanding on their studies. Thus, this finding indicated that many of the participants concentrated better on their studies when using mobile devices in class.
6. 41% of the participants indicated that mobile devices did not allow them to engage in in-class activities, while 40.6% disagreed and 17.6% of the participants were uncertain. This finding indicated that many of the participants could not engage in in-class activities because of their mobile devices, which they indicated hindered their ability to learn effectively. The participants who were hindered from effectively engaging in the class activities attributed this to the noise of the mobile phones and distractions made by other students.

**Hypothesis**

H0: The use of mobile devices (smartphones, tablets, and laptops) by college students in a classroom in Nigeria does not affect their engagement and learning.

H1: The use of mobile devices (smartphones, tablets, and laptops) by college students in a classroom in Nigeria does affect their engagement and learning.

**Table 8**

<table>
<thead>
<tr>
<th>Effect of student use of mobile technology in the classroom on engagement and learning</th>
<th>Value</th>
<th>df</th>
<th>Asymp. Sig. (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pearson Chi-Square</td>
<td>32.831&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4</td>
<td>.000</td>
</tr>
<tr>
<td>Likelihood Ratio</td>
<td>35.307</td>
<td>4</td>
<td>.000</td>
</tr>
<tr>
<td>Linear-by-Linear Association</td>
<td>8.655</td>
<td>1</td>
<td>.003</td>
</tr>
<tr>
<td>N of Valid Cases</td>
<td>694</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup> 0 cells (0.0%) have expected count less than 5. The minimum expected count is 24.73.

Table 8 above presents the result of the chi-square test on whether students’ use of mobile devices affects their engagement and learning in the classroom. Students use of mobile device was captured by the number of students that access their social media sites, and engagement and learning was captured by students’ perception of mobile device impact on their engagement and learning in the classroom. A 5% level of confidence was also employed. The
result showed that the p-value was less than the chosen significance level ($\alpha = 0.05$), so the null hypothesis, H0: *The use of mobile devices (smartphones, tablets, and laptops) by college students in a classroom in Nigeria does not affect their engagement and learning* is rejected. Hence, classroom engagement is dependent on mobile device usage. This finding further reiterates that there is an association (dependence) between students’ use of mobile devices and their engagement and learning in the classroom, which implied a negative influence of using mobile devices in the classroom on students’ engagement and learning.

Table 9a

*Social Media Access by Students* *Mobile devices do not allow me to engage in in-class activities Crosstabulation*

<table>
<thead>
<tr>
<th>Social Media Access by Students</th>
<th>Mobile devices do not allow me to engage in in-class activities</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>strongly agree</td>
<td>agree</td>
</tr>
<tr>
<td>yes</td>
<td>110</td>
<td>104</td>
</tr>
<tr>
<td>no</td>
<td>38</td>
<td>35</td>
</tr>
<tr>
<td>Total</td>
<td>148</td>
<td>139</td>
</tr>
</tbody>
</table>
Table 9b

*Social Media Access by Students* *Mobile devices do not allow me to engage in in-class activities*

*Crosstabulation with percentages*

<table>
<thead>
<tr>
<th></th>
<th>Mobile devices do not allow me to engage in in-class activities</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>strongly agree</td>
<td>agree</td>
</tr>
<tr>
<td>Social Media Access by Students</td>
<td>yes</td>
<td>110</td>
</tr>
<tr>
<td></td>
<td>% within Social Media Access by Students</td>
<td>20.4%</td>
</tr>
<tr>
<td>no</td>
<td>Count</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>% within Social Media Access by Students</td>
<td>24.4%</td>
</tr>
<tr>
<td>Total</td>
<td>Count</td>
<td>148</td>
</tr>
<tr>
<td></td>
<td>% within Social Media Access by Students</td>
<td>21.3%</td>
</tr>
</tbody>
</table>

Table 9a and 9b above presented the results of cross-tabulation with percentages of Social Media Access by students and Mobile devices engagement. Wilcoxon-Mann-Whitney test was conducted using the results of the cross-tabulation to test the hypothesis. The test revealed a statistically significant difference between the underlying distributions of students who use mobile device versus those who do not (U-value = 0, the critical value of U at p < .05 is 2; the z-score = 2.50672, p-value = .01208). The tabulated results showed that the results are significant at p-value < .05. The null hypothesis is rejected, there is a statistical significance on the impact on engagement between students who use mobile devices in the classroom to access social media versus those who do not.
The research sub-question: What do students primarily use their mobile technology for during class?

