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Using the Sakai Learning Management System to change the way Distance Education nursing students learn: are we getting it right?

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ABSTRACT

The popularity of LMSs tools and the different levels of interaction they offer have influenced learning. Interest in the use of technology among nursing students has risen and the need to find out how nursing students use Learning Management Systems to learn has become more critical now in developing countries and universities. Whilst LMSs initial focus had been on the administration of learning, there is the recent interest in how these LMS tools effectually result in learning and student satisfaction. The aim of the study was to explore whether students using LMSs such as Sakai to learn differently as they interact with their course content, their instructors and peers. Collaborative and communicative tools such as Wikis, Blogs and charts were not used intensively. The study found that students were not interacting effectively with their tutors. The lack of social presence has led to the use WhatsApp and Telegram by student groups as opportunities to enhance social presence. The findings suggest that effective use of Sakai CLE collaborative and communication tools can enhance interaction between students and content, instructors and students and among students and their overall learning.

KEYWORDS

Learning Management System; learning; distance education; interaction; nursing

1. Introduction

Improvements in educational technologies have transformed the way Distance Education (DE) is provided globally. Today, both single and dual universities are offering online distance learning courses within countries and across borders due to the deployment of educational technologies. Online distance learning has widened access to higher education in developed and developing countries, removing barriers of location and addressing issues of equity by accommodating the needs of both traditional and non-traditional students. In their much-acclaimed research on the growth of online learning in the United States, Allen, Seaman, Poulin, and Straut (2016) noted that a total of 5.8 million students were distance education students, with a population of 2.85 million taking all of their courses at a distance and 2.97 million taking some, but not all, courses at a distance.

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The meteoric rise of online learning has been attributed to the growth of e-learning platforms or Learning Management Systems (LMS) also described as Course Management Systems (CMS), Virtual Learning Management Systems (VLMS) and Learning Course Management Systems (LCMS). LMSs have supported distance, face-to-face and hybrid/blended teaching and learning processes (Fathema, Shannon, & Ross, 2015; Malikowski, Thompson, & Theis, 2007). LMSs are either proprietary or open source. Open source LMSs such as Moodle and Sakai have become more popular with institutions of higher learning in both developed and developing countries offering benefits such as ease of course delivery electronically, access to learning materials using mobile technologies anywhere and anytime, thus saving commuting time and making it possible to enrol in a course that otherwise one would have missed (Coates, 2005; Coates, James, & Baldwin, 2005; Marks, Sibley, & Arbaugh, 2005; White & Larusson, 2010), and the creation of unique learning environments that enhance different levels of interactions and learning among students (Coates, 2005; Dube & Scott, 2014; Lonn & Teasley, 2009; White & Larusson, 2010).

In spite of the much-declared affordances of LMSs and the different tools they offer students and instructors, there is little consensus on how LMSs benefit learning or change pedagogical practices in institutions of higher learning (Koszalka & Ganesan, 2004; Lonn & Teasley, 2009). Recently, there has been much interest in distance education programmes where nursing students use technology (DeBourgh, 2003; George, DeCristofaro, Murphy, & Sims, 2017; Gonen, Sharon, Offir, & Lev-Ari, 2014; Posey & Pintz, 2017; Williamson & Muckle, 2018). In spite of this interest among researchers, very little research has been done on how nursing students in most African universities are using technology, especially LMSs to learn.

The purpose of the study is to explore whether nursing students, on distance education programmes using the Sakai CLE, learn differently as they interact with their course content, their instructors and peers. The paper addresses the following questions:

(1) What are the benefits and challenges of the Sakai Learning Management System?
(2) Which Sakai tools do nursing students use?
(3) How efficient is the Sakai CLE in facilitating interactions between student-content, student-instructor and student-student?

2. Literature review

The provision of nursing education in Ghana has, in the past, been offered by conventional universities where students are taken through a four year Bachelor of Science programme. With the onset of educational technology and Internet access, universities have in recent times widened access and offered nursing students opportunities to learn online. The University of Ghana in 2007 commenced a distance education programme for the humanities using the print method. In 2012, the university adopted the Sakai Learning Management System as a learning platform for the distance education programme, making a transition from print-based delivery mode to an online delivery mode. In 2014, the Department of Distance Education of the School of Continuing and Distance Education, University of Ghana decided to introduce a distance nursing education programme for diploma holders who wanted to pursue a Bachelor of Science Nursing programme for three years. The objective of the online nursing distance education

programme is to offer the opportunity to nurses to access university education irrespective of work, geographical location and family challenges.

2.1. The learning environment

In an online learning environment, Vrasidas (2004) has argued that technology plays a central role. Vrasidas (2004) posits that all interactions take place via a Learning Management System (LMS). In this study, the online learning environment, using the Sakai Learning Management System, includes the homepage where students and lecturers can interact. Some scholars have cautioned that an online learning environment can benefit students more when more emphasis is placed on the content and instructional strategy built into the learning materials, than on the technology per se (Ally, 2011; Anderson, 2011). The Sakai project, which began in 2004, could be traced to the activities of four universities in the United States, namely Michigan, Stanford, Massachusetts Institute of Technology (MIT), and Indiana. With funding provided by the Andrew W. Mellon Foundation, the software development work was done by staff of the four universities and released to the public in 2005 as an open-source Collaboration and Learning Environment (CLE) software and managed by the Sakai Foundation (Alves, Miranda, Morais, & Alves, 2012; Monarch Media, 2010; Piña, 2010). Since 2005, the Sakai CLE has been accepted as one example of an open-source LMS that has influenced online learning in higher education institutions across the globe.

