

Learning Management Systems and Self-Directed Learning in Higher Education Institutions in Cameroon

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ABSTRACT

This study purposed to find out how the use of learning management systems influence learners' self-directed learning skills in higher education institutions in Cameroon, this with particular focus on how content delivery influences learners' development of self-directed learning skills, how learning assessment impacts learners' development of self-directed learning skills, and how teacher-student interaction affects learners' development of self-directed learning skills. Theoretically, this study is anchored on the following theories; Garrison's self-directed learning model (1997) Mayer's theory of Multimedia learning (1949), Seymour Papert's constructionism theory (1980), George Siemens theory of Connectivism (2004), Information Processing Theory by Richard Atkinson & Richard Shiffrin (1968) and Adult learning by Malcom Knowles (1968). In order to find appropriate answers to the research questions, a mixed research method was adopted whereby the sequential exploratory design was used. The sample population of this study was made up of 12 lecturers including e-learning personnel and 260 students from eight higher education institutions, giving a total of 272 respondents. Data were collected using an interview guide, observation checklist and a questionnaire. Data were analysed qualitatively using thematic analysis and quantitatively using frequencies, proportions and Multiple-Responses Analysis (MRA), and inferentially using the Pearson's product moment correlation and the Binary Logistic

Regression. The findings revealed that there was no significant impact of content delivery on students' acquisition of self-directed learning skills which implies that the more teachers dwell on content online, the lesser students acquire self-directed learning skills; secondly, the findings unfold that there was a significant impact of learning assessment on students' acquisition of self-directed learning skills, which implies that the more teachers assess students, the more they commit to learn thus acquiring self-directed learning skills; lastly, the findings indicated that there was a significant impact of teacher-student interaction on students' acquisition of self-directed learning skills which implies that the more teachers interact with their students, the more they acquire self-directed learning skills. Based on the findings, the following recommendations were made: Teachers who teach using Learning Management Systems (LMS) in higher education institutions should be properly trained so they don't load content online for students to assimilate as it may be monotonous to them. Teachers who teach using LMS should be sensitized to prioritize the use of continuous assessment strategies; at every stage of using LMS, emphasis should be laid on teacher-student interaction.

KEYWORDS: Learning Management Systems, Self-Directed Learning, Content Delivery, Learning Assessment, Teacher-student Interaction, Higher Education

INTRODUCTION

The acquisition of skills and learning according to UNESCO (2002) is the major driver for a sustainable education. For this reason, educational institutions are under increasing pressure to make sure students learn skills in the course of their interaction in schools.

However, this acquisition can be made easy with self-directed learning. Self-directed learning is becoming a formidable form of learning in higher educational institutions striving toward academic excellence of their students. It is also known for making students

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authors of their own knowledge as they try to make sense of the world (Tchombe, 2019). According to Wendy & Devon (2015), self-directed learning (SDL) is an instructional strategy where the students with guidance from their teacher, decide what and how they will learn. It can be done individually or with a group, but the overall concept is that, students take ownership of their learning. Correspondingly, Knowles (1975) defines self-directed learning as a process in which individuals take the initiative to diagnose their own learning, identifying resources for learning, choosing the appropriate learning strategies and evaluating their own learning. On this premise, the partnership for 21st Century skills has recently identified self-directed learning as one of the life and career skills necessary to prepare students for education and workforce.

In the course of acquiring self-directed learning skills, higher education students in Cameroon face myriad issues such as lack of facilities, motivation and confidence to manage their own learning effectively. This therefore makes it challenging for them to fully develop SDL skills appropriately. Students' personal responsibility in learning involves students taking ownership of their learning, setting learning goals, and accepting responsibility for their thoughts and actions (Hiemstra, 1994). In essence, the decision of learning begins and resides with the learner; with the learner maintaining control for many learning decisions (Banz, 2009; Hiemstra, 2013). However, it is important to note that learning usually takes place within a social context involving the teacher as well as other students (Hew, Cheung & Lim, 2013). In other words, taking personal responsibility over one's learning does not exclude a student from working with the teacher or his peers (Banz, 2009).

Historically, the advent of learning management systems (LMS) has completely changed the way students learn and acquire knowledge. The efficacy of LMS was seen during the global outbreak of Covid 19 where it was impossible for students to go to school. As such, in higher education, some measures were adopted to manage teaching and learning at that period which were, institutions adopting learning management systems for teaching and learning to continue while students were at home. This however, facilitated pedagogic practices and till date, LMS are still being adopted and used in the classroom. The use of LMS makes students to be actively involved in their learning which therefore promotes SDL.