Table 10 presents more information on the participants’ use of mobile devices to answer the research sub-question: What do students primarily use their mobile technology for during class?

Table 10

What Students Use Mobile Devices for in the Classroom

<table>
<thead>
<tr>
<th>Usage</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Access Learning Management System</td>
<td>346</td>
<td>49.9</td>
</tr>
<tr>
<td>Access Other e-Learning Tools</td>
<td>102</td>
<td>14.6</td>
</tr>
<tr>
<td>Browse the Internet</td>
<td>108</td>
<td>15.4</td>
</tr>
<tr>
<td>Listen to Music</td>
<td>49</td>
<td>7.0</td>
</tr>
<tr>
<td>Access Course Calendar</td>
<td>33</td>
<td>4.7</td>
</tr>
<tr>
<td>Locate Maps</td>
<td>10</td>
<td>1.4</td>
</tr>
<tr>
<td>Download and Listen to Podcasts and Audio Books</td>
<td>9</td>
<td>1.3</td>
</tr>
<tr>
<td>View YouTube</td>
<td>7</td>
<td>1.0</td>
</tr>
<tr>
<td>Download and Read E-Books</td>
<td>8</td>
<td>1.1</td>
</tr>
<tr>
<td>Search for Information</td>
<td>7</td>
<td>1.0</td>
</tr>
<tr>
<td>Send and Receive Email</td>
<td>5</td>
<td>0.7</td>
</tr>
<tr>
<td>Use Social Media</td>
<td>5</td>
<td>0.7</td>
</tr>
</tbody>
</table>
When asked if they use mobile devices for studying, 54.1% indicated that they used mobile devices for studying and 43% indicated they did not. As shown in Table 9, there are several activities which the participants used their mobile devices for; notably, 49.9% used mobile devices to access the learning management system in the classroom.

Cross-tab analysis was used to show the relationship between gender and participants’ use of mobile devices in the classroom. As indicated in Table 11, 52.6% of females used mobile technology in the classroom, compared to 47.4% of males.

Table 11  
Participants’ Use of Mobile Devices in the Classroom

<table>
<thead>
<tr>
<th>Gender</th>
<th>To access current information during class</th>
<th>To access an alternative online textbook</th>
<th>To collaborate with others for group work</th>
<th>To record lectures</th>
<th>To submit homework</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>178</td>
<td>51</td>
<td>65</td>
<td>53</td>
<td>14</td>
<td>7</td>
<td>368</td>
</tr>
<tr>
<td>Male</td>
<td>1145</td>
<td>38</td>
<td>65</td>
<td>64</td>
<td>58</td>
<td>12</td>
<td>332</td>
</tr>
</tbody>
</table>

Summary of Findings

The beneficial use of mobile technology in the classroom, coupled with the students’ desire to use the technology, and the potential for future academic preparation had a substantial influence on students’ learning and engagement. The purpose of this study was to explore how the use of mobile devices influences students’ engagement and learning in the classroom. This was achieved by using a descriptive survey.

Based on the data analysis of the opinions of the participants in this study, the results of how the use of mobile technology in classrooms impacts students’ learning and engagement at a university in southwestern Nigeria were presented.
Chapter 5: Discussion of Research Findings

Revisiting the Problem of Practice

This quantitative study used a survey design with descriptive statistical analysis in the investigation of how students’ use of mobile devices in the classroom influenced their engagement and learning. The pace at which information technology is evolving demands that attention is paid to the potential challenges and opportunities these innovations may present in a university classroom environment.

The current highly-mobile and user-friendly technology, coupled with the increase in internet access, make it pertinent for higher institutions to pay attention to certain issues associated with the influence of mobile technology on engagement and learning, as well as the need for mobile technology integration into the classroom experience.