Today, several universities in Australia, the United States and United Kingdom are using Sakai. In Africa, several universities in South Africa [University of Cape Town (*Vula*), University of South Africa (*myUnisa*), University of the Witwatersrand (*Wits-e*), North-West University (*eFundi*), and University of the Western Cape (*iKamva*)] and Muhimbili University of Health & Allied Sciences in Tanzania are using the Sakai CLE. The University of Ghana has also become a member of the Sakai community. The deployment of the LMS to enhance teaching and learning has focused more on distance education students. The objective of the deployment is to ensure teacher presence and support for students who are on the programme. The Sakai LMS offers instructors and students various tools for content management, collaboration and assessment.

These Sakai CLE tools have been categorised by Lee and DePue (2010) and by Munoz, Lasheras, Capel, Cantabella, and Caballero (2015) as:

- Communicative tools: Announcements, Messages, Calendar, Schedule, News, etc.
- Collaborative tools: Discussion Forum, Wiki, Chat, etc.
- Content tools: Resources, Podcast, etc.
- Evaluative tools: Assignments, Tests and Quizzes, etc.
- Monitoring tools: Site Stats, My Workspace, etc.

In general, the features and functionality of the tools of the Sakai CLE, like those of most LMSs, create the opportunity for effective course management, interaction and assessment (Cavus, 2013; Coates et al., 2005; Lai & Savage, 2013; Schnetter et al., 2014). The Sakai CLE also allows administrators to have access to a database which includes user (profile), academic results and user interaction data (Romero, Ventura, & Garcia, 2008). The course management functionality of the Sakai CLE allows the instructor to upload documents

and course objectives and activities. Instructors can organise their course work far ahead of time for use by students.

At the University of Ghana interactive online learning materials are prepared by faculty from the School of Nursing and these materials are uploaded onto the Sakai LMS. Students interact with the materials using the Sakai resource tool. Sit, Chung, Chow, and Wong (2005) have argued that the online material allows students to engage in learning activities, pace their own studies and complete tasks of assignment on their own schedules as well as monitoring students' own progress. In addition, students and faculty are expected to interact and communicate using the online forum, chat room and emails.

However, Engstrom and Tinto (2008) have noted that just allowing students to access information on the Sakai CLE platform without support is not an opportunity. Instructors need to be online and to maintain their presence to create the necessary learning environment for interaction and support. Beldarrain (2006) has argued that email, chat rooms, and discussion board, which are the first generation Web tools are very important in ensuring student-student and faculty-student interaction. Also, the blogs, wikis and podcasts which are the second generation Web tools in Sakai have the promise of taking interactivity in distance education to the next level of interaction and collaboration. These Web tools provide strong interaction and engagement between instructor and student and student and student resulting in significant outcomes such as critical reflection, self-regulation and active learning. Interaction is very critical to the use of the Sakai CLE. Not only are there tools that facilitate interaction, but also there is a learning environment that promotes interaction between students and their content, students and instructors and among students.

2.1.1. The concept of interaction in distance education

Various scholars have found a synergetic relationship between interaction and learning (Abrami, Bernard, Bures, Borokhovski, & Tamim, 2011; Bernard et al., 2009; Su, Bonk, Magjuka, Liu, & Lee, 2005). What has emerged from extant studies is that although LMSs have the capacity to enhance learning among students, the usage of LMSs is still predominantly teacher-centric. Learning does not happen by pushing out information to students. Learning is social and takes place in varied contexts (Järvelä et al., 2015; Johnson, Corazzini, & Shaw, 2011; Vygostsky, 1978). The social dimension of learning is based on the foundation of interaction and cooperation with others in a learning environment (Jarvis, 2009; Merriam, 2008; Merriam, Caffarella, & Baumgartner, 2007). It also serves personal integration in communities and society and builds up the sociality of the learner (Jarvis, 2009;). Interaction with others, especially with peers and instructors has been found to be very important in determining and facilitating students' successful learning and satisfaction in the online learning environment (Beldarrain, 2006; Cho & Kim, 2013). Learning in an online environment does not happen automatically because educational technology has been deployed, or because new content is presented. Rather, learning occurs when there is interaction with content, the instructor and others in the learning environment (Abrami et al., 2011; Bernard et al., 2009; Chickering & Gamson, 1987; Koszalka & Ganesan, 2004; Su et al., 2005).