In support of the above, Campbell (2020) asserts that one of the biggest benefits of a the LMS is the opportunity for self-directed learning. Learners can not only choose their own learning paths, but they can

also access course sessions at the times that best suit them and go through the training content at their own pace. It is on this premise that this study seeks to investigate the effectiveness of LMS on Self-directed learning in higher institutes of learning in Cameroon.

Background

Historically, it is difficult to trace the evolution of LMS without mentioning educational technologies; as such the historical background begins by articulating the evolution of educational technologies. Educational technologies can also be traced back to the time of the three-age system periodization of human prehistory; namely the Stone Age, the Bronze Age, and the Iron Age (Saettler, 2004). During the Stone Age, ignition of fire by rubbing stones, manufacture of various handmade weapons and utensils from stones and clothing practice were some of the simple technological developments of utmost importance. A fraction of Stone-age people developed ocean-worthy outrigger-canoe-ship technology to migrate from one place to another across the Ocean, by which they developed their first informal education of knowledge of the ocean currents, weather conditions, sailing practice, astronavigation, and star maps. During the later Stone Age period (Neolithic period), for agricultural practice, polished-stone tools were made from a variety of hard rocks largely by digging underground tunnels, which can be considered as the first steps in mining technology. The polished axes were so effective that even after appearance of bronze and iron; people used it for clearing forest and the establishment of crop farming. Although Stone-age cultures left no written records, archaeological evidences proved their shift from nomadic life to agricultural settlement (Saettler, 2004) as they advanced in technology. Ancient tools conserved in different museums, cave paintings like Altamira Cave in Spain, and other prehistoric art, such as the Venus of Willendorf, Mother Goddess from Laussel, France, and more authentically in Kamitic or Black Pharaohic Egyptian Pyramids just to name a few are some of the evidences in favour of their cultures. Neolithic revolution of Stone Age resulted in the appearance of Bronze Age with development of agriculture, animal domestication, and the adoption of permanent settlements. The Iron Age people replaced bronze and developed the knowledge of iron smelting technology to lower the cost of living since iron utensils were stronger and cheaper than bronze equivalents. In many Eurasian cultures, the Iron Age was the last period before the development of written scripts. During the ancient civilisation, educational technologies can be traced back to the time when tribal priests systematized bodies of knowledge and ancient cultures invented

pictographs or sign writing to record and transmit information (Saettler, 2004). In every stage of human civilization, one could find an instructional technique or set of procedures intended to implement a particular culture which were also supported by a number of investigations and evidences. The more advanced the culture, the more complex became the technology of instruction designed to reflect particular ways of individual and social behavior intended to run an educated society. Over centuries, each significant shift in educational values, goals or objectives led to diverse technologies of instruction. The greatest advances in technology and engineering came with the rise of the ancient civilizations. These advances stimulated and educated other societies in the world to adopt new ways of living and governance.

According to the Chinese Civilization, some of the major techno-offerings from China include paper, early seismological detectors, toilet paper, matches, iron plough, the multi-tube seed drill, the suspension bridge, the wheelbarrow, the parachute, natural gas as fuel, the magnetic compass, the raised-relief map, the blast furnace, the propeller, the crossbow, the South Pointing Chariot, and gun powder (Gernet, 2002). With the invention of paper they have given their first step toward developments of educational technology by further culturing different handmade products of paper as a means of visual aids.

Ancient Pharaohic Egyptian language was at one point one of the longest surviving and used languages in the world. Their script was made up of pictures of the real things like birds, animals, different tools, and so on. These pictures are popularly called hieroglyph. Their language was made up of above 500 hieroglyphs which are known as hieroglyphics. On the stone monuments or tombs which were discovered and rescued latter on provides the evidence of existence of many forms of artistic hieroglyphics in ancient Egypt.

Maria Montessori (1870-1952), internationally renowned child educator and the originator of Montessori Method exerted a dynamic impact on educational technologies through her development of graded materials designed to provide for the proper sequencing of subject matter for each individual learner (Saettler, 2004). Modern educational technologies suggest many extension of Montessori's idea of prepared child centered environment. In 1833, Charles Babbage's design of a general-purpose computing device laid the foundation of the modern computer and in 1943, the first computing machine as per his design was constructed by International Business Machines Corporation in USA. The

Computer Assisted instruction (CAI) in which the computer functions essentially as a tutor as well as the Talking Type writer was developed by Moore in 1966. Since 1974, computers are interestingly used in education in schools, colleges and universities.