Review of Methodology

The methodology for this study was descriptive survey research in the quantitative research tradition and involved surveying students at a university in southwestern Nigeria. The goal was to understand, through the lens of students’ use of mobile technology in the classroom, the impact on their engagement and learning. The research question that drove the study focused on how the use of mobile technology by students in the classroom affected their engagement and learning. The descriptive method was appropriate for this study because it enabled the researcher to describe how mobile devices influenced students’ engagement and learning in the classroom (Kothari, 2004).

With the assistance of two graduate students, the researcher visited six classrooms in which lectures were in progress. Before distributing the questionnaires, the students were informed of the purpose of the study and asked to participate voluntarily. The questionnaires
were distributed to every student who was willing to take the survey. Convenience sampling was used because it helped to collect quality and useful data within a short period of time. It also facilitated the execution of the pilot study.

Student engagement informed this investigation. Based on this model, students learn by becoming involved through engagement in their environment. The model emphasized that the time and effort students devote to their educational activities is empirically linked to their desired college outcomes. Moreover, the primary determining features of engagement are involvement and learning. Thus, the model was appropriate for this study as it addressed factors that are essential for classroom learning.

Discussion of Major Findings

The findings from this study were found to be consistent with the results of several related studies on the impact of mobile devices on learning and engagement. It also suggests that access to mobile technology has increased the comfort level of students’ use of mobile technology in the classroom and helped to enhance engagement and learning. However, mobile technology has negatively affected some students from effectively engaging in class activities due to distractions posed by the use of mobile devices by their peers in class. The information obtained from the findings is further discussed below.

Access to Mobile Technology Increases the Comfort Level of Students’ Use of Mobile Technology

When participants were asked about their frequency of use of mobile devices, 66.4% indicated that they used them multiple times daily, and 24.2% indicated that they used them multiple times weekly. When asked how comfortable they were with the use of mobile devices, 79.6% indicated that they were fairly or very comfortable. This confirms the Bannon et al.
(2012) findings, which illustrated that mobile technology use has increased in the 18-29 age bracket and their comfort level has also increased.

**Use of Mobile Technology Enhances Engagement and Learning**

Relevant research in the use of mobile technology in the classroom as a learning tool (Hwang, Lai & Wang, 2015; Davison & Lazaros, 2015) reported increased student interactivity and learning both in and outside the classroom. In this study, of the 689 students who responded to the question, “What do students use their mobile devices for in the classroom,” 70.2% indicated they use it to access the learning management system or other e-learning tools. The rest were either browsing the Internet or listening to music. When asked about their perceptions of the impact of the use of mobile technology in the classroom, 64.9% of the participants indicated that the use of mobile devices in the classroom facilitated their ability to collaborate with other students. Sixty-three point three percent of the subjects indicated that they concentrated better on their studies when using mobile devices, and 66.7% of the participants indicated that they enjoy using mobile devices for in-class activities. The findings of this study established the connection between the use of mobile devices in the classroom, learning and engagement and are consistent with previous studies (Bannon et al., 2012; Brooks, 2016; Hung & Yuen, 2010).

**Use of Mobile Technology in Class Affects Student Engagement**

Studies on student engagement and its impact on learning suggest that engagement needs to be connected to meaningful student learning (Heflin et al., 2017; Suhr et al., 2010; Tao, & Yeh, 2013). Mobile technology is a potential source of distraction in the classroom and affects students’ learning and engagement (Brooks, 2016; Ezemenaka, 2013; Lau, 2003; McCoy, 2016). Some participants in this study reported the negative effect of the use of mobile technology in the
classroom. Sixty-four point one percent of participants reported that other students’ use of mobile devices distracted them from paying attention in class, 47.9% reported that their use of mobile devices in class distracted them from doing class work, and 41% reported that their use of mobile devices did not allow them to actively engage in in-class activities.

The result of the chi-square test used to test the hypothesis also revealed an association between students’ classroom use of mobile devices and their engagement and learning, (X² (2) < \( = 34.721, p = 0.000\)). The tabulated chi-square is lesser than the calculated chi-square at 5% significance level and degree of freedom of 5. The asymptotic probability value \( p<0.001 \) also affirms that there is a significant effect of mobile device use on students’ engagement and learning in the classroom. The null hypothesis is rejected, there is a negative influence of using mobile devices on students’ engagement and learning in the classroom.

