

Are Social Media Sites a Platform for Formal or Informal learning? Students' Experiences in Institutions of Higher Education

Cedric Bheki Mpungose¹

¹Discipline of Curriculum Studies and Educational Technology, School of Education, University of KwaZulu-Natal, Durban, South Africa

Correspondence: Cedric Bheki Mpungose, Discipline of Curriculum Studies and Educational Technology, School of Education, University of KwaZulu-Natal, Durban, South Africa.

Received: May 26, 2020

Accepted: July 29, 2020

Online Published: August 11, 2020

doi:10.5430/ijhe.v9n5p300

URL: <https://doi.org/10.5430/ijhe.v9n5p300>

Abstract

By being oblivious to the recent paradigm shift from formal learning to informal learning platforms, higher education institutions (HEIs) disadvantage student learning in the digital age. With the aim of bringing awareness of the need to shift from the use of learning management systems (LMS) to social media sites (SMS), this study explores students' experiences of the use of SMS for learning science modules. This qualitative interpretive case study was carried out at two universities, with electronic reflective activities, Zoom focus group interviews and WhatsApp one-on-one semi-structured interviews used to generate data. The sample was a total of 47 students purposively selected from science modules in a teacher education programme at two schools of education, one in South Africa and one in the United States of America. Data were thematically analysed and framed by social constructivism and connectivism. Findings indicated that learning of science modules is mainly through LMS, at the expense of SMS which are preferred by the students. The study concludes that since SMS are used effectively for students' communication and collaboration outside of the lecture hall, then HEIs need to shift to thinking about bringing these SMS inside and putting them to use for effective learning.

Keywords: students' experiences, formal and informal learning, higher education institution, learning management systems, social media sites, science module

1. Introduction

SMS are now pervasive and ubiquitous in the lives of undergraduate students around the world, including South African universities. The rapid growth of SMS and their use by students over the past five years has transformed the way in which learning is done (Greenhow & Lewin, 2016; Mpungose*, 2020c). SMS are referred to as Web 2.0 online applications that allow users to produce and consume (prosumers) information through sharing, communicating, collaborating, interacting, and publishing (Selwyn, 2012; Selwyn & Stirling, 2016). As outlined in these studies, SMS may range from social networks sites (Snapchat, WhatsApp, Facebook, Twitter and others) to media sharing (YouTube), presentation sharing (SlideShare), wikis (Wikispaces) and others.

These scholars (Prensky, 2001; Selwyn, 2012) further argue that students as millennials (born in or after 1982) or digital natives are 'tech-savvy' (good at using technology), and can multitask – talk, type, and text while listening during the lecture. In comparison, their lecturers are not well versed in technology and they need training before use of technology (digital refugees). The students enjoy using SMS both inside and outside the lecture; neglecting this opportunity frustrates them and they end up not focusing in the lecture. This leads to a situation where, as Venter (2019) as well as Myers and Sadaghiani (2010) indicate, current students are labelled by lecturers as selfish, lazy, lacking motivation, and disrespectful when accessing their SMS via their mobile devices while a lecture is in progress. The rationale behind this labelling is that lecturers fail to recognise the recent paradigm shift from the use of LMS (formal learning system adopted by universities), which are only capable of addressing students' knowledge experience, to the use of SMS that has dominated the ways in which information is shared by bringing in students' social and personal experiences for learning (Cavus & Zabadi, 2014). Clement (2020) shares the same opinion as Shirky (2009) that even though SMS have the power to influence both students and lecturers for collective online learning rather than individual learning, few universities around the globe have taken the initiative to adopt SMS as an official learning platform. This is also the case in a South African university context.

In contrast, in as much as SMS are viewed as one of the most useful informal online platforms for learning, many studies (Evans et al., 2014; Hosein, Ramanau, & Jones, 2010; Pangrazio & Selwyn, 2018; Selwyn, 2016) outline reviews on the limitations of using SMS for learning in higher education. They further assert that most university students use SMS for their own everyday social life and pleasure (living technologies), and that few students use SMS for authentic learning (learning technologies). It has also been outlined that almost 95% of students in the United Kingdom (UK) are using SMS for activities not related to education, even though SMS have the potential to be used for education (Pangrazio & Selwyn, 2018). This is because most universities fail to recognise the paradigm shift to the potential of using SMS (Informal) for teaching and learning, and remain stuck on the use of traditional or formal platforms (LMS).

Complicating these tensions is the fact that no provision is made by universities for SMS usage, and students are sometimes restricted in terms of access to SMS or barred from bringing their mobile phones with them during the learning process (Hamidi & Chavoshi, 2018). In other words, the vast majority of university lecturers are still only using formal platforms (lecturer halls, LMS and others), while ignoring or failing to acknowledge the innovative, participatory and interactive ways of enhancing students' use of SMS (informal) for authentic learning that draws from experience. However, as yet little exploration has been done to theorise SMS for informal learning in order to bring about awareness of the paradigm shift from LMS to SMS (Greenhow & Askari, 2017). Therefore, this study intended to explore students' experiences of the use of SMS for learning science modules in a qualitative interpretive case study of two university contexts, in order to highlight the need to shift/move from the use of formal learning (LMS) to informal learning (SMS).

In terms of structure, this article first draws on a social constructivist and connectivist learning framework to theorise the use of SMS at university for informal learning, including a review of the literature. This research from the United States of America (US) and South Africa (SA) explores students' experiences of the use of SMS for learning in order to bring awareness to university lecturers (in both regions) of the need to shift from formal learning to informal learning, particularly among lecturers teaching science modules at schools of education.