2.2. Importance of interaction

The importance of interaction in distance education cannot be overemphasised (Abrami et al., 2011; Anderson, 2011; Bernard et al., 2009; Kang & Im, 2013; Kanuka, 2011; Thurmond & Wambach, 2004). In spite of its importance, interaction cannot be easily defined (Anderson, 2011). Indeed, various definitions have been offered which focus on human-human, social and content-driven dimensions of interactions (Anderson, 2003; Bernard et al., 2009). Indeed, Wagner (1997) has attempted to distinguish between interactivity and interaction. Interactivity is referred to as the characteristics and use of technology within the context of facilitating interaction. Wagner in 1994 defined interaction as 'reciprocal events that require at least two objects and two actions. Interactions occur when these objects and events mutually influence one another' (cited in Wagner, 1997, p.20) although interaction is basically perceived as actions among individuals (Wagner, 1997). However, Abrami et al. (2011) have noted that this meaning ought to be extended to include individual interaction with curricular content and with technology (Ally, 2011).

There are several significant benefits to be derived from interaction. These include allowing for learner control, which ensures learner independence and the ability of the learner to engage in learning experiences; various forms of communication and participation, which reduces transactional distance between students and instructors and develops communities of learners; and the enrichment of learning experience as learners interact within the learning environment. All of these result in scaffolding the synthesis, evaluation and application of knowledge (Anderson, 2003, 2011; Rhode, 2009). However, Rhode (2009) cautions that when the level of interaction is inadequate or non-existent, learners may feel isolated and experience an overall degradation of the learning experience.

2.3. Interaction with LMSs

In a world that is driven by technology, the increasing use of technology in distance education has also brought to the fore the need to explicate how Learning Management Systems (LMSs) promote interaction in online environments. In the distance education learning environment, interaction can take place using both synchronous and asynchronous methods (Zimmerman, 2012). In terms of categorisation of interaction, various studies have relied on Moore's (1989) three-dimensional framework that include: (a) learner-content interaction; (b) learner-instructor interaction; and (c) learner-learner interaction. Recently, there has been an expansion of Moore's (1989) typology to include teacher-teacher interaction; teacher-content interaction; and content-content interaction (Anderson, 2003) and learner-interface interaction (Hillman, Willis, & Gunawardena, 1994). Although the learner-interface has been identified as critical in online learning (Zimmerman, 2012), Anderson (2003) has explained that since all interactions are technology-mediated, learner-interface interaction need not be seen as a unique form of interaction.

Studies by Bernard et al. (2009), Abrami et al. (2011), Borokhovski, Tamim, Bernard, Abrami, and Sokolovskaya (2012), Agudo-Peregrina, Iglesias-Pradas, and Conde-González (2014) and Rodriguez and Armellini (2013) that have tested Moore's typology of

interaction have ranked learner-content interaction and learner-learner interaction higher than that of learner-instructor. Although learner-instructor interaction has not been subjected to a lot of research (Zimmerman, 2012), studies have also shown that learner-instructor interaction is critical and therefore cannot be discounted or played down when discussing interaction in the online environment (Kang & Im, 2013; Shackelford & Maxwell, 2012). Indeed, Sher (2009) found that both learner-learner and learner-instructor interactions were significant contributors to the level of student learning and satisfaction in a technology-mediated environment, whilst Jaggers and Xu (2016) found that student-instructor was ranked higher than student-student interaction in research they conducted among instructors teaching online courses in the United States of America.

Thus, drawing from results of studies that have been conducted on interaction in online learning (Abrami et al., 2011; Arbaugh & Benbunan-Fich, 2007; Bernard et al., 2009; Borokhovski et al., 2012; Croxton, 2014; Swan, 2001, 2002; York & Richardson, 2012) and that have relied on Moore's typology, this study adopts the three typologies of interaction: learner-content, learner-instructor and learner-learner interactions as the basis for study. As argued by Finch and Jacobs (2012, p.548), these 'interactions become the basis for the development of a collaborative learning community, which is considered critical to promote learning in an online environment.'

2.4. Learner-content interaction

Moore (1989) has noted that 'without it there cannot be education, since it is the process of intellectually interacting with content that results in changes in the learner's understanding, the learner's perspective, or the cognitive structures of the learner's mind' (p.2). Learner-content has been identified as critical in distance learning (Bernard et al., 2009; Gosmire, Morrison, & Van Osdel, 2009; Kellogg & Smith, 2009; Rhode, 2009; Tuovinen, 2000; Xiao, 2017; Zimmerman, 2012) because it is through this interaction that learning takes place (Zimmerman, 2012). It allows the learner to interact with the content or subject matter so that he/she is able to construct meaning, and apply the content to solve problems (Bernard et al., 2009; Borokhovski et al., 2012; Lou, Bernard, & Abrami, 2006; Moore, 1989). Bernard et al. (2009) have noted that learner-content interaction encompasses the development of mental and physical skills. In the online learning environment, learner-content interaction includes reading e-books, course modules and PowerPoints, watching instructional videos and using discussion forums (Abrami et al., 2011; Thurmond & Wambach, 2004; Zimmerman, 2012) as well as searching for new information and completing assignments and working on projects (Abrami et al., 2011; Bernard et al., 2009).

