

**MOBILE LEARNING IN THE 21ST CENTURY
HIGHER EDUCATION CLASSROOM:
Readiness Experiences and Challenges**

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The University of the West Indies (UWI) has signalled its intention to use ICTs to fuel growth in its competitiveness and improvement in the quality and effectiveness of its delivery of higher education services to a wider audience. The university's *Strategic Plan 2012–2017* spells out the path to this development and the priorities to achieve its vision. In an effort to be proactive in fulfilling the university's strategic objectives, the UWI School of Education, St. Augustine (UWISOESA) initiated the use of mobile learning technologies via a Bring Your Own Device (BYOD) initiative with some of its students in the Bachelor of Education programme. The mobile technologies literature reports many issues that can impede their effective use during teaching and learning. These issues include the degree of readiness for implementation, safety, security, connectivity, and communication. This paper reports on a study done to determine how students involved in the BYOD initiative experienced the initiative at the UWISOESA. It reports on students' perceptions of the degree of readiness of UWISOESA for BYOD; their experiences and challenges; and how to improve the initiative. The study has implications for regional policy formulation.

Introduction

21st century technological developments currently drive educational reform, improvement, and change at all levels of the system from early childhood to higher education. Educators and instructional designers, recognizing the potential of mobile technologies as a viable learning tool, have incorporated their use in blended, distance, and face-to-face programmes (Norris & Soloway, 2011). Regionally, in its strategic plan 2012–2017, one of the goals that The University of the West Indies (UWI, 2012) has identified in its strategic objectives is to “provide multiple, flexible paths for all constituencies to pursue tertiary education over their lifetime” (p. 33). The third strategic objective of this goal is to “enable technology solutions for teaching, learning and research” (p. 33). The use of mobile technologies for teaching, learning, and research is one technological solution that can be used to achieve this objective. Figaro-Henry, Mitchell, and Grant-Fraser (2011) conducted a study on three

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higher education institutions in Trinidad and Tobago, namely, UWI School of Education, UWI Open Campus, and The University of Trinidad and Tobago (UTT) San Fernando Campus. That study sought to determine the degree of mobile device ownership, willingness to purchase mobile devices, usage patterns, and access to services, as well as perceptions of mobile learning utility at these institutions. Despite some reservations, 92% of respondents expressed readiness and willingness to embrace mobile learning. Yet the literature identifies many issues that can impede the effective use of mobile technologies during teaching and learning (Estable, 2013; Morrison, 2013). These issues revolve around the degree of readiness for implementation, safety, security, connectivity, and communication. Nevertheless, these challenges are not insuperable.

Context

UWI is considered the premier higher education institution in the Commonwealth Caribbean. It consists of three physical campuses at: Mona in Jamaica, St. Augustine in Trinidad and Tobago, and Cave Hill in Barbados; and one virtual campus: the Open Campus. In the UWI higher education regional context, there is little research that documents students' experiences of the impact of using mobile devices during their instruction. Still, there is evidence that the campuses have been embracing mobile technologies to some degree to deliver their services. The Mona Campus has engaged mobile technology within its departments to communicate with students. It has been reported that the library uses text messaging to inform students of the availability of reserved books, and patrons are also able to access some databases using their smartphones. Other departments use text messaging to inform students of financial matters. Thus, the Bring Your Own Device (BYOD) at the UWI School of Education, St. Augustine (UWISOESA) initiative being reported on in this study documents a step further across the campuses in embracing mobile technologies in teaching and learning. It is not in this singular regard that this study is important. It is also significant because it signals an innovativeness on the part of UWISOESA that can fulfill the university's strategic objective to "enable technology solutions for teaching, learning and research" (UWI, 2012, p. 33). Further, the study is significant because it demonstrates proactiveness on the part of the UWISOESA to garner feedback from students, and to weave this into formulating and adopting policy and making changes to the initiative (Raths, 2012). As such, the results of this study have implications for university-wide BYOD policy creation and adoption.

The BYOD Initiative

In 2012, UWISOESA introduced the BYOD mobile learning innovation as an instructional strategy in two courses in the Bachelor of Education (B.Ed.) programmes. The course titled “Production and Use of Educational Material — EDTK3202” was offered in two modes of delivery: face-to-face and blended. Students enrolled in both groups were allowed to bring their own devices to facilitate their learning during the delivery of these programmes.