2. Theorising the Use of SMS in HEIs

The constructivist view of learning posits that learning is an active process which takes place through experiences, that knowledge is socially constructed rather than passively absorbed, and that learning allows students to understand their own world, while effective learning requires problem-solving activities (Griffin & Cole, 1984; Vygotsky, 1978). This view of learning claims that learning occurs in the real world where students are happy, active, free and self-directed, and use experiences in order to share learning by interacting among themselves and other members of society who share the same culture and values (Windschitl, 2002).

Theoretically, the use of SMS seems to be well aligned with the constructivist view of learning, because students are participating in a social space to produce and consume information rather than just receiving information deposited by lecturers (Clement, 2020; Greenhow & Askari, 2017). Moreover, in avoiding viewing learning as being stimulated by and responding to stimulus (passive learning), constructivists view learning as discovering, experiencing and acting upon the world while getting to know it (active learning) (Vygotsky, 1978). This suggests that SMS allow students to use their experiences to construct knowledge socially, by being active participating members of a certain community (e.g. friends on Facebook, followers on Twitter and others). In other words, the constructivist view of learning emphasises the formation of social groups and flexibility in a social space (SMS) so that learning can occur anytime and anywhere, irrespective of stipulated official university times and demarcated lecture venues. However, it is not clear how students can make connections to form social groups for learning (Verhagen, 2006).

Siemens and Downes (2009) also view the learning process as sharing of information or experiences among members of a social group, but that it has to be a network, made up of connections between nodes/relationships among individuals, groups, and technological resources. Thus, connectivism further generates new learning methods, where the focus is increasingly shifting from formal learning (address subject needs) to informal learning (address student and society needs) through the effective use of SMS (Anderson, 2016; Kop & Hill, 2008). Moreover, learning is theorised to rest in a diversity of students' opinions/experiences in order to seek out updated information (Siemens, 2005).

Thus, through the use of technologies like SMS, mobile phones and others, students are able to distribute updated content among themselves and lecturers, because learning does not only reside with a lecturer or LMS (formal learning). Downes (2010) argues that a connectivist strength in learning is the use of Web 2.0 applications as powerful tools for conceiving of distributed course content, through network connections for effective online

learning via SMS. consequently, students can be knowledgeable provided they can nurture and maintain effective connections that lead to the access of the specialised subject information (Kop & Hill, 2008; Siemens, 2005). In other words, students' learning can be meaningful if they can be allowed by university lecturers to use any available technology (SMS) to create relations with any student completing the course, in order to share their social and personal experiences for knowledge construction (Khoza & Biyela, 2019; Mpungose-, 2020b).

3. Material Studied: Students' Experiences of the Use of SMS

Research on the use of educational technology (hardware, software and ideological-ware resources) shows that few students draw from knowledge experience by reading manuals or articles before using any technology at their disposal (Amory', 2010; Khoza, 2019). This is evident from the study conducted by Mpungose* (2020c) at a South African university to explore students' experiences of the use of LMS (Moodle) and SMS (WhatsApp) for learning. Findings showed that students did not use their knowledge experience from professional training or reading manuals and articles on the use of LMS from their university laptops (the laptops being provided at no cost), but they preferred the WhatsApp SMS over the Moodle LMS for learning. This suggests that students in this digital age mainly make meaning of their actions for learning through their social experiences (sharing information) and personal experiences (personal values of love, respect, identity). In other words, this shows that learning need not only be driven by the vertical science curriculum (content-driven) but must be more driven by the horizontal (society-driven) and pragmatic (student-driven) science curriculum (Hoadley & Jansen, 2014; Van den Akker, Branch, Gustafson, Nieveen, & Plomp, 2012). Consequently, this article argues for lecturers to recognize the need to shift from using LMS (formal learning) to SMS (informal learning) in the teaching of science courses, in order to address the need of students and their community.

Christopher' (2019) and Sara (2014) argue that the paradigm shift from traditional paper to the modern paperless environment forced universities to adopt a formal online platform like LMS, which acts a depository where learning resources are stored to be retrieved by students. Use of LMS may include Moodle, Canvas, Chamilo, Sakai and others, depending of the context and needs of the institution. Moreover, LMS is viewed as the carrier of the curriculum (plan for/of teaching), because it allows the space for bringing in students' knowledge experiences for disseminating the content (Khoza, 2019; Van den Akker et al., 2012). This is evident from the review of literature on LMS conducted by Soykan and Şimşek (2017), showing that Moodle, Blackboard, and Canvas are the LMS most used by HEIs from 2010 to date, because of the ease of communication (email broadcasting), the fact that quizzes (tests) are easily set, and readings and other learning resources are easily distributed for retrieval by students. In other words, LMS are used for instructing students on what to do (lecturer-centredness) and formally used to deliver the content (uploaded readings) for the course or subject by running assessment of learning (grading) in order to address the needs of the university lecturers and the course (Bates, 2018; Black & Wiliam, 2006). This suggests that use of LMS draws from formal learning (knowledge experiences) where the lecturer has control over selection of the content, when and how students learn (pedagogy and sequence), as well as how quickly students learn (pace) (Hoadley & Jansen, 2014).