2.5. Learner-instructor interaction

In this type of interaction, Moore (1989) has explained that the instructor seeks 'to stimulate or at least maintain the student's interest in what is to be taught, to motivate the student to learn, to enhance and maintain the learner's interest, including self-direction and self-motivation' (p.2). The role of the instructor in a DE environment is that of a facilitator rather than the role of a 'sage on stage' as in a formal classroom situation. In spite of the differences in roles between a DE environment and a typical classroom face-to-face environment with lecturers, students value interaction with

facilitators (Thurmond & Wambach, 2004). Several benefits have been highlighted by DE theorists with respect to learner-instructor interaction in a DE environment. These benefits include provision of motivation and emotional support, instructor presence, clarification of nebulous learning points, deep understanding of course content, timely feedback, and course satisfaction (Bernard et al., 2009; Finch & Jacobs, 2012; Kang & Im, 2013; Kuo, Walker, Schroder, & Belland, 2014; Lonn, Teasley, & Krumm, 2011; Shackelford & Maxwell, 2012; Thurmond & Wambach, 2004; Xiao, 2017).

2.6. Learner-learner interaction

This refers to interaction between individual students or among students working in small groups, with or without the real-time presence of the instructor (Bernard et al., 2009; Kuo et al., 2014; Lou et al., 2006; Moore, 1989). Studies have shown that this interaction allows learners to collaborate with one another on projects, assignments and discussions and to form communities of learners (Marks et al., 2005; Vrasidas, 2000). When students interact with their peers, there is heightened interest and motivation amongst them, they understand the content better, and develop critical thinking skills (Anderson, 2003; Kuo et al., 2014; Lonn et al., 2011; Swan, 2002; Thurmond & Wambach, 2004; Xiao, 2017). This interaction can happen synchronously through the use of videoconferencing and chatting (using chat rooms), or asynchronously, through discussion forums or emails, and drop-box (Borokhovski et al., 2012; Lou et al., 2006). In spite of the growing importance of learner-learner interaction in DE, there has been some criticism levelled against this interaction. Some DE theorists argue that for this interaction to be encouraged and effective, either synchronously or asynchronously, there is the need to appropriate the affordances of technological tools offered by LMSs such as Sakai (Beldarrain, 2006; Borokhovski et al., 2012). Sakai communication and collaborative tools such as the discussion forum, drop-box, email, chat room, e-portfolios, blogs and wikis allow students to engage in online discussions and interactions. What is important is that none of the three types of interaction operate in isolation from one another. Anderson (2011) and Swan (2001) have noted that interaction among students is supported by instructor facilitation and content.

3. Materials and methods

The study adopted the qualitative descriptive case study as its research design. The qualitative case study design focuses on exploration of a phenomenon within its context using a variety of data sources (Baxter & Jack, 2008). The qualitative case study allows for exploration of the issue through different lenses revealing multiple facets and promoting a deeper understanding of issues (Baxter & Jack, 2008). Different writers have proposed different types of qualitative case study (Merriam, 2000; Stake, 1994; Yin, 2003). Because the study focused on how DE nursing students could learn using the Sakai LMS as they interacted with content, peers and instructors, we adopted Stake's instrumental case study approach. The instrumental case study allows us to explore the issues of interaction of students rather than focusing on the case (Stake, 1994).

The study population comprised all the Distance Education Level 300 Nursing Students in the eight Regional Learning Centres of the School of Continuing and Distance Education of the University of Ghana. In terms of sampling, a non-probabilistic, purposive sampling method was adopted to allow for the identification and selection of information-rich cases (Coyne, 1997; Patton, 2002). The convenience sampling approach was adopted to select students from four

of the regional learning centres. These centres were: (1) Accra Learning Centre; (2) Tsito Learning Centre; (3) Sekondi/Takoradi Learning Centre; and (4) Tamale Learning Centre. The homogenous sampling approach (Patton, 2002) was chosen to select nursing students for focus group interviews. The homogeneous sampling approach allowed the selection of nursing students based on similar characteristics as distance education students (Collins, Onwuegbuzie, & Jiao, 2007; Patton, 1990) and those who have similar experiences as DE students who are using the Sakai CLE.

The focus group interview method was used to collect data on students' interaction with content, peers and instructors using the Sakai LMS. The semi-structured interview guide, which comprised open-ended questions, covered four main areas: (a) experiences with the Sakai CLE; (b) benefits and challenges of using the Sakai CLE; (c) students' uses of tools in the Sakai CLE; (d) efficiency in using the Sakai CLE in teaching and learning, focusing on learner-content interaction, learner-instructor interaction, and learner-learner interaction; (e) whether the Sakai CLE learning management system promotes learning.

In all, four focus group discussions were conducted in four of the eight Learning Centres of the School of Continuing and Distance Education of the University of Ghana: Tsito Learning centre, Tamale Learning Centre, Accra Learning Centre and Sekondi/Takoradi Learning Centre. Each focus group discussion had around twelve students and lasted about an hour. Audio-tapes were used to record the discussions. The focus group discussion approach was adopted because it allowed for a fast and efficient way of obtaining data from multiple participants (Onwuegbuzie, Dickinson, Leech, & Zoran, 2009).