In the beginning of the 19th century, there were noteworthy changes in the field of education. British Broadcasting Corporation (BBC), right from its start of school broadcasts in 1920 had maintained rapid pace in making sound contribution to formal education (Saettler, 2004). Educational Technologies have passed through five stages. The first stage of educational technologies was coupled with the use of aids like charts, maps, symbols, models, specimens and concrete materials. The term educational technology was used as synonyms to audio-visual aids. The second stage of educational technologies was associated with the 'electronic revolution' with the introduction and establishment of sophisticated hardware and software (Saettler, 2004). Use of various audio-visual aids like projector, magic lanterns, tape-recorder, radio and television brought a revolutionary change in the educational scenario. Although the first practical use of regular television broadcasts was in Germany in 1929, and in 1936 the Olympic Games in Berlin were broadcasted through television stations in Berlin, Open circuit television began to be used primarily for broadcasting programmes for entertainment in 1950 (Saettler, 2004). Since 1960, television is used for educational purposes. In 1950, Brynmor, in England, used educational technological steps for the first time. As a result of industrial revolution in England in 1960, other countries also started progressing in the field of educational technology. Electronics was the main technology developed at the beginning of the 21st century. Broadband Internet access became popular and occupied almost all the important offices and educational places and even in common places in developed countries with the advantage of connecting home computers with music libraries and mobile phones (Saettler, 2004). Today's classroom is more likely to be a technology lab, a room with rows of students using internet connected or Wi-Fi enabled laptops, palmtops, notepad, or perhaps students are attending a video conferencing or virtual classroom or may have been listening to a podcast or taking in a video lecture. Universities in developing countries have been confronted with significant changes in their external and internal environments (Kibinkiri & Colette, 2023). They are forced to respond to emerging challenges such as the continual development in information and communication technologies (ICTs), increasing demand for higher education, insufficient infrastructure and instructional

materials, and a shortage of qualified human resources with adequate expertise. The number of post primary and secondary students keeps on increasing rapidly every year. World Bank (2005), reports that this trend is partly as a result of the gradual achievement of the Millennium Development Goals (MDGS) by developing countries. This has generated a tremendous demand for higher education, which many cannot satisfy by building schools. The Commonwealth of Learning - COL (2005) stressed that developing countries must find alternative methods to conventional education so that people can continue to learn. Notwithstanding, Tanjong (2010) remarks that educational technologies have opened up entirely new horizons in information access and retrieval and are revolutionizing the way in which people and societies interact, conduct business and compete in international markets. More specifically, the evolution of LMS has passed through five phases as propounded by Training Industry Magazine (2023).

The first phase was known as the Stand Alone LMS. The first generation platform was called the Stand Alone LMS. It was a software program designed to operate on a single personal computer and designed for use solely by training administrators (Training Industry Magazine, 2023). The first known LMS was created in 1983 by software developer Phil Bookman and human resource development executive Rich Silton, who together formed the company Silton-Bookman Systems (SBS). The Cupertino, Calif.-based SBS was acquired by Pathlore in 2000. The application, named Registrar, enabled HR and training departments to manage training administrative operations including enrolling employees in courses, recording attendance and tracking their training. As the first such training administration software program designed for the fledgling PC market, it introduced other important recordkeeping functions such as providing workforce compliance data to the government. The Stand Alone LMS was limited in its functionality since networking technologies had not yet been introduced. For example, a single administrator (called a registrar) typically handled all the inputs. All of the training it supported was instructor-led and self-paced.

The second phase was known as Networked LMS. The introduction of personal computer networking capability in the early 1990s was an important event in the development of the LMS (Training Industry Magazine, 2023). It meant that single systems could be accessed by multiple training administrators within a training department, enabling managers to share LMS-related responsibilities and expanding the use of the software. Although systems were still designed solely for

administrators during this phase of development, the duties of scheduling, registration, post-course tracking and analytics could be spread among other individuals.

Thirdly, there was Learning Content Management Systems (LCMS). The debut of the Internet in the mid-1990s enabled the broadening of LMS applications beyond that of interest only to the administrator (Training Industry Magazine, 2023). Instructors and students could access the same system and benefit from an expanded set of features being added. Instructors could create content for students to access, and also conduct testing. This courseware content capability spawned the need for authoring technology, which quickly became a training market niche. By bringing content into the mix, the training industry finally had a system that included all of the principal learning constituents. Among the key functionality features of an LCMS is the ability of students to “launch” a specific course from the system following registration (this was done from another server in earlier versions). For the student, this meant the LCMS could provide the e-learning course, administer and record testing, and manage his or her transcript. It also told the scheduler who was taking a given course and when, and provided the administrator with billing and tracking information. Despite the much technological advancement of the LCMS and the additional applications enabled by it, the market for “pure play” LMS software programs continues to be robust. According to market research, the vast majority of LMS-related activity is still conducted by training administrators – not instructors or students. This is especially true for large and decentralized organizations.