However, Palvia et al. (2018) argue that the use of LMS comes with various challenges, which may include but are not limited to the lack of infrastructure, wrongly adopted LMS, inadequate training and others. This has a negative impact on students' learning globally, in universities from North America, Europe, South America, Asia, and Asia-Pacific, but mostly in Africa. In the mixed-method study conducted by Shemahonge and Mtebe (2018) at the open university of Botswana in Africa on how learners use Moodle LMS for teaching/learning, the unavailability of Internet connections, lack of awareness of Moodle LMS caused by lack of training, and lack of learning material on Moodle LMS disadvantaged students' learning. This suggests that lack of training and awareness seem to be common problems for lecturers, such that they are found to favour some LMS functions (deposit readings) over others (discussion forums). Similarly, even though LMS encourage students' interaction through functions like discussion forums, chat rooms and others, they lack user-friendliness and can hardly maintain connectedness among students and lecturers; thus students are being pushed away from the environment (Selwyn & Stirling, 2016). This means there is a need for universities to shift to the use of SMS because they are highly connected, collective, interactive, more flexible and fluid, and accelerate alternative pathways of student learning (Selwyn, 2012; Venter, 2019). In other words, the use of SMS is driven by the social and personal experiences of students, since they are exposed to SMS to perform activities in environments ranging from home to school (Makumane & Khoza, 2020; Selwyn & Stirling, 2016).

While the rapid change from the first to the fourth industrial revolution encourages universities to change the way they operate—with lecturers changing the way they teach and students changing the way they learn—the inception of

SMS (Web 2.0, the Internet of things) has completely changed the higher education landscape (Brynjolfsson & McAfee, 2014; Schwab, 2017). This revolution has led universities to note the importance of SMS in both communication as well as teaching and learning. Mudaly, Van Laren, Morgan, Singh, and Mitchell (2015) carried out a qualitative case study at the School of Education (SoE) at a south African university, to explore student teachers' experiences on the use of SMS to teach science. Findings showed that the use of social media sites like Wikipedia, Facebook, WeChat, WhatsApp, blogs, YouTube and others caters for students' diverse learning styles, with scientific knowledge being easily accessible, affordable and creatively presented. This suggests that the use of SMS calls for course content knowledge to be socially and personally constructed, because SMS allow connectedness and collaboration among students and lecturers anyhow, anywhere and anytime. In other words, SMS allow students to populate different content among themselves with the purpose of sharing their experiences, rather than passively constructing knowledge by following lecturers' instructions.

Additionally, Philip and Garcia (2013) further argue that technologies, particularly SMS on smart phones, offer a personal and social platform influenced by a personal and social experience for learning. It is believed that if lecturers can teach in the right way (pedagogy) using SMS, students can also learn in the right way. In other words, SMS, tablets, smartphones and other portable technological resources provide a new way of sharing information in education, particularly in the learning of science courses, because they provide a new way of learning scientific content in a digital age (Mpungose, 2018; Prensky, 2006). SMS communication is swift, learning comes at a low cost through voice calls and video calls, and SMS are easily accessible because they are compatible with computers as well as mobile devices, which makes life easier for students (Clement, 2020). This supports the opinion of Vygotsky (1978), that students learn better when they interact and communicate with others in a preferred and convenient environment of their own interest. This suggests that the use of SMS gives freedom to students to reflect on social and personal experiences in constructing science content knowledge. The high demand for SMS for learning in HEIs is evident from empirical findings from a study conducted by Bozanta and Mardikyan (2017) at Bogazici University in Turkey, to explore students' perceptions of the use of SMS for learning. The study found that social sites are students' daily preoccupation (from home to school) and are effective for learning because they improve interaction among peers and lecturers for content dissemination. This shows that currently the world of technology in HEIs should gradually shift away from using LMS (which only bring in knowledge experience) to using SMS (which bring in personal and social experiences).

Recent research also shows that students come with a lot of digital SMS practices from their own communities, while there is little digital practice at the institution, with major restrictions; these tensions become a barrier to the adoption and usage of SMS by university lecturers (Selwyn & Stirling, 2016). For instance, Greenhow and Lewin (2016) conducted a study of two cases (in the UK and US) on the use of SMS for learning. The study revealed that the use of SMS in the UK case study was influenced by university context, while in the US case study it was influenced by community social activities. This suggests that the context in which students live (society) and learn (university) has a great deal of influence on the type of SMS that should be used for learning. Similarly, a survey showed that students from Serbia prefer to use Facebook SMS more than others, because it is good for e-commerce, while students from Croatia preferred Twitter because it is easy to get political updates (Vranešević, Perić, & Marušić, 2019).

Nevertheless, it is argued that the vast majority of students lack the innovative, participatory as well as interactive ways of using SMS for authentic learning, such that 95% of students in the UK are using SMS for activities that are not related to education, even though SMS have the potential to be used for education (Pangrazio & Selwyn, 2018). However, Van Dijk (2006) asserts that not all students have access to SMS, and that the digital divide (gap between those who have and do not have access to computers/mobile phones and the Internet) is one of the great limitations on the use of SMS. These challenges can be resolved, provided there is clear planning and a clear SMS learning policy, because learning is not all about the presence of technologies but about the underlying pedagogy (Amory', 2010; Khoza, 2019).

4. Methods and/or Techniques

4.1 Research Objectives and Questions

This study aims to develop a realistic sense of a paradigm shift from the use of LMS to the use of SMS in HEIs by exploring students' experiences of the use of SMS for learning science modules. As such, the study addresses the following research questions:

- What are students' experiences of the use of SMS for learning science modules?
- What informs students' experiences of the use of SMS for learning science modules?