Similar to the chi-square test, the result of the Wilcoxon-Mann-Whitney test used to test the hypothesis also revealed a statistically significant difference between the underlying distributions of student’s who use mobile device versus those who do not, (U-value = 0, U at \( p < .05 \) is 2; \( z \)-score = 2.50672, \( p \)-value = .01208). The tabulated results show that the result is significant at \( p \)-value < .05 between the students who use mobile devices in the classroom versus those who do not. The null hypothesis is rejected, there is a statistical significance on the impact on engagement between those who use mobile devices in the classroom to access social media versus those who do not. The results agree with studies (Brooks, 2016; McCoy, 2016; Peter, & Bijik, 2018) that students can be distracted when mobile devices are not purposefully used for active engagement in the classroom.

**Discussion in Relation to the Theoretical Framework**
This study was informed through the perspective of student involvement theory and the student engagement model. These theoretical and conceptual frameworks served as the lens to investigate students’ perceptions of their use of mobile devices in the classroom during lectures.

**Student Involvement Theory**

The fundamental aspects of student involvement theory are that students learn by being engaged in their environment. The theory focuses on the behavior and motivation of students and emphasizes the importance of faculty in ensuring that students are fully engaged in the classroom. Such learning can be achieved without teacher interaction; however, research has shown that non-teacher involvement in the use of mobile technology in the classrooms by students can become a distraction or can become a tool for increased learning (Henrie, et al., 2015). Sixty-five percent of the participants agreed that their use of mobile technology in the classroom facilitated their collaboration with other students, while others stated that it was a source of distraction from doing their class work.

**Student Engagement Model**

The time and effort students devote to their educational activities is empirically linked to their desired college outcomes (Henrie, et al., 2015; Kuh, 2009). Kuh et al. (2007) defined student engagement as “participation in educationally effective practices, both inside and outside the classroom, which leads to a range of measurable outcomes” (p. 10). The study of engagement focuses on academics, student-faculty interactions, student-peer interactions, and involvement with co-curricular activities (Henrie et al. 2015; Kuh, 2009). Additionally, student engagement involves the effort that a particular college student applies to their academic and non-academic experiences. Active engagement is important because all of these aspects of academic and non-academic life play a role in student success. Student performance was
significantly correlated with cell phone use during class time in a study by Duncan et al. (2012). Duncan et al. found an average negative grade difference of $0.36 \pm 0.08$ (on a four-point scale) for students who reported regular cell phone use in class. The framework in this study aligns with both the student engagement model and student involvement theory.

The findings of this study are aligned with the theoretical framework. They support the results, which indicate that students’ use of mobile technology in the classroom was related to greater classroom engagement and learning. Most of the participants responded that their use of mobile devices helped them to concentrate better and facilitated their collaboration with other students. They enjoyed using mobile technology for in-class activities. Other participants reported that other students’ use of mobile technology in the classroom distracted them from paying attention in class, and their use of mobile technology in the classroom distracted them from doing their classwork and did not allow them to engage in in-class activities.

Willms et al. (2009) three-level framework includes academic, social, and intellectual aspects of student engagement. Academic engagement level is defined as the extent to which students are involved and interested in their academic activities, while social engagement level relates to the student’s sense of belonging while in the school, and the intellectual engagement level involves the student’s ability to deal with complex problems and the creation of new knowledge. Student Involvement Theory and the Student Engagement Model were relevant to this study because they explained factors that contribute to engagement and learning, especially in non-teacher directed student use of mobile technology in the classroom.

**Discussion of Findings in Relation to the Literature Review**

The findings in this study strongly connect with the literature presented in chapter two on the use of mobile technology for student engagement and student learning in universities. Many
of the findings in this study were consistent with the literature that illustrated the need for the effective use of technology to increase student performance and enhance student engagement. In the twenty-first century, it has become critical to find ways to integrate mobile technology into the classroom in order to engage and enhance student learning.

Embracing mobile technology in the classroom can improve interactivity and student engagement (Brooks, 2016; Wang et al., 2009). The students improved their engagement and changed the classroom from a passive to an active environment. In two related student engagement studies, Hung and Yuen (2010) and George and Dellasea (2011) found that the inclusion of social media in the classroom helped to create a sense of community. This is important because it enhances student engagement and contributes to students’ overall success.