Fourthly, there was the Learning Portal. The LMS entered its fourth generation during the late 2000’s with the introduction of Web 2.0 capabilities (Training Industry Magazine, 2023). The result is the Learning Portal, an integrated website for training administration and learning activities. It is today’s growth LMS marketplace. The Learning Portal allows any learning constituent to participate in publishing, authoring, delivering and administering training. Employees, customers and other learners can visit the site to register for and launch specific courseware targeted to them. The portal employs a dedicated web interface that aggregates an LMS with social media, collaboration and e-commerce tools. The LMS and possibly other e-commerce software are typically delivered under hosted “software as a service” (SaaS) model. A primary attraction for learners is the ability to access informal content, articles, case studies, access to books and other learning materials via the web interface.

Lastly there was the Personal Learning Environment. The next generation of the LMS will be an advanced

learning portal that allows learners to manage and control their own learning experiences (Training Industry Magazine, 2023). The features of a personal learning environment include an LMS, collaboration and social media tools, analytics and measurement systems, and advanced filtering technologies that can create a highly customized personal learning experience. The emergence of relevancy filtering technology by Google and other search engines is creating interest in the potential of PLE's by a small segment of early adopters. Initial market growth for PLE's is expected to be in customer training, not employee development. The focus of this study will mainly be on Moodle and Google classrooms as learning Management Systems.

Self-directed learning has existed even from classical antiquity. For example, self-study played an important part in the lives of such Greek philosophers as Socrates, Plato, and Aristotle (Hiemstra, 1994). Other historical examples of self-directed learners included Alexander the Great, Caesar, Erasmus, and Descartes. Social conditions in Colonial America and a corresponding lack of formal educational institutions necessitated that many people learn on their own.

However, it was during the last decade (20th Century) that self-directed learning has become a major research area. Groundwork was laid through the observations of Houle (1961) (University of Chicago, Illinois). He interviewed 22 adult learners and classified them into three categories based on reasons for participation in learning: (a) goal-oriented, who participate mainly to achieve some end goal; (b) activity-oriented, who participate for social or fellowship reasons; (c) learning-oriented, who perceived of learning as an end in itself. The first attempt to better understand learning-oriented individuals was made by Tough, a Canadian researcher and one of Houle's doctoral students (Hiemstra, 1994). His dissertation effort to analyze self-directed teaching activities and subsequent research with additional subjects resulted in a book, *The Adult's Learning Projects* (1979). This work has stimulated many similar studies with various populations in various locations.

In parallel scholarship during this same time period (that is the 20th century), Knowles popularized in North America the term, andragogy, with corresponding adult instructional processes (Hiemstra, 1994, p.121).

Conceptually, Hiemstra, (1994) in his 1975 publication, "Self-directed Learning", provided foundational definitions and assumptions that guided much subsequent research: (a) self-directed learning

assumes that humans grow in capacity and need to be self-directing; (b) learners' experiences are rich resources for learning; (c) individuals learn what is required to perform their evolving life tasks; (d) an adult's natural orientation is task or problem-centered learning; (e) self-directed learners are motivated by various internal incentives, such as need for self-esteem, curiosity, desire to achieve, and satisfaction of accomplishment.

In the African traditional societies, self-directed learning was visible in the five fundamental philosophies. Firstly, communalism, where parents sought to raise their children within a community as each individual saw his/her wellbeing as tied to the welfare of the group, clan or tribe (Mac-ojong, 2008). Cooperation was preferred to competition; the child was brought up to love and sympathize with fellow human beings. Children acquired knowledge through participation in group activities like team conceptual exercises, craft, building and construction which called for the cooperation of many members of the family or community (for no individual family built a house alone). As children participated in these activities, they acquired knowledge and skills in building and construction, and it also instilled the sense of love in them. Further, children were taught the desire to be together and share the joy and sorrows of the family, the tribe and the clan. The solidarity is shown during the birth of a child where there is joy shared by members of the family, the tribe and the clan. During deaths, sorrow is shown by all members of the group.