4.2 Research Context, Sample, Design and Paradigm

Research objectives and questions were addressed through data generated from case studies at of two different universities. University A (UniA) is a research-intensive public university in KwaZulu-Natal province of SA. UniA has four campuses, including an SoE, with a current enrolment of more than 5 000 with student demographics including black, white, Indian, coloured (mixed race) and other students. All students attend face-to-face lectures for a range of undergraduate degrees as well as postgraduate certificates, honours, master's and doctoral study programmes. The SoE has six disciplines, including education and curriculum studies. University B (UniB) is a private research-based university in downtown Denver, in Colorado State in the US. This university has 11 schools, including an SoE. Their SoE is a graduate college that offer master's and doctoral degrees in higher education, policy, counselling, research methods, and library and information science, in addition to more traditional programmes including school psychology, educational leadership, early childhood and teacher preparation. Demographics include African American, Asian, Indian and other students.

Further to this, Students from both SoEs were recruited electronically through a flyer. After the consent forms were signed, they were purposively and conveniently selected to participate in the study because they were accessible and completing a science module in the teacher education programme, and were using SMS (Creswell & Poth, 2017). The total of 47 students is made up of 29 students from UniA SoE and 18 students from UniB SoE. I opted for a qualitative interpretive research design because it “captures the meaning of real-world events from the perspective of a study's participants” (Yin, 2015, p. 12). A multiple case study design (UniA and UniB) was used to explore students' experiences in order to gain an in-depth understanding of the real context in HEIs, by asking questions that not only gave information but also stimulated students to reflect on why they engage in the use of SMS (Creswell, 2014; Yin, 2013).

4.3 Research Methods and Analysis

In UniA data were generated from a PhD research project from 2016 to 2018, whereas in the case of UniB they were generated from a Fulbright research project conducted in 2019-2020. Electronic reflective activities and Zoom focus group interviews were administered to understand students' experiences of the use of SMS in both cases. To achieve this, reflective activities with a short series of questions were emailed to students, seeking their reflections on the use SMS; these were completed within a period of two months in each case (Cohen, Manion, & Morrison, 2013). Moreover, one session of an online Zoom focus group interview was carried out in each case within a month and lasted for 40 minutes. A case study design strives to use multiple sources of data rather than relying on a single source (Yin, 2015). Consequently, I used WhatsApp one-on-one semi-structured interviews in order to understand the rationale behind the use of SMS; each took approximately 30 to 35 minutes and was recorded. Generated data is stored in the SoE for a period of 5 years thereafter, data in hard copies can be shredded and that in the laptop such audio recordings can be permanently deleted. Thus, trustworthiness (transferability, dependability, confirmability, and credibility) of the generated data was ensured. For the fact that the participants in this study included digital natives (born on or after 1982). I acknowledged that the process of data generation welcoming to them and were excited. However, I controlled excitement by focusing more on the their experiences of using LMS and SMS.

I used qualitative thematic analysis (inductive and deductive reasoning) to get a sense of the generated data in terms of the participants' definition of the situation, noting patterns, themes, categories, and regularities (Creswell & Poth, 2017). Data generated by the three instruments were directly and openly coded from the recorded source, in order to avoid data analysis weakness through loss of meaning from transcription. I deductively mapped the codes into the set categories from the theoretical framework and the literature to form themes. However, I sought to use an inductive process to capture remaining codes which were not deductively analysed in the prior analysis, in order to form categories. After using these processes as a guide, categories were focused and sharpened to form three themes: learning platform, accessibility, and students' experiences.

5. Results and Discussion

5.1 Theme 1: Learning Platform

Table 1. most used SMS in 2020 (Simon, 2020)

Number	Name	MAU (B)
1	Facebook	2449
2	YouTube	2000
3	WhatsApp	1600
4	Facebook Messenger	1300
5	Weixin/WeChat	1151
6	Instagram	1000
7	Douyin/TikTok	800
8	QQ	731
9	Qzone	517
10	Sina Weibo	498
11	Reddit	430
12	Snapchat	382
13	Twitter	340
14	Pinterest	322
15	Kuaishou	316

As the digital 2020 report indicates, mobile devices and SMS have become an indispensable part of everyday life for people globally, since most people have access to the Internet; Facebook has billions (B) of monthly active users (MAU) and is the leading SMS (Table 1) (Simon, 2020). In line with this, Clement (2020) outlines that Facebook, YouTube and WhatsApp are the most popular SMS used by South Africans, whereas Facebook, Twitter and Pinterest are the SMS most used in the US. Consequently, findings (figure 1 below) revealed that students from UniA preferred to use Facebook, YouTube and WhatsApp SMS for personal use, mostly for learning, sharing the course content and communication; at UniB students were mostly using Facebook, Twitter, Pinterest and Snapchat for personal use and learning. Students from both case scenarios agreed that they prefer the use of SMS even though it was not officially adopted for learning, but the university normally used them for posting newsletters. Thus, students from both context enjoy the use of Facebook as the most common SMS, that is accessible and user-friendly because of its global popularity. Moreover, only LMS (formal learning) were officially used for learning, with UniA using Moodle and UniB using Canvas to disseminate the content while students were more active on the use of SMS (informal learning). However, even if findings show a paradigm shift from the use of formal learning (LMS) to informal learning (SMS), universities still do not recognize SMS as a learning platform; instead it used for media dissemination (newsletter).