In Semester 1 of September 2012, the EDTK3202 course was offered to two groups of students doing their B.Ed. degree in both face-to-face and blended modes, respectively. The same content, objectives, outcomes, and deliverables (shared by the lecturers in the learning management system Moodle, customized as myeLearning) were used for both groups, but taught by two different lecturers. The blended group met for classes on Mondays from 5-8 pm, and the face-to-face group met on campus in the PC laboratory from 5-8 pm. The blended group met face-to-face for four out of the 12 meeting times, in a room fitted with one wireless access point capable of continuous wireless Internet streaming for the group; the other eight meetings were online, at a distance, using the Blackboard Collaborate synchronous learning tool.

Literature Review

Defining Mobile Learning

Mobile devices are the instruments that facilitate mobile learning. Jacob and Issac (2008, p. 1) described mobile devices as “small, portable and wireless computing and communication devices” that can be used from multiple locations. Al Mosawi and Wali (2015) differentiated mobile smart phones and tablets with improved processing, location identification, connectivity, memory, communication and interaction capabilities as newer mobile devices, and categorized less capable devices as first generation devices. Examples of mobile devices include cellular phones, portable media players, electronic reading devices, ipods, palmtops, tablets, laptops, phablets, smartphones, smart watches, and other wearable technologies. Web 2.0 technologies facilitate social networking using social networking sites (such as Facebook, Tumblr, Instagram, blogs, YouTube, Twitter, wikis), and program applications (mobile apps) have made mobile devices not only dynamic but pervasive (Park, 2011). It is perhaps the dynamic and pervasive nature of mobile devices that make them so appealing to use within the learning environment. Hence, mobile learning is often described as ubiquitous,

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anytime, anywhere access to educational and university resources and instruction driven by mobile technology (Akour, 2009; Martin, Pastore, & Snider, 2012).

The concept of mobile learning has evolved over time. Early definitions of mobile learning tended to define it in terms of a tool used to facilitate and support learner instruction because of its portability and affordability (Traxler, 2007; Yamaguchi, 2005). More recent definitions of mobile learning are more process oriented in their definitional approaches, associating its meaning with learning activities and the role that handheld wireless devices play in facilitating such learning. The *2008 Mobile Learning* report defines it as:

any activity that allows individuals to be more productive when consuming, interacting with, or creating information mediated through a compact digital portable device that the individual carries on a regular basis, has reliable connectivity and fits in a pocket or purse. (Wexler, Brown, Metcalf, Rogers, & Wagner, 2008, p. 7)

Still, a key definitional quality of mobile learning is its ability to transcend geographical boundaries. Chuang (2009) defines it as “learning that happens across locations, or that takes advantage of learning opportunities offered by portable technologies” (p. 51).

Therefore, in the higher education context, mobile learning is seen to possess three main components: mobility of the technology and the mobility of the learner, as well as “the mobility and dynamism of the learning processes and the flow of information” (El-Hussein & Cronje, 2010, p. 12).

Developing an Understanding of BYOD in the Context of Mobile Teaching and Learning

The term BYOD refers to “the practice of students bringing their own laptops, tablets, smartphones, or other mobile devices with them to class” (Rackley & Viruru, 2014, p. 1). The practice “encourages students to use devices they already own. This calls for a new mobile learning paradigm: When BYOD is the norm, learning should be device agnostic and fluid across device types” (Fang, 2014, para.16). In other words, the devices should facilitate continuous learning on and off campus, at a distance, anywhere, and anytime. As the number of personal mobile devices increases in higher educational institutions, there is real opportunity for this practice to continue as “educational institutes are observing [a] tendency of students and teachers to bring their laptops, smart phones and tablets as a resource for enhancing their learning experience” (Afreeen,

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2014, p. 234). Enhanced experiences could signal more and varied use of digital media, and these:

media applications will place ever-increasing demands on a university's network infrastructure. Universities not only [now] need to support the requirements of today; they need to anticipate and plan for future requirements so they can scale the network in a prudent and cost-effective way. (Aspell, 2012, p. 2)

The term BYOD first surfaced in 2009, when corporate employees began bringing personal devices to connect to company networks. (Johnson, Smith, Willis, Levine, & Haywood, 2011). This trend continued over the years and found its way into the classrooms of many schools and higher educational institutions. Grounded in social learning theory and connectivism, BYOD capitalizes on the use of the Internet and wireless technologies in the teaching and learning process. Even though institutions are inherently different, the BYOD phenomenon continues, and has assisted higher educational institutions, facing diverse financial challenges and shrinking funding for technology equipment, to leverage students' mobile devices as a solution for effecting student learning in and away from the classroom. Getting teachers and students ready for teaching and learning in the 21st century is a complex and costly enterprise. Hence, in an effort to minimize their financial strain, some higher education institutions are attempting to harness this innovation to satisfy student needs, by embracing policies proposing students use their own mobile devices, which they already know how to use and are responsible for maintaining (Jarvis, Jimison, Norris, & Waskey, 2013).