Secondly, there was preparationism which demanded children to be prepared to assume adult cultural, social, economic and political roles in the family, the tribe or the clan. Children were prepared to assume adult roles and functions in the family, the tribe and the clan (Mac-ojong, 2008). These roles were cultural, social, economic and political. Children were prepared to eventually play the roles of husband, wife, bread-provider, councillor in the village, and so on. Children learnt farming to become future farmers.

Thirdly, perennialism which posited the perpetuation of culture from generation to generation, (children were brought up to imbibe their culture so that, it does not disappear). Children were continually reminded by their parents to learn and practice their culture, so that it does not disappear even after the death of the elders, for if culture disappears, the whole society disappears spiritually (Mac-ojong, 2008). Through perennialism, members of the society made sure that behaviours which ensured the survival of the cultural heritage were learnt.

Fourthly, holism, where children were trained to be jacks of all trades and masters of all, (here, children were brought up to participate in all communal skills and activities, as such knowledge was not compartmentalised) (Mac-ojong, 2008).

Theoretically, in Constructionist learning there is the creation by learners of mental models to understand the world around them. Constructionism advocates student-centered, discovery learning where students use what they already know, to acquire more knowledge. Students learn through participation in project-based learning where they make connections between different ideas and areas of knowledge facilitated by the teacher through coaching rather than using lectures or step-by-step guidance. Further, constructionism holds that learning can happen most effectively when people are active in making tangible objects in the real world. In this sense, constructionism is connected with experiential learning and builds on Jean Piaget's epistemological theory of constructivism. Seymour Papert advanced that learners as active participants, are involved in structuring their own learning experiences; however, by teacher-learner interaction via LMS, learners can easily structure their learning experiences since they are actively involved in the knowledge construction process thereby building their SDL skills.

Siemens (2004) emphasizes the idea that knowledge is a series of interrelated webs from not only social interactions, but experiences, digital observations (commercials, websites), or even organizations. In the end, the interconnectedness of all of the knowledge leads to learning. These previous experiences can be positive or negative, and the advisor is at the disadvantage of knowing very little about a student's background with advising. The idea of connectivism accepts the medium of technology as a part of the student's decision-making process. Students not only process previous knowledge, but current knowledge from online articles, their best friend's tweet about a profession, or their role model's Instagram account. Students' digital feeds are influencing them (Pasquini, 2013). Connectivism admits that students can learn from devices and "decision-making is itself a learning process" (Siemens, 2004, Para. 25). This is not a new concept, but students today have access to more technology, digital devices, and social networks than ever before (McHaney, 2011). Students are not only polling their parents, friends, or relatives to help them make decisions, but using their digital devices for decision making, as well. By relating this theory to the study, 21st century students can easily connect to classroom learning the use of technological platforms such as LMS. In the course of the

connection, they interact with their teachers/facilitators to easily construct knowledge for themselves as part of their decision-making process.

Contextually, the need for Cameroon to develop a science and technology culture is a key component of her ideological development (Tambo, 2003). This technology has been contributing to the solution of developmental problems in agriculture, health, education, industrialization, business, animation, and so on. For these reasons, institutions and organizations in Cameroon have been struggling to adopt modern technologies. In support of this, law N° 005 of 16 April 2001 to govern higher education in Cameroon emphasized on the advancement of science, culture and progress. Cameroon universities have not been left out in the venture of developing science and technology though these universities are plagued with problems. These problems include an increase in students' population without a corresponding increase in infrastructure and teaching staff, poor facilities, exodus of highly qualified staff due to low salaries, high repetition rate and dropout or educational wastage and rote learning (Ndongko & Ngwei, 2000 and Tambo, 2003). These institutions are thus forging ahead to integrate ICTs into their systems for organizational and educational purposes. This is illustrated by the computerization of the administrative structure of Cameroon state universities, the introduction of computer science into higher education curricula, the equipment of Cameroon state universities with Multimedia or information and communication Technology (ICT) Centers with computers, photocopy machines, telephone services and other ICT resources as well as, the donation of 500,000 laptops to universities both public and private in the 2017/2018 academic year by the Head of State His Excellency Paul Biya.

By 2003, according to the Ministry of Higher Education (MINSESUP), as cited in Mambeh (2005), all state Universities in Cameroon had ICT with internet access. The University of Yaounde I, Douala, Ngoundere, Buea, Yaounde II, Dschang, and inter-university resource center by this report had 150, 130, 90, 70, 40, 20, 35 computers respectively. Study by Willinsky, Jonas, Shafack & Wirsy's (2005) found out that the internet had quickly become part of students' and instructor's life but still a long way from becoming a source of research and knowledge. Therefore, when compared, universities in Cameroon still suffer lack of access to both technology and research literature to fully participate in today's academic community and knowledge based economy.