3.1. Data analysis

The data collected were transcribed as per the focus group meeting. Thematic analysis, which is a qualitative descriptive method for analysing and reporting patterns (themes) within data was used (Braun & Clarke, 2006; Clarke & Braun, 2013; Cruzes & Dybå, 2011; Floersch, Longhofer, Kranke, & Townsend, 2010; Vaismoradi, Jones, Turunen, & Snelgrove, 2016; Vaismoradi, Turunen, & Bondas, 2013). This approach was adopted because it had been identified as appropriate for the analysis of qualitative interview data from in-depth interviews (Kelley, Swanson, Maas, & Tripp-Reimer, 1999 cited in Butcher, Holkup, Park, & Maas, 2001). Butcher et al. (2001) have argued that thematic analysis affords 'direct representation of an individual's own point of view and descriptions of experience, beliefs, and perceptions' (p. 474). Thematic analysis in this study was based on the guidelines of Braun and Clarke (2006), Clarke & Braun (2013)). First, the investigators read through the transcripts carefully and highlighted all quotes that appeared to be significant or information-rich (Anderson & Felsenfeld, 2003; Braun & Clarke, 2006). Second, a coding scheme was prepared for the analysis of the transcribed data. Third, themes were identified in the text and those that were similar were put together while different themes were separated. Fourth, further work was done on the themes to ensure that they told convincing and compelling stories. The themes in this stage consisted of statements made by students about their experiences, beliefs and perceptions on the adoption of learning management systems, as well as their affordances and constraints and the efficiency of Sakai CLE in teaching and learning. The final stage of the thematic analysis was the write-up, which involved weaving together the analytic narrative and data extracts to tell a coherent and persuasive story that is contextualised in relation to the data (Clarke & Braun, 2013). The major themes identified are found in Table 1:

Table 1. Main themes identified.

Theme	Data Analysis
Theme 1	Experiences with Sakai CLE
Theme 2	Benefits of Sakai CLE
Theme 3	Challenges of using Sakai CLE
Theme 4	Tools usage pattern of Sakai CLE among students
Theme 5	Time Spent on Sakai
Theme 6	Sakai CLE Efficiency – learner-content, learner-instructor, learner-learner interactions

3.2. Ethical considerations

The questions of the study were submitted to the College of Humanities Ethical Committee for ethical approval. Steps were taken to ensure that the privacy, confidentiality and rights of the respondents were not violated. There was full disclosure of the objectives of the study and permission was sought to use a tape-recorder to record their statements.

4. Results

The study was interested in finding out the levels of interaction among students using the Sakai LMS. The study focused on DE nursing students who were on an online teaching and learning programme at the University of Ghana. As part of the effort to determine if the Sakai LMs was helping students learn better, the following themes were identified:

- Experiences
- Benefits
- Challenges
- Tool usage patterns
- Time spent on Sakai
- Sakai CLE Efficiency – learner-content, learner-instructor, learner-learner interaction

4.1. Experiences with Sakai CLE

One of the major themes identified from the data was the experiences of students with the LMS. Studies have shown that students' interaction with technology is influenced greatly by their past and present experiences. Students who are computer literate before they enter university, are likely to have a strong liking for the use of technology. Student experiences are determined by the training they have received and the perceived ease of use and usefulness of the technology. Students' experiences with the Sakai LMS were positive to a large extent.

4.1.1. Benefits of using the Sakai CLE

On the positive side, most of the students indicated that the Sakai CLE offered benefits such as convenience, flexibility and ease of access to learning materials. The findings of the study show that convenience was the predominant benefit of using the Sakai CLE among the majority of participants. Most of the students interviewed noted that the Sakai CLE was convenient as it made it possible for one to access course materials irrespective of

one's location. One does not need to travel to the campus in order to undertake any work or assignment. The only thing one needs to do is to take cognisance of the assignment deadlines in order to avoid late submission. Students further noted that using the Sakai CLE reduced their cost of travel to centres for information. They intimated that due to easy access to learning materials online, students did not need to travel to the university campus to submit assignments.

A student reported:

> I would say it is convenient because you can sit anywhere and access your assignment, do it and submit. And then you are not really under pressure. You can do it at your own comfort and at the time that you want to do it. Just that you have to meet deadlines. So I think it's ok.

As workers, some students noted that they could be anywhere with their tablets, on which they had their learning material, and therefore could do their learning anywhere and at any time. Some said their use of the technology had also helped them to hone their digital literacy skills. A student buttresses this point as follows:

> To me it has built my ICT knowledge more because initially I knew how to do few things when it comes to internet but when I came into this class, I had to learn by force other than that I would be behind. So it has helped me to know more about IT.

Another student states:

> For me personally I don't have much knowledge on IT, so accessing it or using the Sakai has broadened my knowledge because I have to ask people how to go about things. So it has really helped me.

For one, the benefits included, *'No plagiarism here because all the assignments that we submit are tested by a software that is embedded in Sakai; as such it prevents plagiarism'*. Nursing students reported that Sakai enabled them to network with other students in other regional centres. According to one nursing student, *'You are able to get in contact and reach out to a lot of people. Like when you put a suggestion on the chat room, a lot of people come to contribute and you are able to get other contributions'*.