Readiness Perceptions of BYOD

Though connectivity to the Web has facilitated higher education institutions' mobile and BYOD initiatives, educators interface with technologies only when they feel comfortable. Developing staff and students with the requisite skills to navigate and eventually thrive in the mobile technological environment may still require some training, and will not occur instantly or in one day, but with planning and perseverance, development will happen. In the long run, Hockly (2012) sees real value for educational organizations, as he points out that "clearly a big plus with BYOD is that students are already responsible for the upkeep and maintenance of their own devices, which they know how to use" (p. 45). However, readiness for BYOD involves more than just knowing how to use a device and how the device can aid in education.

Raths (2012), in documenting educational institutions' BYOD readiness and experiences in several educational districts throughout the

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US, had some readiness suggestions for educators. Essentially, a proactive approach was welcomed, along with suggestions for a gradual improvement to the organization's wireless system. Raths further suggested that feedback should be gathered and analysed from users at various locations, in order to ensure that the wireless system is flexible and agile. If the educational institutions are unable to monitor and view what is happening on their WAN, they should contract it out so that the system can be fine-tuned to improve performance for the users.

At Letterkenny Institute of Technology in Ireland, Lennon (2012) described similar yet uniquely different readiness activities for younger learners and part-time, older, non-traditional learners living far from the institute. Lennon shared her institution's legal issues and the educational challenges encountered while housing resources in the cloud and transitioning to BYOD. Her readiness advice spoke to the need for the wireless computing environment to contain practical human resource development and training on physical and cloud application, in order to enable the differentiated younger learners and the older students who may be unfamiliar with the cloud environment to become more proficient in its use. She stressed the importance of the institutions considering BYOD to conform to "data security and data privacy policies of the educational institution and all applicable laws and regulations on data privacy; software licenses and digital media copy protection" (Lennon, 2012, p. 2). She also underscored the need for a helpdesk to continue supporting the diverse 21st century learners at a distance.

21st Century Learners, BYOD Environments, and Trends

Learners in the 21st century possess an inherent need to create, communicate, collaborate, and curate in the physical and virtual environments they traverse. Stevens (2011) suggests that this is not about to change in the near future. Learners, teachers, and the learning have changed, and it is reasonable to expect that the environments where the learning happens must also change. Neither revolution nor innovation happens just by the placement of technological tools in the environments. Having the knowledge to effectively use the technologies is advocated. Thus, institution-wide readiness, including student readiness, is an integral initial step (Emery, 2012).

Large numbers of learners own more than one mobile device, and the higher education landscape is awash with consumer-owned mobile devices. Pagram and Cooper (2013) urged higher education institutions to adopt a BYOD strategy that is steeped in sound pedagogical practice. Their 2013 research report, which was the third in a series of surveys (the

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first was conducted in 2007, the second in 2010, and the third in 2012), reported a dramatic increase in the use of personal mobile devices from 2010. It included recommendations for adapting both pedagogy and support for a BYOD model. Generally, students were found to be comfortable with technology devices even though they do not own them, and were found using these devices to learn and achieve tasks. (Pagram & Cooper, 2013). The paper went on to identify some critical BYOD student readiness considerations and issues, such as telling students about some of the minimum hardware specifications and the software they need access to upon enrolment, and about the e-books and other digital resources that are available to them. Infrastructural support should exist, and professional development, if needed, should be identified and provided to the learners.

There appears to be consensus among BYOD researchers regarding advocacy for institution-wide strategies. Emery (2012) provided a review of the BYOD literature published between 2007 and 2012, in which he too stressed the need for developing an institution-wide strategy to address a BYOD decision. In his work, he identified “(a) policy creation, (b) data security, (c) user education, and (d) mobile learning” (p. 9) as key elements of the strategy. Staff, it was recorded, preferred using their own devices, and employers are opening up their networks to learners’ mobile devices. This trend is called the “consumerization of IT” (Gens, Levitas, & Segal, 2011, p. 1). This phenomenon refers to the process of how users (consumers) and user technologies are being incorporated, along with digital tools and social networking tools, into the BYOD environment, thus driving the IT enterprise processes of the educational institutions. This phenomenon was at work in the BYOD initiative at the School of Education, too, as the teachers on the B.Ed. programme, by bringing their devices, effected a demand for mobility, causing the technical team to increase and improve the wireless reach, number, and speeds of the access points. A positive outcome results, in that, ultimately, “the flow is two-way: work is flowing into personal time as well, which makes workers more productive” (Gens, Levitas, & Segal, 2011, p. 1).