The use of educational technologies in the universities across Cameroon is visible on campus

especially with the Online Student Registration and e-learning. It is interesting to examine its use in teaching and research as it pertains to pedagogical practices. Many studies conducted on the use of ICT in Higher Education in Cameroon (Achale, Mmbeh & Chongwain, 2007; Babila, 2010; Chiafie, 2011) revealed that ICT transforms learning as a whole and bridges the gap between the taught and the learned curriculum.

According to Beche (2020), in an interview given to CRTV on 20 March 2020 entitled “Can digital technology ensure the continuity of university courses?” (CRTV, 2020a), the Minister of Higher Education listed the tools used for this purpose: learning management systems, WhatsApp, e-mail and mobile phones. For distance conferences and meetings, he listed Skype and Zoom. Following this interview, conducted after the consultation meeting of the Ministry of Higher Education held earlier on the same day, academic institutions scrambled to “exhibit” their innovative tools and approaches for maintaining pedagogical and administrative continuity. For example, the University of Yaoundé 1 praised its distance training system built on Moodle, restarted in the age of COVID-19, in a report on national television on 20 March 2020 (CRTV, 2020b). The University of Douala launched a digital university press as well as an online course system for each of its fourteen faculties and institutes. The University of Bamenda, for its part, boasted of its proactivity in setting up a platform for pedagogical interactions. In a note addressed to the Cultural Service of the United States Embassy in Cameroon, one of its officials said that the campus lockdown was an opportunity for his university to enhance its distance learning provision (Beche, 2020). The same is true for the University of Buea and the Catholic University Institute located in the same city, whose distance learning programs have been in place for a couple of years.

The Universities of Ngaoundéré and Maroua stand out in their efforts (Beche, 2020). The former massively increased the use of its Moodle platform in all departments, which prior to COVID-19 had only been used in the Department of Geography. The latter, as well as implementing several online training systems using Google Classroom and Forma LMS, developed a digital environment for distance meetings and thesis and dissertation defense. The University of Maroua is the first university in Cameroon to have organized a viable way of defending doctoral dissertations using the Zoom videoconferencing application.

Institutions use LMS to supplement traditional face-to-face delivery where faculty members develop and share digital learning materials via the Internet. In this case, the LMS are used as electronic repositories of learning materials (Vovides et al. 2007). Other institutions especially those offering distance education, have been combining LMS with traditional face-to-face delivery in order to reach more learners across various geographical boundaries (Andersson & Grönlund 2009). When such management systems are used, the development of students’ SDL is enhanced, the students are actively involved in the construction of knowledge and also contribute where need be.

Statement of the problem

Education for self-directed learning is becoming a global concern as higher institutions of learning are putting myriad infrastructure in place as well as providing relevant resources toward making it becoming a reality. To underscore its efficacy, the partnership for 21st Century skills has recently identified self-directed learning as one of the life and career skills necessary to prepare students for education and workforce. Also, the fourth sustainable development goal recommends that stakeholders of education ensures inclusive and equitable quality education and promote lifelong for all learners. With the disposition of self-directed learning skills, students can choose their own directives and follow their own curiosity, resulting in happier, more engaged, and more productive citizens. However, many higher education students lack self-directed learning skills, in the form of lack of goal setting skills, insufficient self-planning skills, lack of motivation, inability to self-monitor their progress and evaluate their efforts. As a consequence, self-directed learning toward skill development and lifelong learning is at stake, reason why many graduates are still lacking in skills in the various disciplines.

One approach that may impact SDL is the use of learning management systems. A learning management system is a software application that deals with the administration, documentation, tracking, and delivery of educational courses, materials or programs. An LMS can enhance content delivery, assessment and teacher-student interaction. Campbell (2020) posits that one of the biggest benefits of a LMS is the opportunity for self-directed learning. Nevertheless, research in Cameroon, especially in higher education has not paid much attention to the concepts of LMS and SDL. It is on the basis of this that this study intends to examine the relationship between LMS and self-directed learning in higher education institutions in Cameroon.

Objective

The main objective of this study is to find out how the use of learning management systems influence learners' development of self-directed learning in higher education institutions in Cameroon, this with particular focus on how content delivery influences learners' development of self-directed learning skills, how learning assessment impacts learners' development of self-directed learning skills, and how teacher-student interaction affects learners' development of self-directed learning skills.

Significance of the study

This study may be significant to the government, higher education institutes, administration, lecturers and students.