The authors identified common activities regarding how students are engaged. This included visiting social media sites to update what other students are doing, thereby creating closer ties with the instructor and other students, interacting in a setting outside the classroom, and helping them to feel more connected to their classmates. Several students stated that when they had difficulties with course assignments, they would use social media to turn to their peers for support. Corroborating the researchers’ findings, 64.9% of the participants in this study indicated that the use of mobile technology in the classroom facilitated students’ ability to collaborate with other students as well as help them to concentrate on their studies.

An interesting finding from another study highlights the impact of that behavior. Tindell and Bohlander (2012) found that other students were distracted by students’ texting in class. Students may argue that they are only hurting themselves when texting, but studies show that others are also affected. Ezemenaka (2013) found that internet-enabled phone use does not affect the academic performance of the students, but that distractions caused by phone use were
reported to negatively affect academic performance. Davison & Lazaros (2015) reported that mobile technology use was a potential source of distraction in the classroom during lectures.

This study found that 47.9% of the students indicated that they were distracted when using mobile technology in the classroom, and a considerable percentage of students (94.1% of the participants) were distracted by other students’ use of mobile technology. The Chi-Square showed a negative influence of using mobile technology, and the Wilcoxon-Mann-Whitney test also revealed a statistically-significant difference between the underlying distributions of student’s who use mobile device versus those who do not, which further affirms the school of thought that students’ use of mobile devices in the classroom for non-classroom integration purposes would distract students, thus affecting their engagement and learning.

Although this study did not investigate student academic performance, Sundari (2015) stated that studies have shown that extensive use of technology such as social networking, chatting, and texting on students’ mobile phones during class time contributes to lower grades and overall poorer performance. Various researchers have shown that a significant number of students have the habit of using their phones during classes and while studying, and this habit extends even to the library, thereby resulting to numerous distractions to the users and others (Sundari, 2015).

The key benefits of mobile phone usage and technology in learning and teaching are that they can be used as multimedia access tools, communication tools, representation tools, analytical tools, personal assistant tools and help in capturing data and media.

In this study, when students were asked what they used their mobile devices for in the classroom, most of the participants indicated that they used them to access the learning management systems, other e-learning tools, access the course calendar, and research
information. This suggests that student engagement can lead to increased performance even without teacher engagement.

**Limitations of the Study**

Most of the students who participated in this study reside in an urban section of Lagos. This may limit the generalizability of the results to other students who reside in other remote parts of the country. The study was limited to student perceptions and did not look at actual student academic performance in relation to their engagement and learning.

Further study is needed to look at student engagement and learning in relation to age, gender, and year in school in order to better understand how mobile technology influences student academic performance. Another area of study would be to explore the effects or influences that mobile technology policies may have or not have on students’ engagement, learning, and academic performance. It is necessary to have purposeful mobile technology integration into the classroom, as it is evident that the pace of technological innovation far outruns higher education technology integration, and it is important that further research studies help to address these limitations. Based on findings in this study and in agreement with other researchers, it is essential to investigate the way students are currently using technology, as well as the impacts it has on their educational outcomes.

**Conclusion**

This study was driven by the primary research question that was developed at the beginning of this study: How does the use of mobile technology (smartphones, tablets, and laptops) by college students in a classroom in Nigeria affect their engagement and learning? The research sub-question was: What do students primarily use their mobile technology for during class? The responses generated from the participants indicate that most students had access to
mobile technology, knew how to use it, and enjoyed using it in the classroom for in-class activities. The students’ use of mobile technology in the classroom facilitated collaboration with other students and helped them to concentrate better. On the other hand, the study also revealed that student use of mobile technology in the classroom was a source of distraction for other students, as well as for themselves.

The findings in this study are significant for several reasons:

1. The findings highlight how technology can play an important role in making teaching and learning conducive and accommodating to the needs of the students.

2. The findings further highlight the importance of ensuring that the classroom environment is less distracting and more favorable to student learning.

3. The study provides policymakers with a clear understanding of the potential positive impact and the potential negative impact of allowing cell phone use in class.