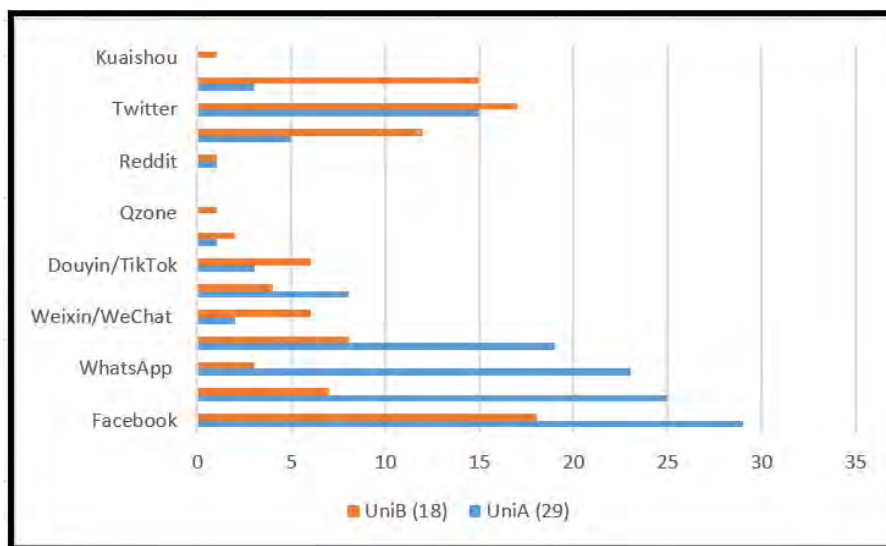


Figure 1. most used SMS by students per case/context.

5.2 Theme 2: Accessibility

In terms of accessibility, all students admitted having access to SMS through their mobile devices, more so than to LMS, because it is cheaper and they buy cheap monthly data bandwidth to use from home to school. This suggests that learning is easily accessible to students through the use of SMS, and the compatibility of SMS to mobile devices makes it easier for students to make friends and share personal and social experiences (Clement, 2020; Manca, 2020). It was evident from the findings that SMS were not used for learning all the time, but also to share personal and social media updates. As one student said: *“I am always up-to-date about coronavirus developments”*. This means that SMS is a pragmatic platform (blended), where students as digital natives or tech-savvy persons can find their identities (self-direction, respect, love, passion) while sharing their personal and social experiences on on SMS (WhatsApp/Pinterest/YouTube videos) (Khoza, 2019; Prensky, 2001). Thus, learning should not only be about knowledge transmission (formal) which is autocratic, but must be democratic in order to bring in both students’ social and personal experiences (informal), so that they can make meaning of what they do, particularly in the learning of science courses (Dewey*, 1938; Mpungose*, 2020c). In response to whether they have Wi-Fi for Internet access, one student from UniA indicated as follows *“I only have Wi-Fi access when I am on campus ... I can’t read emails but I can communicate with other students using my own SMS data bandwidth when I am at home”*. A student from UniB opined *“I have Wi-Fi access when I am at home and on campus”*. These findings suggest that the use of SMS bridges the digital divide, particularly in developing countries like SA. Hence, SMS allow students to share course content among themselves (even if they do not have access to Wi-Fi), which is not practically possible with LMS. Thus, the use of SMS not only bridges the digital divide in terms of Internet access, but also the digital divide in terms of attitude to, skills, type of use and benefits of the Internet (Van Deursen & van Dijk, 2019).

The findings show that the use of Moodle and Canvas LMS (formal learning) in both cases was good, because it allowed students easy access to the uploaded readings and easy ability to undertake assessment activities by following lecturers’ instructions. However, little evidence was seen where students were practically involved through the use of chat or discussion forums in learning science content, to ensure discussion and make connections. As Muthoosamy, Lee, and Chiang (2012) and Giancoli (2005) remind us, science courses (Physics and Chemistry) are practical subjects which involve small group learning (tutorials), simulation and problem-based learning to enhance practicality and flexibility. In overcoming the LMS limitation of failing to maintain interactive or practical learning, the findings have proven that SMS like Facebook, WhatsApp, Pinterest, YouTube, wikis and others have the potential to maintain participatory and active learning; hence simulation videos can be shared and discussed. Similarly, Clements and Sarama (2017) further assert that the use of technologies like computer-assisted instruction also enhance informal learning in science, for students to master formulas, equations, and theories.

Fomunyam (2019) argues that SMS use inside and outside the classroom is the best way to acquire knowledge. Similarly, in figure 2 below, the findings of this study have shown the main purpose and potential of use of SMS for informal learning is driven by subject need and personal need. Hence, SMS enhances connectedness among students in both cases, enabling students to acquire knowledge by creating open spaces for sharing and discussing the science

content(Singh, 2018). This suggests that it is now high time for universities to adopt and use SMS for learning, since their connectedness affords students an opportunity to define their self-identities, and helps students to perform their science course activities beyond the classroom. In other words, informal learning (SMS) gives students autonomy to produce and consume science content through their social and personal experiences (Siemens & Downes, 2009). In line with this, the findings have shown in figure 1 and 2 that students are finding and making good use of SMS that ‘work best’ for them within their local context of learning science to serve their needs. Thus, universities have an obligation to shift to informal learning in order to support these useful and interactive informal platforms for learning to disseminate science content (Mpungose*, 2020c).



Figure 2. the purpose of using SMS.