To the government, it can help investigate the efforts of the government in pursuing her goal of equipping schools with Educational Technologies (EdTechs). As it is enshrined in the Higher Education goals of education in Cameroon, the government aims to ensure the development of science and technology in educational institutions. This study will evaluate the extent to which the goals have been attained. It may also be useful to the Higher Education institutes in establishing a powerful vision and mission statement for EdTechs. The adequacies and inadequacies of EdTechs realized in higher education institutes may help in the formulation of a formidable vision and mission statements. Administrators may be able to evaluate the effectiveness of the educational technology policies through the use of LMS they implemented. Through the study, the effectiveness of LMS used can be ascertained by university administrators, for better planning.

Lecturers might be motivated to adopt more modern methods of teaching which will help them cover their entire scheme of work or course outlines. Lecturers find it difficult nowadays to cover the entire course outlines given to them, reason why LMS are useful in covering a range of topics within the shortest period of time.

Students might be encouraged by this study to integrate constructive methods as well as technologies in learning, and bridge the gap between the different learning styles (visual, auditory and kinesthetic) and also improve their self-directed learning skills (goal setting, self-planning, self-monitoring, self-evaluation and revision).

Justification of the Study

In the twentieth and the start of the twenty first centuries, more significant changes have already occurred or will occur than have taken place in any similar period of time in our history (UNESCO,

2002). These revolutionary changes demand that the teachers and students use educational technologies in the teaching and learning process (Facer, Furlong & Sutherland, 2003). It is apparent that when LMS are properly used, it captures the human mind, learners are motivated since they are actively involved and not mere recipients, the teacher becomes more organized in selecting media and the method for presenting content so as to stimulate learners and enhance better understanding of the concept (Ssewanyana & Busler, 2007). It is therefore imperative for this study to be carried out to examine the effectiveness of LMS on self-directed learning (SDL).

Furthermore, self-directed learning as its evolution has been examined at the level of the background of this study has always had its place in the educational milieu at various dispensations. Considering the fact that, we are at the dispensation of science and technology, there is therefore a need to see how LMS as outcome of science and technology can affect self-directed learning. In addition, the Growth and Development Strategy Paper clearly articulates that, students outcome in the society is measured by the skills they have acquired in school. Skill acquisition is therefore a springboard toward making students employable when they get into the society. It is therefore essential to carry out a study of this nature in order to investigate the influence of LMS on students' development of self-directed learning skills especially in the higher education sector of the country. Lastly, the fact that little research has been done on the area of LMS and SDL necessitated the conception of this study.

Scope of the study

Geographically, this study will be carried out in higher education institutions in Cameroon specifically in the Southwest, Littoral and Center regions. Content wise, the study shall be delimited to investigating the influence of LMS like Moodle and Google Classroom in terms of content dissemination, learning assessment, and teacher-student interaction on self-directed learning (goal setting, self-planning, self-monitoring, self-evaluation and revision). Theoretically, this study shall be anchored on the following theories; Garrison's self-directed learning model (1997), Mayer's theory of Multimedia learning (1949: Cited in Mayer 2014), Seymour Papert's constructionism theory (1980), George Siemens theory of Connectivism (2004), Information Processing Theory by Richard Atkinson & Richard Shiffrin (1968) Cited in Ansari (2020), and Adult learning by Malcom Knowles (1968). Methodologically, this study will adopt an

exploratory sequential design in a mixed research method.

Operational Definition of Terms

Self-Directed learning (SDL): According to Garland (2015), self-directed learning is an instructional strategy where the students with guidance from the teacher, decide what and how they will learn. It can be done individually or with a group, but the overall concept is that, students take ownership of their learning (Self-Directed Learning: Definition and Strategies, 2017). Knowles (1975) define self-directed learning as a process in which individuals take the initiative to diagnose their own learning, identifying resources for learning, choosing the appropriate learning strategies and evaluating their own learning. In this study, SDL refers to students' disposition of skills such as goal setting, self-planning, self-monitoring, self-evaluation and revision.

Goal setting: Goal setting involves the development of an action plan designed to motivate and guide a person or group toward a goal (Grant, 2012). Goal setting can be guided by goal-setting criteria (or rules) such as SMART (Specific, Measurable, attainable, relevant and Time-bound) criteria (Grant, 2012). Operationally, this definition is adopted for this study.

Self-planning: Self-planning also known as personal development planning is the process of creating an action plan based on awareness, values, reflection, goal-setting and planning for personal development within the context of a career, education, relationship or for self-improvement (Chinoperekweyi, 2017). Operationally, this definition is adopted for this study.