4.1.2. Challenges of Sakai CLE usage

Though there are benefits associated with Sakai, it was also revealed that some challenges do exist. In terms of challenges, students mentioned difficulties such as downloading learning materials, difficulties with the way Interim Assessments are held on Sakai, the high cost of data bundles, the unstable nature of the Internet, inadequate training, the absence of tutors and instructors on the learning platform for interaction and the difficulty of identifying those who participate in the chat rooms. According to some of the students:

> But the main challenge is with the network because we are from different places. At times where you are, the network might not be very good and I noticed that even on campus it's only when you go to the computer lab that you get a reliable network that you can do your work successfully without any major challenge.

> The network as well, especially last semester when we were doing the Interim Assessment (IA), in the middle of the exercise the network went off and the timer continued and so by the time the network was restored, the time was up and I could not complete the assignment. I sent emails to the authorities but I did not get a response and when the results came out I had performed poorly.

Students explained that the Sakai CLE training, which was often provided during orientation and took more than a few hours, was not adequate to enable them to navigate their way through the Sakai tools effectively. Students also noted that the cost of bundles and data to browse when outside the Learning Centres was quite expensive for many of them.

4.2. Tools usage pattern of the Sakai CLE among students

As noted earlier, the Sakai LMS has several tools that students can use to interact with content, with instructors/tutors and among themselves. The study found that nursing students on the University of Ghana Distance Education programme used a variety of Sakai tools. The major tools used by students were: resources, assignment and quizzes, gradebook, announcement, chat room, and discussion forum. On the whole most students found the resources, assignment and chat room tools to be very useful. The majority of students used the resource tool to download their course materials. According to one student:

> We do download most of our lecture slides from resources so that makes us go there most often and sometimes they update the resources and put books there, so we have to go and check.

A significant number of nursing students used the Test and Quizzes tools because Interim Assessments were often organised on the Sakai CLE platform. The study also found the chat tool to be very useful.

According to one nursing student:

> I have found the chat room very helpful. When you go there you find out challenges of their colleagues and how they were able to solve it. Some of the course mates also post the solutions to certain problems and if you go through it you can also apply similarly.

This was supported by another student who said:

> When I am on campus I go to the chat room because I learnt there is a graph on how often you use the Sakai. We are all being graphed, so either you are on a flat scale or you are going up. So when I heard it I tried to do something, even if it's hi/hello. I try to do something so that I can at least have something on my graph so that is it; chat room, assignment and resources.

The study found out that there were Sakai tools which were scarcely used by students. These tools included Syllabus, Drop-box and Calendar. Tools that were not used at all by students were Lessons, Site Info, Polls, Wiki, Blogs and Workspace. This might suggest that during the training on Sakai the interviewees were not introduced to these tools and therefore did not know of their relevance.

4.3. Time spent on the Sakai CLE platform

In exploring the usage pattern of Sakai among participants, the study sought to find out the time students spent on the platform in a day. It was noted that on average the majority, or more than two thirds (18 out of 24), of participant duration of Sakai usage was from 5 to10 minutes. However if they were downloading any lecture slides or course materials and the Internet network was poor, then they could stay longer than ten

minutes, and therefore might be logged on for about 15 to 30 minutes. In situations where students had Interim Assessments (IA) or regular assignments, they could spend an hour or more to complete their work. This implies that one might stay longer on Sakai when completing assignments. For activities that require no downloading, however, not more than ten minutes is spent on the platform.

4.4. Learner-content interaction

One of the advantages of the Sakai CLE is that it allows students to examine and study the course content which has been developed and uploaded by faculty. Thurmond and Wambach (2004) have noted that factors that affect students' perception of learning course content include continuous contact with the content, clarity of design, time, and participation in online discussion. The study found out that students had access to study guides, PowerPoint slides and reading lists often uploaded on the Sakai CLE through the resources tool. Students noted that the PowerPoint slides were well designed to facilitate easy reading and learning. However, students complained that they did not have continuous contact with the content.

> So if we don't get the resources on time, how are we able to go through? So sometimes you realize that the facilitator comes here, she expects that at least before we meet the first section, we should have gone through at least four or five sections on the Sakai but we haven't gone through. So she comes here and the discussion is not fruitful at all.

4.5. Interaction with course instructors and tutors online

One of the uses of the tools of Sakai is to facilitate interaction between course instructors and students and among students. These tools, especially the communication and collaborative tools such as Discussion Forum, Wikis and Blog have allowed course instructors and tutors to maintain a social and teaching presence. The major problem students noted was the difficulty in communicating with their course instructors or lecturers who developed their learning materials. They complained about the lack of interaction with the course instructors either in the chat rooms or the discussion forums. The study found overwhelmingly that course instructors were not regularly on Sakai to interact with students. According to a student:

> If the word "interaction" is being used then I would say no, but we hear from them (lecturers) during revision. We have videos during revision. Last semester for instance videos were available. We watched it and then there was meeting too with one lecturer and we interacted. But interaction is an ongoing thing; that one I know. But we don't have any sort of interaction. During the course of the semester, we don't have a means unless maybe you email them (lecturers). I have not tried emailing a lecturer but for those who have emailed said on response of feedback came. To communicate to a lecturer without a feedback, then that wasn't an interaction".