5.3 Theme 3: Students' Experiences

Concerning the experiences that drive the students' learning in this digital age, it was evident from the findings that students from both universities are highly driven by social (societal need) and personal (individual need) experience in the production of knowledge (subject need) experience. Students indicated that they become free to share any information on SMS such personal real life stories, educational content and other social issues. In other student were driven by personal and social experience for knowledge construction in their subject. Hence, students indicated that they feel comfortable when using their own mobile phones to access SMS of their own choice which have their personal details, at any time that they want to as compared to LMS. This boosts their morale and confidence, since they get to know their identities (strengths and limitations) first before going out into social spaces to share content information with other students (Khoza, 2019; Mpungose', 2020a). Moreover, a minority (11 out of 47) of students were skeptical about using SMS for learning, being cautious of identity theft and sharing of disruptive content. As a result, it is vital for the university to take students' experiences into account by “getting users [students] to think about the process, the system, and the way the system will be used well before and during the planning stages will assure greater and better utilisation after the system is in place” (Cullen, 2008, p. 158). Thus, a clear guiding policy needs to be in place to regulate the use of SMS for learning, in order to achieve effective informal learning without any disruption or identity theft.

Selwyn (2016) argues that much research needs to be done to rethink and re-conceptualise learning in HEIs, because LMS in universities are usually for supporting the management of the subject rather than the learning of it. Thus the shift seeks “the translation of everything there is to say about education in terms of learning and learners” (Biesta, 2017, p. 38). The findings showed that the use of SMS is about learning and getting learners connected and sharing the content in a more flexible way. Consequently, this study argues for the need for advances in and awareness of student-centred and more socialised and personalised learning systems like SMS, which are prompting calls for learning to be automated and learner-driven in social and connected spaces (Siemens & Downes, 2009; Vygotsky, 1978).

6. Conclusion

This study intended to explore students' experiences of the use of SMS for learning science modules in qualitative interpretive case studies of two university contexts, in order to raise awareness of the need to shift from the use of formal learning (LMS) to informal (SMS) learning. Both cases used LMS (Moodle and Canvas) for managing learning of science modules, which was driven by a lecturer-centred approach for learning; students were forced to use their knowledge experience to follow lecturers' instructions to download resources. This might be judged by others as autocratic, because students were not given a chance to engage with the content through discussion (chat and discussion forums) or to use SMS. Moreover, Facebook was found to be the most preferred SMS for learning, because it was affordable and accessible, and students were free to share content through videos and text; they enjoyed using it for learning, even if it was not officially adopted by the university for this purpose. SMS offered opportunities for students to harness the power of the network and connectedness to seek relevant expertise.

It was found that Facebook was the common and most used SMS in both case. However, students from the South African case preferred WhatsApp, while students from the American case preferred Pinterest and Snapchat for chatting/communication. Thus, contextual factors have a great influence on the use of a particular SMS for learning. For instance, in the South African case students were struggling to access Wi-Fi, while for American students, access to Wi-Fi was not a problem. Nevertheless, SMS are shown to have the potential to bridge the digital divide, because of affordable monthly data bundles from network service providers in South Africa. Even though issues of safety were raised, the majority of students saw a need for the adoption of SMS for interactive learning that is driven by social and personal experience for knowledge acquisition.

SMS have unique and powerful attributes for informal learning and facilitate social construction of knowledge, while maintaining connections among human and non-human resources (Siemens & Downes, 2009). This is possible through sharing of experiences in unpacking the science content. There is a need for further research to raise awareness of the potential use of SMS for informal learning that addresses students' social and personal needs in HEIs.

Acknowledgements

I want to thank Prof. Simon Bheki Khoza (SA) and Prof Julie Sarama (USA) for their supervision in to construct this article from a PhD research and Fulbright research project, as well as Leverage Gething language for editing. Furthermore, I want to thank in advance the anonymous reviewers for their insightful comments and valuable suggestions that will be made.

References

- Amory, A. (2010). Education Technology and Hidden Ideological Contradictions. *Educational Technology & Society*, 13(1), 69-79.
- Anderson, T. (2016). Theories for learning with emerging technologies. *Emergence and innovation in digital learning: Foundations and applications, 2016(1)*, 35-50.
- Bates, A. (2018). *Teaching in a digital age: Guidelines for designing teaching and learning for a digital age* London: Tony Bates Associates Ltd.
- Biesta, G. (2017). Education, measurement and the professions: Reclaiming a space for democratic professionalism in education. *Educational philosophy and theory*, 49(4), 315-330. <https://doi.org/10.4324/9780429343421-2>
- Black, P., & Wiliam, D. (2006). *Inside the black box: Raising standards through classroom assessment*. Northumberland: Granada Learning.
- Bozanta, A., & Mardikyan, S. (2017). The effects of social media use on collaborative learning: A case of Turkey. *Turkish Online Journal of Distance Education*, 18(1), 96-110. <https://doi.org/10.17718/tojde.285719>
- Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. New York: WW Norton & Company.
- Cavus, N., & Zabadi, T. (2014). A comparison of open source learning management systems. *Procedia-Social and Behavioral Sciences*, 143(1), 521-526. <https://doi.org/10.1016/j.sbspro.2014.07.430>
- Christopher, P. (2019). The 20 Best Learning Management Systems (2019 Update). Retrieved from <https://elearningindustry.com/the-20-best-learning-management-systems>
- Clement, J. (2020). Most popular social networks worldwide as of January 2020, ranked by number of active users. Retrieved from <https://www.statista.com/statistics/272014/global-social-networks-ranked-by-number-of-users>