4. The findings from this study enable teachers to understand students’ perceptions of the use of mobile devices in the classroom and the influence of mobile devices on learning and engagement.

The past decade has seen a steady growth in students’ use of mobile devices (smartphones, laptops, tablets). The devices allow students more extensive access to information and people. As more students use mobile devices in the classroom, research shows that their use is affecting learning and classroom engagement. This study investigated and assessed how mobile devices influence students’ engagement and learning in the classroom. Based on the findings derived from this study, it is clear that the benefits of the use of mobile technology in the classroom, the student’s desire to use the technology, and the potential for future academic preparation, can have important influences on student learning and engagement.
References


Ezemenaka, E. (2013). The usage and impact of Internet enabled phones on academic concentration among students of tertiary institutions: A study at the University of Ibadan,


Tao, Y., & Yeh, C. R. (2013). Transforming the personal response system to a cloud voting service. In S. Uesugi (Ed.), IT enabled services (pp. 139-156). Verlag, Austria: Springer.


Appendices

A. Questionnaire for the Study

Purpose

The purpose of this study is to explore and assess how mobile devices influence students’ engagement and learning in the classroom. **Mobile phone usage in the classroom.**

Dear sir/madam:
Please take the time to complete this survey. The answers that you provide will help a research study to investigate and assess how mobile devices influence students’ engagement and learning in the classroom. This survey is voluntary, and confidentiality is guaranteed. However, your participation is greatly appreciated and will be useful for possible course planning, development, and improvement.

Section A

Tell us about yourself:

Circle response indicative of age and gender
1. Age Group:
   16 <21
   21 < 24
   24 < 30
   30 < 35
   35 <40
   40 < 45
   >45

2. Gender
   Female
   Male

3. Institution: ________________________________ State: ______________

4. Department/Major________________________

4a. Circle Year:   1st year   2nd year   3rd year   4th year other ______
Section B

Mobile Device Use

5. Do you own a Smartphone or Tablet/PC that is capable of accessing the Internet (whether or not you use that capability)?

   Yes
   No


   a. None
   b. Smartphone
      iPhone
      Android
      Windows
   c. Tablet
      Kindle
      Android
      iPad
   d. Laptop
      (Please Specify) ____________________________________________

7a. How do you use your Smartphone, Tablet, or PC? Circle all that apply.

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<tr>
<th>Smartphone</th>
<th>Tablet</th>
<th>PC</th>
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<td>c. As an e-reader alternative</td>
<td>As an e-reader alternative</td>
<td>c. As an e-reader alternative</td>
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<td>d. Chat rooms</td>
<td>d. Chat rooms</td>
<td>d. Chat rooms</td>
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<td>e. Sharing through blogs</td>
<td>e. Sharing through blogs</td>
<td>e. Sharing through blogs</td>
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<td>f. Using social media</td>
<td>f. Using social media</td>
<td>f. Using social media</td>
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<td>g. Sending text messages</td>
<td>g. Sending text messages</td>
<td>g. Sending text messages</td>
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<td>Mobile diaries</td>
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<td>Watching movies</td>
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<td>i.</td>
<td>Downloading and listening to music</td>
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<td>Shopping</td>
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<td>Scanning codes</td>
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<td>Other</td>
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8. What do you mostly use your mobile devices for **in the classroom**? Circle all that apply
   a. Access learning management system
   b. Access other e-learning tools
   c. Browse the Internet
   d. Listen to music
   e. Download and listen to podcasts/audio books
   f. Download and read e-books
   g. Download and view streaming movies/video clips
   h. Search for information
   i. Send and receive e-mail
   j. Use camera to take and share pictures
   k. Calendar
   l. Maps
   m. Shopping
   n. Social media
   o. YouTube
   p. Recording lectures
   q. Dictionary/thesaurus/calculator
   r. Other (Please specify) ____________________________________

9. How often do you use your mobile device?
   a. Never
   b. Once a week
   c. Three times a week
   d. Multiple times a week
   e. Multiple times a day

10. What is your level of comfort with your mobile/handheld device use?
    a. Not at all Comfortable
b. Not very Comfortable
c. Fairly Comfortable
d. Very Comfortable