Scanning the BYOD Landscape

The higher education landscape is changing. Tertiary institutions, as part of their BYOD readiness efforts, have begun researching to ascertain readiness for BYOD—to glean responses from the student population and from the institution as a whole. A Malaysian study involving 2,837 undergraduate adult learners between the ages of 31 and 35 years, from 31 centres throughout that country, found that almost all (98.91%) of the

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students possessed mobile phones and, of that number, 82% pictured themselves using them to learn. (Abas, Peng, & Mansor, 2009).

Two years earlier, Zawacki-Richter, Brown, and Delpont (2006) reported on knowledge of and experiences of mobile learning in an international survey of distance educators' organizations, which included a lone Caribbean respondent from a higher educational institution in Barbados. The findings were reported as a collective whole, and it was not possible to identify the individual institutions' mobile experiences. However, what is known is that at the time of the survey, exactly half of the 88 participating institutions did not have plans to pursue mobile learning. Some 37% of institutions had contemplated "developing course materials but [none had] as yet done so" (p. 9). Only 7% of the educators, though, had developed content for delivery on mobile devices. The Barbados respondent, though a solitary voice, signalled a region just waking up to a new mobile paradigm.

Four years later in Trinidad and Tobago, Figaro-Henry, Mitchell, and Grant-Fraser, in their 2011 study, revealed a more lucid picture of the Caribbean region's perception of its state of mobile learning readiness. Data from two universities were collected, representing three campuses, each with different instructional modes of programme delivery—one offering courses in a fully face-to-face mode, one providing a blended programme, and one in a fully online instructional mode. The Open Campus of UWI offers programmes in fully online modes only, and services smaller, separated Caribbean territories. Readiness data from 178 Caribbean participants—78% students and 22% facilitators—disclosed information on the degree of readiness for mobile learning with respect to ownership of and willingness to purchase mobile devices, mobile services and usage patterns, and the perceived usefulness of mobile learning. Although some uncertainty was reflected, 92% of the Caribbean participants divulged willingness and readiness for mobile learning (Figaro-Henry, Mitchell, & Grant-Fraser, 2011).

At UWI, Mona, a year later, the Bursary staff used innovative digital text messaging technologies to communicate with students regarding their financial status. Library staff use text messaging to contact work-study students they employ, apprise registered students of the availability of reserved items, and afford library users access to databases from their mobile devices (Nelson, 2013).

Improving BYOD Readiness Through Policy Formulation, Development, and Adoption

Institutional readiness for BYOD could be beneficial to all in the organization—students, faculty, and administration—and as students become more empowered with mobile learning tools in their own hands, what remains “the real challenge, therefore, is the embrace of BYOD readiness [by] high level management” (French, Guo, & Shim, 2014, p. 196). It is at this administrative level that an expertly crafted BYOD policy can assist the BYOD initiative; a view held by diFilipo (2013), who advocates policy as a means to assist in protecting mobile systems, networks, and data. He goes further to suggest that the use of policies can garner structure and support for personal mobile devices, and provide limited liability for tertiary institutions. An institution’s *Acceptable Use Policy* may be inadequate for some issues that can accompany a BYOD initiative, and a policy audit may reveal a need for additional policies or procedures. Formulating policy is, however, just one part of the BYOD challenge. The greater challenge resides in ensuring that policy formulation, as a part of the institution-wide strategy, provides protection for the institution and its resources (diFilipo, 2013). All groups involved in the BYOD strategy may require policy formulated to their unique function or department. The policy or policies should also facilitate present and future technologies in all educational spaces, real and virtual. Drafting a policy that is detailed yet broad, and which provides sufficient flexibility to encompass emerging technologies, requires both thought and time.

Policies should, of necessity, emanate from national and international laws (Afreen, 2014). Unfortunately, some “educational institutes have [already] allowed some form of BYOD onto their campus mostly via network access control (NAC) without formulating and implementing BYOD policy” (Afreen, 2014, p. 235). An obvious implication of this is that “this is very risky as institutes are exposing their networks to various threats like unauthorized access, attacks of malware and viruses from student devices connected to [an] institute[’s] network” (Afreen, 2014, p. 235). Student devices, too, can also experience unauthorized access and data loss.