- Clements, D. H., & Sarama, J. (2017). Valid issues but limited scope: A response to Kitchen and Berk's research commentary on educational technology. *Journal for Research in Mathematics Education*, 48(5), 474-482. <https://doi.org/10.5951/jresematheduc.48.5.0474>
- Cohen, L., Manion, L., & Morrison, K. (2013). *Research methods in education*. London: Routledge. <https://doi.org/10.4324/9780203720967>
- Creswell, J. (2014). *Qualitative inquiry and Research Design: Choosing among five approaches (3 ed.)*. California: SAGE Publications, inc.
- Creswell, J., & Poth, C. N. (2017). *Qualitative inquiry and research design: Choosing among five approaches*. California: SAGE Publications, inc.
- Cullen, M. (2008). *Primer on technology and behaviour: Cyber Sins and Digital Good Deeds: A Book about Technology and Ethics*. New York: Haworth Information Press.
- Dewey*, J. (1938). *Education and experience*. New York: Simon and Schuster.
- Downes, S. (2010). New technology supporting informal learning. *Journal of Emerging Technologies in Web Intelligence*, 2(1), 27-33. <https://doi.org/10.4304/jetwi.2.1.27-33>
- Evans, C., Hackney, R., Rauniar, R., Rawski, G., Yang, J., & Johnson, B. (2014). Technology acceptance model (TAM) and social media usage: an empirical study on Facebook. *Journal of Enterprise Information Management*, 27(1), 6-30. <https://doi.org/10.1108/jeim-04-2012-0011>
- Fomunyan, K. (2019). Theorising Social Media as a Learning Platform in Cameroonian Higher Education. *International Journal of Civil Engineering and Technology*, 10(3), 1-10.
- Giancoli, D. C. (2005). *Physics: principles with applications*. London: Pearson Education.
- Greenhow, C., & Askari, E. (2017). Learning and teaching with social network sites: A decade of research in K-12 related education. *Education and Information Technologies*, 22(2), 623-645. <https://doi.org/10.1007/s10639-015-9446-9>
- Greenhow, C., & Lewin, C. (2016). Social media and education: Reconceptualizing the boundaries of formal and informal learning. *Learning, media and technology*, 41(1), 6-30. <https://doi.org/10.1080/17439884.2015.1064954>
- Griffin, P., & Cole, M. (1984). Current activity for the future: The Zo-ped. *New directions for child and adolescent development*, 1984(23), 45-64. <https://doi.org/10.1002/cd.23219842306>
- Hamidi, H., & Chavoshi, A. (2018). Analysis of the essential factors for the adoption of mobile learning in higher education: A case study of students of the University of Technology. *Telematics and Informatics*, 35(4), 1053-1070. <https://doi.org/10.1016/j.tele.2017.09.016>
- Hoadley, U., & Jansen, J. (2014). *Curriculum: Organizing knowledge for the classroom*. Cape town: Oxford University Press Southern Africa.
- Hosein, A., Ramanau, R., & Jones, C. (2010). Learning and living technologies: A longitudinal study of first-year students' frequency and competence in the use of ICT. *Learning, media and technology*, 35(4), 403-418. <https://doi.org/10.1080/17439884.2010.529913>
- Khoza, S. (2019). Lecturers' reflections on curricular spider web concepts transformation strategies. *Transformation of Higher Education Institutions in Post-Apartheid South Africa*, 1(2019), 15-26. <https://doi.org/10.4324/9781351014236-2>
- Khoza, S., & Biyela, A. T. (2019). Decolonising technological pedagogical content knowledge of first year mathematics students. *Education and Information Technologies*, 2020(1), 1-15. <https://doi.org/10.1007/s10639-019-10084-4>
- Kop, R., & Hill, A. (2008). Connectivism: Learning theory of the future or vestige of the past? *The International Review of Research in Open and Distributed Learning*, 9(3), 1-13. <https://doi.org/10.19173/irrodl.v9i3.523>
- Makumane, M., & Khoza, S. (2020). Educators' reasoning (s) and their effects on successful attainment of curriculum goals. *South African Journal of Higher Education*, 34(2), 95-111. <https://doi.org/10.20853/34-2-3428>