11. Do you use any Mobile Apps for studying?
   a. Yes
      Name the specific mobile apps________________________________________
   b. No

12. Do you access social media (such as Facebook, WhatsApp, Twitter, Soundcloud, YouTube, Instagram, etc.) through your Tablet, PC or smartphone?
   a. Yes
      Name the specific social media _________________________________________
   b. No

13. Describe briefly possible ways that you would like to see the use of Tablets, PCs and Smartphones integrated into the classroom.
   a. To access current information during class
   b. To access alternative online textbooks
   c. To collaborate with other students during class for group work
   d. To record lectures
   e. To submit homework
   f. Other (Please specify) _____________________________________________

Section C
In this section, indicate your level of agreement or disagreement with the statement in the box.

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<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Undecided</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
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</thead>
<tbody>
<tr>
<td>14</td>
<td>The mobile phone has helped to improve the level of the quality of education</td>
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<td>15</td>
<td>My academic performance has improved due to mobile technology</td>
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<td>16</td>
<td>I can easily contact classmates/lecturers for study purposes</td>
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<td>17</td>
<td>Other student’s use of mobile devices distracts me from paying attention in class</td>
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<td>18</td>
<td>I waste my time writing/sending SMS during class time</td>
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<td>19</td>
<td>I play games every day on my mobile device during lectures</td>
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<td>20</td>
<td>Using mobile devices distracted me from doing my class work</td>
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<td>21</td>
<td>I send texts messages to classmates who disturb during classes</td>
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<td>22</td>
<td>Use of mobile devices in the classroom facilitated my collaboration with other students</td>
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<td>23</td>
<td>I concentrate better on my study when using mobile devices to accomplish my goals</td>
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<tr>
<td>24</td>
<td>Mobile devices do not allow me to engage in class activities</td>
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B. Positionality Statement

My experiences in higher education as a consultant, technology educator, and administrator, as well as my ethnicity, gender, and faith, have shaped me as a researcher in some ways. For instance, being a higher education consultant forces me to research widely in order to understand the complexities of the institutions that I advise. Research also plays a key role in appreciating the politics around any proposed changes. Also, as a technology educator, I am required to keep researching in the area of technology in an effort to seek new knowledge, since the world of technology is extremely dynamic in nature. Research enables an educator’s lessons to remain relevant even with the changing technological environment. Researching has also improved my proficiency as an administrator. Through research, I am able to gain new insights into contemporary administrative issues, which better enables me to manage people and resources.

Moreover, my ethnicity, gender, and faith have always motivated me to research various subjects and the contradictions that surround them. For example, gender equality issues keep me constantly engaged in research in an effort to identify the forces behind these issues and the possible ways through which such concerns can be addressed. Thus, I can describe myself as a researcher who is influenced by her experiences.

Being technologically savvy can have its drawbacks. I am always exploring and reading while working on other projects simultaneously, and inevitably end up a few clicks away from the original website that I was viewing. My assumptions have always been that I was engaged in every aspect of the activities I was undertaking. This posture I took for myself was not applied to my students’ multitasking during lectures. The interpretation of my observations of my students was that they did not seem to be engaged in the class while being distracted by their cell
phone use. Why is there such a contradiction? What made me feel that I was engaged when I multitasked but did not believe that my students were? These questions can only be truly answered through the lens of transparency, through the reflexivity of acknowledging perspectives and biases, which would lead to a better research investigation.

Constructivists consider me a researcher whose role is vital in the collecting and interpreting of data using quantitative methods and agree that my experiences, or lack thereof, may affect the research approach. My assumptions on engagement and learning have made me consider my various roles as an educator, learner, and researcher, as well as how I must be aware of these biases in the course of this study. It is vital to take note of biases, such as confirmation biases, that occur as a researcher uses information provided by respondents to confirm a hypothesis. Biases may also arise from leading questions in the questionnaires where the researcher elaborates on the answer given by the respondent, hence putting words in their mouth. Additionally, there is the bias that occurs as a result of the halo effect whereby the researcher and respondents tend to view something in a certain light due to a single positive or negative attribute. By understanding these biases, the quality of the research undertaken can be improved.