Security and Other Challenges: Important BYOD Considerations

Both human and physical resources need to be secure. Unauthorized access to data on networks and individual devices, viruses and malware, and impersonating users are possible breaches to BYOD security (Armando, Costa, & Merlo, 2013; Bennett & Tucker, 2012; Ullman, 2011). The work of these researchers is testimony to the importance of the

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organizational infrastructure, systems, and security in BYOD adoption. They propose that tertiary institutions adhere to a security framework for mobile devices which ensures that only applications complying with the organization's security policy can be installed on devices. This, they believe, is crucial to the security plan. All stakeholders should be part of formulating and administering the security plan. Establishing a support team for existing policies; developing security standards for institutional hardware, software, and infrastructure; and a financial plan for funding recurring security expenditure are also important in BYOD initiatives. "Without those in place, don't bother going forward," declares Ullman (2011, p. 3).

Without a doubt, "Bring Your Own Device (BYOD) is a big challenge for network administrators. Another requirement is to reduce prime and maintenance costs" (Aßmann, Kiontke, & Roller, 2015, p. 141). "BYOD has small investment cost but longtime operational cost" (Afreen, 2014, p. 234). These may initially be low, but with time, and if left unmanaged, could climb as there are fixed and recurring costs needed to keep the human, physical, and systems resources safe in the BYOD environment.

The BYOD Initiative: Impediments and Importance

There are three *Is* impeding impactful BYOD: impediments to the individuals using the initiative; impediments to the ICT systems connecting the individuals to the learning; and impediments to the infrastructure, the physical structures, equipment, and resources needed to run the intangible software or freeware. Administrators and faculty do not always share the same vision about mobile learning innovations. Faculty teaching the same subject areas or curriculum, too, can also experience this diametric opposition. Faculty concerns regarding perceived increased student potential for cheating hold real implications for negatively impacting readiness initiatives (Thomas & O'Bannon, 2013). This is a fundamental incongruence, and can immobilize any BYOD thrust. In the recent past, BYOD was seen by some educators as a disruptive innovation. Some faculty still hold to this view. Students also distrust the wireless connectivity, regarding it as open, thus unsecured, and fear for the safety of their stored or shared data. Depending on the type and length of experiences with BYOD, individuals may not possess the self-discipline to self-regulate in the BYOD spaces (Fang, 2014). The inability of users to access the Internet, cloud storage, learning management systems (LMSs), and digital resources housed in networks locally or remotely; or the presence of frequent electrical or computer systems disruptions that

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impede online communication among learners are severe ICT systems obstacles impacting BYOD (Lennon, 2012).

In navigating the BYOD environment, faculty, other staff, and students are required to be proficient in the use of all the peripheral instructional devices such as wireless printers, projectors, and other devices operated remotely, which will facilitate and complement the new fluid, mobile spaces. Not being au courant with peripherals can hamper or even stymie instruction and learning. It has also been noted that, overall, student devices tend to be more modern than those owned by the institution (Thomas & O'Bannon, 2013). Educators are now required (not to be device experts) to know about emerging technologies students are using in these fluid environments. The technical and administrative staff may be challenged in managing the fluid BYOD spaces (Afreeen, 2014). This analogy, shared by Fang (2014), aptly describes the disposition that should be adopted by users of new BYOD spaces:

Rather than viewing a learning activity as a solo performance on a particular instrument, it might be best to view it as more like an orchestra, with students using their own devices to the best of their ability, while the same content flows like music through them to create the grand harmony of learning. (para. 27)

The BYOD environment is not just riddled with challenges; benefits also abound in the form of flexible learning opportunities, active engagement in groups, motivated learners, engaging activities, communication, preparation for the future (college and workforce), increased teaching time, saving space (e-books), improved student engagement (Sucre, 2012), and increased productivity. Mobile devices are facilitating the creation of learning outcomes that promote creativity, innovation, and engagement (Sucre, 2012). Therefore, after careful and critical consideration of the negative BYOD consequences, it cannot be denied that the practice of BYOD “opens up opportunities to connect learning inside and beyond the classroom” (Sharples et al., 2014, p. 17).

Research Design

This study used a qualitative interpretive approach to investigate students' perceptions of their BYOD experiences as part of a technology integration course at the UWISOESA.

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The following research questions guided the investigation:

1. *What are students' perceptions of the state of readiness of UWISOESA for BYOD mobile learning?*
2. *How did students feel about their BYOD experiences at the UWISOESA?*
3. *What challenges did students involved in the BYOD initiative encounter in using their mobile devices during instruction at the UWISOESA?*
4. *What do students believe the UWISOESA can do to improve students' BYOD experiences?*

All participants teach at various levels in the education system, including early childhood, primary, and secondary. Participants were drawn from students enrolled in either the face-to-face or blended version of the course titled "Use of Media and Production of Educational Materials (EDTK 3202)," a final-year course, which is offered to students pursuing a B.Ed. degree. The research sample consisted of a total of 56 participants (3 males and 53 females). Of these participants, 39 (38 females and 1 male) were enrolled as face-to-face students; and 17 (15 females and 2 males) were enrolled as blended students (see Table 1).