Most of the students noted that the discussion forum, which should allow students and lecturers to interact, is not well managed and therefore it is difficult for any meaningful interaction to happen. According to the students, the forum was mainly used by students seeking answers to their problems.

According to some of the students:

> We post contributions on Sakai forum hoping that our lecturers will respond. However, we do not get feedback. Without feedback there is no communication. Communication entails the sender, the receiver and the feedback must be there. We never get feedback. So far as we are concerned, we are not communicating. We are just posting, we just put something there. Whether it is wrong or not nobody knows, so we just continue our conversation until we get tired and stop.

> When the tutors come around they tell you they are not on the Sakai platform and therefore do not have some of the learning materials we have. So it is very challenging in class. The interaction we are supposed to be having is not there. The communication which should be there is then broken.

Students also indicated that their tutors were not on Sakai and therefore it was very difficult to interact with them. Tutors noted that they had not been trained to prepare them for the interaction that is critical with students on Sakai. Tutors indicated that in addition to the absence of training, they also have not been logged on to Sakai and therefore are not interacting with their course instructors and students. According to one student '*we have not interacted with any of our tutors before*'. This was confirmed by another student who thought that '*the problem they had was that they were not given access to Sakai, so they are not able to log in and interact with us. So we have never been able to interact with them on the Sakai platform*'.

The situation of not having tutors on the Sakai platform, and therefore of tutors not interacting with students, was confirmed by the tutors. According to some of the tutors:

> Had we been given the opportunity of interacting with the lecturer then I would actually be on solid ground meeting and chatting with students. You have to think this way. This is what the lecturer wants and actually know exactly where to pint them. So right now I am clueless as to which direction the lecturer wants us to go. I really don't know so it is constraining me. It is very constraining.

> In my case I have the slide which I use for my tutorials but I am not on the Sakai Platform, the shared platform where tutors interact with students. However, we have what I will call an alternative. It is a WhatsApp group and sometimes students chat there, so I get the sense of the things they talk about.

> Just as my colleague has said, one thing I saw that could help was to create a WhatsApp group. That is what I have been using but for this current class I have not started with them but the previous class I was using WhatsApp group with them for interaction.

4.6. Interaction among students

Student interactions are to be facilitated on Sakai through the communication and collaborative tools. The study found out that whilst some students used the chat tool to communicate and collaborate with their peers, others did not use the tool. The study found out that the majority of students preferred and were using the WhatsApp platform for interaction.

According to a student:

> Since we have a WhatApp platform we don't use Sakai because we send messages anytime to our peers on WhatApp. We have a WhatsApp group for our course mates. So we use that more often than Sakai.

According to another student, '*we have WhatsApp groups that are extended to other regional centres. For example, in Takoradi we are linked with Kumasi and Sunyani. We also have various groups within this class who interact on Telegram.*' According to the students, the Telegram is an application just like WhatsApp for group interaction.

5. Discussion

Extant studies have shown that the use of LMSs and their tools by both faculty and students have the potential to enhance teaching and learning. LMSs have several affordances that need to be harnessed to transform teaching and learning. The study revealed that there were significant affordances associated with the use of the Sakai Learning Management System. These benefits included easy access to learning materials anywhere anytime, efficiency in terms of saving time, and convenience. These findings support earlier studies by Costa, Alvelos, and Teixeira (2012), Iqbal and Qureshi (2011), Lonn and Teasley (2009), Lonn et al. (2011), Schnetter et al. (2014), West, Waddoups, and Graham (2007), and Cavus (2015). The study also found out that Sakai LMS is being used mainly by students as a repository of materials and information. Apart from the affordances of the Sakai LMS, the study found that there were huge challenges facing nursing students. These challenges had to do with inadequate training on how to use tools, unstable Internet connectivity, the high cost of data bundles, and challenges of conducting interim assessments on Sakai. Similar challenges have been mentioned by Ngeze (2016) and Lonn et al. (2011) as some of the elements that constrain the use of the Sakai LMS by students. Indeed, the importance of continuous training for students in the use of the Sakai LMS cannot be overemphasised. Although significant studies have been conducted on training and adoption of the LMS among faculty (Ali, 2003; Bennett & Bennett, 2003; Morgan, 2003; West et al., 2007), it is increasingly becoming clear that if training is not integrated in the use of the LMS by students, then students' adoption of the LMS will be compromised.

Of the tools frequently used by students, the study revealed that the most important was the resource tool. Other tools used by students included assignment, quizzes and tests; gradebook; announcement, and chat room. Most of the students used the quizzes and test tool mainly for interim assessments. This supports the position of Piña, Green, and Eggers (2008) that students place the highest value on those features that make their lives easier and their learning more convenient. The study revealed that most students did not use the communication and collaboration tools such as discussion forum frequently. While some of the students indicated that tools such as Wikis, Blogs, Lessons and Syllabus were not used at all. This result also supports the findings of Lonn et al. (2011) that students place much emphasis on information (i.e. materials and push-out activities) over communication (i.e. interactive activities) uses of an LMS. As indicated in the study, students did not mention the use of tools such as Wikis, Blogs and e-Portfolios which are important tools in Sakai and which, in addition to the discussion forum, promote interaction.