- Manca, S. (2020). Snapping, pinning, liking or texting: Investigating social media in higher education beyond Facebook. *The Internet and Higher Education*, 44(2020), 1-13. <https://doi.org/10.1016/j.iheduc.2019.100707>
- Mpungose, C. (2020a). Beyond limits: Lecturers' reflections on Moodle uptake in South African universities. *Education and Information Technologies*, 1(2020), 1-20. <https://doi.org/10.1007/s10639-020-10190-8>
- Mpungose, C. (2020b). Is Moodle or WhatsApp the preferred e-learning platform at a South African university? First-year students' experiences. *Education and Information Technologies*, 25(2), 927-941. <https://doi.org/10.1080/18146627.2018.1479645>
- Mpungose, C. (2018). *Exploring Lecturers' Reflections on the Use of Moodle to Teach Physical Science Modules at a South African university*. (PhD.), UKZN, Durban (214581960)
- Mpungose*, C. (2020c). Is Moodle a platform to decolonise the university curriculum? Lecturers' reflections. *Africa Education Review*, 1(2019), 1-16. <https://doi.org/10.1007/s10639-019-10005-5>
- Mudaly, R., Van Laren, L., Morgan, K. P., Singh, S., & Mitchell, C. (2015). Connecting with pre-service teachers' perspectives on the use of digital technologies and social media to teach socially relevant science. *Perspectives in Education*, 33(4), 23-41.
- Muthoosamy, K., Lee, G. P. B., & Chiang, C. L. (2012). *Enhancing Chemistry Learning with Moodle Application among Foundation Engineering Students-A Survey on Students' Perception*. Paper presented at the The Asian Conference on Education 2013 Official Conference Proceedings.
- Myers, K. K., & Sadaghiani, K. (2010). Millennials in the Workplace: A Communication Perspective on Millennials' Organizational Relationships and Performance. *Journal of Business and Psychology*, 25(2), 225-238. <https://doi.org/10.1007/s10869-010-9172-7>
- Palvia, S., Aeron, P., Gupta, P., Mahapatra, D., Parida, R., Rosner, R., & Sindhi, S. (2018). *Online education: Worldwide status, challenges, trends, and implications*. Milton Park: Taylor & Francis. <https://doi.org/10.1080/1097198X.2018.1542262>
- Pangrazio, L., & Selwyn, N. (2018). "It's Not Like It's Life or Death or Whatever": Young People's Understandings of Social Media Data. *Social Media+ Society*, 4(3), 1-9. <https://doi.org/10.1177/2056305118787808>
- Philip, T., & Garcia, A. (2013). The importance of still teaching the iGeneration: New technologies and the centrality of pedagogy. *Harvard educational review*, 83(2), 300-319. doi:<https://doi.org/10.17763/haer.83.2.w221368g1554u158>
- Prensky, M. (2001). Digital natives, digital immigrants part 1. *On the horizon*, 9(5), 1-6. <https://doi.org/10.1108/10748120110424843>
- Prensky, M. (2006). *Don't bother me, Mom, I'm learning! How computer and video games are preparing your kids for 21st century success and how*. St. Paul: Paragon house.
- Sara, B. (2014). Learning Management System Comparison: 15+ Must Have Features. *Int J Scient Technol Res*, 4(8), 7-11.
- Schwab, K. (2017). *The fourth industrial revolution*. New York: Currency Books.
- Selwyn, N. (2012). Social media in higher education. *The Europa world of learning*, 1(3), 1-10.
- Selwyn, N. (2016). *Minding our language: why education and technology is full of bullshit... and what might be done about it*. London: Taylor & Francis. <https://doi.org/10.1080/17439884.2015.1012523>
- Selwyn, N., & Stirling, E. (2016). Social media and education... now the dust has settled. *Learning, media and technology*, 41(1), 1-5. <https://doi.org/10.4324/9781315121697>
- Shemahonge, R., & Mtebe, J. (2018). Using a mobile application to support students in blended distance courses: A case of Mzumbe University in Tanzania. *International Journal of Education and Development using ICT*, 14(3), 1-16.
- Shirky, C. (2009). *Here comes everybody: How change happens when people come together*. London: Penguin UK.
- Siemens, G. (2005). Connectivism: A Learning Theory for the Digital Age <http://www.elearnspace.org/Articles/connectivism.htm> (Accessed: 28 march 2020). Retrieved from https://jotamac.typepad.com/jotamacs_weblog/files/Connectivism.pdf

- Siemens, G., & Downes, S. (2009). Connectivism and connective knowledge 2009. *International Journal of Instructional Technology and Distance Learning*, 2(1), 3-10.
- Simon, K. (2020). Digital 2020 reports Retrieved from <https://wearesocial.com/blog/2020/01/digital-2020-3-8-billion-people-use-social-media>
- Singh, M. (2018). Adoption of Web 2.0 tools in higher education in India: a study. *Global Knowledge, Memory and Communication*, 67(4), 297-315. <https://doi.org/10.1108/gkmc-10-2017-0084>
- Soykan, F., & Şimşek, B. (2017). Examining studies on learning management systems in SSCI database: A content analysis study. *Procedia computer science*, 120(2017), 871-876. <https://doi.org/10.1016/j.procs.2017.11.320>
- Van den Akker, J., Branch, R., Gustafson, K., Nieveen, N., & Plomp, T. (2012). *Design approaches and tools in education and training*. Berlin: Springer Science & Business Media.
- Van Deursen, A. J., & van Dijk, J. A. (2019). The first-level digital divide shifts from inequalities in physical access to inequalities in material access. *new media & society*, 21(2), 354-375. <https://doi.org/10.1177/1461444818797082>
- Van Dijk, J. A. (2006). Digital divide research, achievements and shortcomings. *Poetics*, 34(4-5), 221-235. <https://doi.org/10.1016/j.poetic.2006.05.004>
- Venter, A. (2019). Social media and social capital in online learning. *South African Journal of Higher Education*, 33(3), 241-257. <https://doi.org/10.20853/33-3-3105>
- Verhagen, P. (2006). Connectivism: A new learning theory. Retrieved from <http://www.surfspace.nl/nl/Redactieomgeving/mPublicaties/Documents/Connectivism%20a%20new%20theory.pdf>
- Vranešević, T., Perić, N., & Marušić, T. (2019). Perception of Social Media as a Source of Relevant Information. *Zagreb International Review of Economics and Business*, 22(1), 133-144. <https://doi.org/10.2478/zireb-2019-0016>
- Vygotsky, L. (1978). Interaction between learning and development. *Readings on the development of children*, 23(3), 34-41. <https://doi.org/10.3102/00346543072002131>
- Windschitl, M. (2002). Framing constructivism in practice as the negotiation of dilemmas: An analysis of the conceptual, pedagogical, cultural, and political challenges facing teachers. *Review of educational research*, 72(2), 131-175. <https://doi.org/10.3102/00346543072002131>
- Yin, R. K. (2013). *Case study research: Design and methods*. New York: Sage publications.
- Yin, R. K. (2015). *Qualitative research from start to finish*. New York: Guilford publications.