Table 1. Demographics of Participants

F2f Students		Blended Students	
Gender	No.	Gender	No.
Male	1	Male	2
Female	38	Female	15
Total	39	Total	17

Data were collected via an online survey. Students in both delivery modes were emailed the link to the online survey and their responses were returned online to the B.Ed. facilitators who taught the course. The survey consisted of 36 questions focused on four key elements of BYOD mobile learning:

- UWISOESA's BYOD readiness
- BYOD experiences of students at the UWISOESA
- BYOD challenges at the UWISOESA
- BYOD possibilities the UWISOESA

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The survey comprised different types of questions, including Likert scale, open-ended, dichotomous, and multiple-choice questions. Questions 1 to 8 collected demographic data. Questions 9 and 10 were open-ended and elicited responses on students' BYOD experiences and identified the types of student devices used while at the School of Education. Likert scale questions, from 11 to 32, rated from *strongly disagree*, *disagree*, *agree*, to *strongly agree*, ascertained the degree of readiness of the students for BYOD. The final four questions, 33 to 36, gathered data from students on what reasons they proffered for the SOE's state of BYOD readiness, and future BYOD practice they would like to see in operation at the School.

Items 11 to 32 on the survey, which collected data on student perceptions of UWISOESA's BYOD readiness used Parasuraman's (2000) Technology Readiness Index (TRI) scale, as discussed in Elliott, Hall, and Meng (2008) as a framework to formulate the questions. Parasuraman's (2000) Technology Readiness Index (TRI) scale recognizes that any type of technology readiness should include elements that encourage or discourage individuals from using the new technology. In the Likert scale used by Parasuraman (2000), these elements were captured by dimensions that dealt with optimism, innovativeness, discomfort, and insecurity. For the current study being reported on in this paper, these dimensions were framed in two broad categories—+ positive and – negative—to garner participants' perceptions of UWISOESA's mobile learning readiness. This adapted version of Parasuraman (2000) allowed the researchers to capture the range of participants' experiences within this particular context, without limiting their responses to, on the positive side, optimism and innovativeness, and on the negative side, discomfort and insecurity.

The Findings

The mobile devices being used by students involved in the BYOD innovation at the UWISOESA were smartphones and laptops (see Table 2).

Table 2. Mobile Devices Used by Participants

Type of Device	No of Participants
Laptops	38
Smartphones	14
ipads	0

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Type of Device	No of Participants
ipods	0
eReaders	0
Other:	
Digital Camera	1
Not applicable	1

This section presents the findings based on the four research questions posed for the study.

UWISOESA’s BYOD Readiness (RQ1)

Data collected from the student participants indicate that 68% believed that UWISOESA is 40-100% BYOD ready; 32% felt that the UWISOESA was only 39% ready. The adapted version of Parasuraman’s (2000) TRI (examining positive and negative dimensions of mobile learning readiness) was used to determine the factors participants attributed to the UWISOESA’s current BYOD state of readiness or lack thereof. The factors that positively contribute to the UWISOESA’s BYOD degree of readiness include:

- the helpful staff at the UWISOESA (8%)
- the competence level of staff (8%)
- the technological innovativeness and responsiveness at the UWISOESA (15%)
- the mere fact that it is possible to engage in mobile learning via BYOD (13%)

Participants stated that: “*SOE is always trying to make improvements on technology*” and there is “*regular up grading of technology.*” In terms of the staff factors that contributed to the UWISOESA’s BYOD readiness, participants commented about: “*the hard work done by the team of technicians.*” Additionally, participants indicated that there were student factors which contributed to the UWISOESA’s state of readiness, for example, in their own words: “*Keeping track on assignment, adapting a method of study and research, making myself available to learning about the new types of software or applications.*” Students’ competency in the use of technology also contributed to the UWISOESA’s BYOD’s readiness.

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The negative factors that participants attributed to the UWISOESA's lack of readiness for BYOD included matters related to: connectivity, safety, unhelpful technical staff, competence, security, and communication. Participants commented on: "*intermittent lack of connectivity, poor internet access, the lack of help from the computer technician and the lack of security for ... devices.*"

In determining participants' perceptions of the UWISOESA's BYOD degree of readiness, the researchers asked participants if they were satisfied with the degree of readiness. The findings show that 62% of the participants indicated that they were not satisfied. As such, overall, the researchers concluded that although there are some positive factors, for example, the UWISOESA's innovativeness and competence in the use of technology, at this current time the majority of students engaged in the BYOD innovation do not believe that the school is sufficiently ready, and this is largely because of safety, security, and connectivity issues.