What is significant about the Sakai communication and collaborative tools is that they enrich student-content, student-instructor interaction and student-student interaction. On student-content interaction, the study noted that student satisfaction was not appreciably high due to the challenges of using the Sakai CLE. Apart from the PowerPoint slides, very important pedagogical tools such as video presentations were unduly delayed, whilst the use of problem-based learning approaches was completely absent. Student-instructor

interaction has been identified as very important in online learning because it creates an online presence of the instructor which not only helps students to understand content, but also provides mentoring, motivation and emotional support which improves students' learning and learning outcomes (Arbaugh & Benbunan-Fich, 2007; Bernard et al., 2009; Finch & Jacobs, 2012; Lonn et al., 2011; Soo & Bonk, 1998). The Sakai LMS allows discussion forums to be used as a platform for interaction between learners and instructors in order to improve the asynchronous interactive environment and enable timely feedback from instructors (Sowan & Jenkins, 2013; Yilmaz & Keser, 2016).

Unfortunately, the study revealed that student-instructor interaction was very weak. Students complained about instructors not being online and the discussion forum often being hijacked by other students. Students also indicated that tutors who should provide additional support through tutorials did not engage in any meaningful interaction with students because they did not interact with students on Sakai. Students complained about a lack of feedback from instructors and tutors. These findings support studies by Kupczynski, Ice, Wiesenmayer, and McClusky (2010), and Ladyshewsky (2013), that the lack of timely feedback to students affects their frequency of visits and the time they spend using the Learning Management System as well as their satisfaction. Although Sher (2009) found a significant relationship between student-instructor interaction, this was found to be the opposite in this study. Sher (2009) has noted that students and instructors need to find ways to convey information, and create workable feedback. This is supported by DeBourgh (2003) who has argued that high levels of success in online learning are due to strong interaction between student and instructor.

On student-student interaction, the study found that most of the students interacted using the chat tool. The main reason for the use of the chat tool was to enhance interaction with students in other regional centres of Ghana and, more so, to learn from one another. Beyond using the chat tool, students also created WhatsApp groups and engaged in interaction with their tutors and among themselves using their WhatsApp platform. Another type of platform which students have also started using is Telegram. Tutors confirmed that because they were not on Sakai, they have had to rely on the WhatsApp platform to interact with students. These findings support studies by O'Hara, Massimi, Harper, Rubens, and Morris (2014), Bouhnik and Deshen (2014), Church and de Oliveira (2013) and Rambe and Chipunza (2013) that have revealed that the major reasons for the high usage of WhatsApp among students is its ability to promote group interaction through sharing of information and the ability to help students find solutions through informal social networking.

On the question of whether the Sakai LMS was helping students learn better, the study found that, while the majority of students admitted that the Sakai LMS had made access to course materials easier and enabled them to interact with content anywhere and anytime, they were of the opinion that the challenges often associated with downloading huge course materials, and inadequate training, had made their learning more difficult. Students noted that although Sakai could improve their learning, they did not visit the Sakai site frequently and therefore did not use Sakai tools as often as they should. However, students opined that the more one interacts with the LMS tools the more skilled they became in its use. Much as students wanted to interact with instructors and tutors on Sakai, this critical avenue for enhancing learning among students was absent. These results support the findings of Brown, Dehoney, and Millichap (2015) that more time ought to be given to collaboration for true learning to happen amongst students.

6. Conclusion

Learning management systems such the Sakai CLE have been adopted by several universities to transform teaching and learning. The Sakai CLE offers students and instructors several tools which engender interaction between instructors and students, students and content, and among students. The study demonstrated that whilst the Sakai CLE has affordances such as convenience and ease of access to important learning materials by students, there are critical challenges such as internet connectivity, inadequate training, power supply and challenges with conducting assessments online. There is no doubt that if significant improvements are to be made in enhancing students' learning using the Sakai CLE, then students need to use both the information tools and communication and collaboration tools. Effective and sustained training of students on the use of the various tools needs to be institutionalised.

Levels of interactions between instructors and students, students and students and between students and content are critical to learning among students. Bernard et al. (2009) and Abrami et al. (2011), have all confirmed the importance of the three types of interaction on student learning. However, in this particular study we have found that student-instructor interaction is highly critical in ensuring students' satisfaction with the DE programme. High levels of interaction between instructors and students have been found to promote critical thinking and deep learning. What faculty needs to do to ensure the satisfaction of students is to spend large amounts of time in responding to questions and inquiries on the discussion forum. This aspect of interaction needs to be promoted to ensure that instructors and tutors maintain a teaching and social presence online. Students are creating their own groups and interacting with each other through WhatsApp and Telegram to enhance social presence. Getting the right mix is necessary if students are to improve upon their learning using the Sakai CLE. Strengthening the three levels of interaction (i.e. student-content, instructor-student, and student-student) is the right mix for enhancing students' learning through the use of the Sakai CLE.

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