Students' Perceptions of Their UWISOESA BYOD Experiences (RQ2)

The findings showed that students had both positive and negative experiences of engaging in BYOD at the UWISOESA. The factors that contributed to students' negative experiences were issues associated with poor connectivity (66%); no knowledge of the existence of a BYOD policy at the UWISOESA (66%); and the need for technical support (80%). All the negative factors that participants identified as part of their BYOD experience can be categorized as UWISOESA-related factors. In terms of positive experiences, participants indicated that they felt comfortable with BYOD (70%) and they were encouraged to bring their own devices (71%). They also stated that the BYOD initiative afforded increased productivity (88%) and convenience (90%) working with their own devices, because they could research concepts in real time as they were exploring a topic in class, and save their data onto their own device for quick and convenient retrieval.

Challenges Students Encountered in Engaging in the BYOD Initiative at the UWISOESA (RQ3)

Participants identified a range of factors that presented challenges in using their mobile devices during instruction at the UWISOESA as part of the BYOD initiative. These challenges can be categorized as student-centred factors and UWISOESA factors. Key among the UWISOESA challenges was the inconsistent Internet speed and connectivity, which all the participants alluded to. In fact, based on the participants' comments, this

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challenge was one that significantly affected the students' experience of BYOD and thwarted the effectiveness of the UWISOESA's BYOD initiative. In this regard, participants stated:

“the wireless connection was poor as one often had to disconnect and reconnect the service more than five times in thirty minutes; there seems to be a problem with connectivity and sometimes it is difficult to connect with your own system as there seems to be some sort of a scramble system blocking outside transmission.”

The two student-centred factors were battery failure (1 participant) and incompetence (1 participant). The latter stated: *“inability to access website/incompetent of using device.”*

How Can the UWISOESA Improve Students' BYOD Experiences? (RQ4)

The findings for this research question were linked to issues of connectivity, policy, accommodation in terms of a designated space, security, and safety. As anticipated, all of the participants felt that easier and faster Internet connectivity required improvement for the BYOD initiative to be effective. Nevertheless, it was participants' suggestion that the UWISOESA develop a BYOD policy to guide the initiative, and ensure that this policy is effectively communicated to all stakeholders, that was particularly noteworthy. One participant suggested that the UWISOESA should have a: *“prominent display of BYOD-related matters to facilitate user awareness.”* Another stated: *“I was not aware of BYOD so probably this can be highlighted more in the classes,”* and yet another said: *“not intimate with the policy would like to know more though.”* The participants' comments highlight the importance of institutionalizing the BYOD initiative. One participant's comments encapsulate the need for improvements across all the areas:

“Prominent, user-friendly display of BYOD-related matters at strategic locations on the SOE compound, as well as on the student platform on myuwi.edu. Further, a greater level of security for individuals with devices on their persons or in their vehicles might contribute to user comfort.”

Participants were concerned about safety and security related to their physical equipment, as well as unauthorized access to their data and digital material. Additionally, participants felt that there should be a designated physical space allocated for students engaged in the BYOD initiative, with adequate connections to power their devices.

Discussion

This section discusses the findings of the study in terms of the research purpose, questions, and literature reviewed for the study, and presents the implications of these findings in terms of the UWISOESA's BYOD initiative. As such, the discussion addresses issues related to UWISOESA's BYOD readiness, student experiences of BYOD, BYOD challenges at UWISOESA, and how to improve the BYOD initiative at the UWISOESA.

In discussing BYOD readiness level, the key elements to be examined include student and staff mobile readiness, that is, having both student and staff competent and knowledgeable in using technology for learning, which includes using mobile devices and interacting with systems, synchronously and asynchronously, that facilitate learning on the go (Markelj & Bernik, 2012). Further, readiness includes having reliable, high-speed Internet connectivity; convenient and easy access to mobile learning; working environments that are safe in terms of data security and safety of equipment; institutional commitment to mobile learning as evidenced in the quality of service and policy development and adoption (Akour, 2009; diFilipo, 2013; Emery, 2012; Raths, 2012). The findings of the current study showed that while the majority of participants believe that the UWISOESA is reasonably BYOD ready, this is from the perspective of the mobile readiness of students, but not necessarily ready in terms of connectivity, safety, security, and institutional commitment as evidenced in policy development and adoption. These latter conditions are critical for any institution to be BYOD ready and to ensure the effectiveness of any such initiative (Akour, 2009; diFilipo, 2013; Emery, 2012; Raths, 2012). Still, the fact that research was conducted to determine the experiences, readiness, challenges, and ways to improve the BYOD initiative is laudable and, according to Raths (2012), is certainly a step in the right direction towards effectiveness.

The students engaged in the BYOD initiative at the UWISOESA, by and large, viewed it as an experience that is beneficial. The findings indicated that a large percentage of the participants had positive experiences with the BYOD initiative, particularly as it afforded increased productivity and convenience in accomplishing learning tasks. This finding is in keeping with results found in other studies (e.g., Afreen 2014; Figaro-Henry, Mitchell, & Grant-Fraser, 2011; Sucre, 2012). In the same vein, the results of this study, as they relate to students' negative experiences with BYOD, also support what is generally found in the literature, that is, that negative experiences are attributed to poor connectivity, and lack of attention to safety, security, and technical support

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(Akour, 2009; diFilipo, 2013; Markelj & Bernik, 2012). What seemed incongruent in terms of these findings and that of others reported in the literature related to policy development and adoption. Generally, the literature reported that an ineffective policy may precipitate a negative BYOD experience; however, for the UWISOESA it was not the ineffectiveness of policy that was causing a negative experience for students, but the lack of a BYOD policy.

There are some key issues that present challenges to instituting and effecting any BYOD initiative. These include: Internet connectivity, data security, user education, and policy creation and adoption (Akour, 2009; Gens, Levitas, & Segal, 2011; Markelj & Bernick, 2012). The current study showed that the UWISOESA is experiencing similar challenges to those documented in other research studies with regard to BYOD initiatives. Still, as documented in the literature, these challenges are not insurmountable. There are options that can be implemented to improve the BYOD experience. The UWISOESA might find it useful to heed Rath's (2012) advice to be proactive in developing a BYOD policy, and to collect and use feedback from users to improve the initiative. This study is evidence of the latter, which, in and of itself, signals that the UWISOESA is on the right course to improving its BYOD initiative. In the UWISOESA's case, in particular, the formulation of an institution-wide BYOD policy should to some extent alleviate or minimize some of the challenges, especially those that the findings have identified as institution related. Still further, as Afreen (2014) suggests, there are many factors to consider in establishing a BYOD policy; it is not necessarily a linear process. For the UWISOESA, consideration would have to be given to whether a BYOD policy must first be articulated at the regional UWI level. In which case, the UWISOESA will have to engage the discourse at that level before moving forward with its own policy formulation. Attention will also have to be paid to the university's ICT policy as it relates to access and security, or its mobile work policy.

Implications for BYOD at UWISOESA

The study showed that students see value and benefits in using mobile learning technologies during their higher education instruction at the UWISOESA. This implies that it is worthwhile for the UWISOESA to continue to pursue the BYOD initiative, not only because it is beneficial for the students, but also, as Hockly (2012) posits, because it is worthwhile for the institution financially, as the students already own their devices and are responsible for their maintenance. The students and staff are to a large extent mobile ready and competent. Nevertheless, the findings of this

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study imply that further research to determine mobile learning competency levels of all categories of UWISOESA staff and students should be done before expanding the initiative. Additionally, as Lennon (2012) points out, there may be need for what she terms “practical” human resource training and development for both staff and students on physical and cloud applications, in order to empower the young differentiated learners and the adult learners who may be new to the cloud environment.

The UWISOESA will have to move towards establishing a BYOD policy and, as the findings of this study indicate, it will probably also have to assign a designated space for students engaged in mobile learning to operate. Additionally, the BYOD policy should articulate ways to build mobile learning capacity at SOE in terms of connectivity, data access, data security, safety for devices, and user education.

Conclusion

This study sought to determine the readiness, experiences, and challenges of the BYOD initiative instituted at the UWISOESA in two B.Ed. programmes. The majority of students have their own devices and find it convenient to use them during instruction. Among the reasons they put forward is the ease of access to information, and the ability to save and retrieve information and conduct research related to their course of instruction in real time. Issues of poor Internet connectivity, safety of equipment and data, lack of a BYOD policy that is formally communicated to students, and some unhelpful technical staff impede the otherwise satisfying BYOD experience at the UWISOESA. Still, the majority of students feel that UWISOESA has a satisfactory level of mobile learning readiness, and they are heartened by the UWISOESA’s innovativeness in implementing a BYOD initiative.

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