Self-monitoring: According to Garrison (1997), self-monitoring refers to learners' responsibility for the construction of personal learning, including cognitive and metacognitive processes. Operationally, this definition is adopted for this study.

Self-evaluation: Self-evaluation also known as self-assessment is a powerful mechanism for enhancing learning. It encourages students to reflect on how their own work meets the goals set for learning concepts and skills (Gehringer, 2017). Operationally, this definition is adopted for this study.

Learning Management Systems (LMS): These are software applications for the administration, documentation, tracking, reporting, automation, and delivery of educational courses, training programs, materials or learning and development programs (Ellis, 2009). These software applications are used to plan, create, manage, and deliver online content (Chahal & Petel, 2021). LMS, whether cloud-based or on-premise, are used widely in the eLearning industry

and acts as a distribution and management vehicle for online courses, training programs, or learning and development programs. In this study, LMS are platforms which are web based, installed based and are able to disseminate content to students, assess students' learning as well as give room for interaction in a bid to enable students take total charge and control of their own learning.

Content dissemination: Content dissemination or distribution refers to the strategic process of disseminating and promoting content across various channels to reach a wider audience. It involves utilizing owned, earned, and paid media platforms to maximize the visibility and impact of your content. Creating valuable and engaging content is only half the battle; distributing it effectively is equally crucial. Without well-executed content distribution strategies, even the most exceptional content may go unnoticed. By strategically distributing your content through different channels, you can expand your reach, increase brand awareness, drive website traffic, generate leads, and ultimately boost conversions. Content distribution enables you to connect with your target audience on their preferred platforms, amplifying your message and ensuring that it reaches the right people at the right time (Singla, 2023).

Operationally, this definition is adopted by this study.

Learning assessment: Assessment for learning (AFL) is an approach to teaching and learning that creates feedback which is then used to improve students' performance (William, 2011). Students become more involved in the learning process and from this gain confidence in what they are expected to learn and to what standard. This study adopted this definition.

Teacher-student interaction: Teacher-student interaction (TSI) refers to the way in which teachers and students communicate in their classrooms (Englehart, 2009). Because of the mutual nature of relationships, interactions are the fundamentals of relationship formation (Schaffer, 1984). Operationally, this definition is adopted by this study.

Research Design

For the purpose of this study, the exploratory sequential research design was adopted. It consists of mixed approach which makes use of both qualitative and quantitative methods. The justification of this design is explained by the fact that data were collected in two consecutive phases; first qualitative and then quantitative to support the qualitative data. However the theoretical underpinning behind this design is predominantly qualitative, but will however require the quantitative method as a support to it

(Cresswell, 2000). According to Cresswell (2014), the purpose of using this design is to use quantitative data and results to assist in the interpretation of qualitative findings. The use of this design is also justified by its primary purpose which warrants the researcher to explore a phenomenon.

Area of study

This study was carried out in Cameroon, a country located at the boundary of central and West Africa.

Population of the Study Sites

A population is the totality of subjects or other sampling units which are concerned by the study. The population does not necessarily determine the study setting but defines the limit within which the research

findings are applicable. The population of this study constituted of students and teachers / e-learning personnel in higher education institutions making use of LMS in Cameroon. There are many higher education institutions in Cameroon, but some may not be using LMS, as such the researcher will not target such institutions. Talking about higher education in Cameroon, it is provided by both the state via its state owned institutions and private individuals. The institutions offer several programs in relation to the needs of the society. The institutions also make use of learning management systems in teaching and learning. The table below shows the use of LMS in some higher education institutions in Cameroon

Table 1: Use of LMS in some higher education institutions in Cameroon

Institution	Faculty/school	Department	Programme	LMS
University of Yaounde I	National Advanced School of Engineering, Yaoundé		Professional Masters in Telecommunication; Professional Masters in Information and Communication Security; MOOC courses	Moodle
University of Yaounde II	International Relation Institute of Cameroon (IRIC)		Masters in International Cooperation, Humanitarian Action and Sustainable Development	Moodle
ICT University Yaounde	All post-graduate programs	All	All	Moodle
University of Douala		Department of geography	Master program in Computer Applied to Geography System	Moodle
Univeriste De Golf	All programs			WhatsApp
Univeristy of Buea	Education	Curriculum Studies and Teaching	DED Master's degree program	Google classroom And WhatsApp
Catholic University	All	All	All	Google Classroom and Moodle
CHITECMA University	1.School of engineering for B.Sc. programs 2.All faculties offering post-graduate program		All engineering programs All master's degree programs All master'S degree programs	Zoom
PAID-WA	1.Masters of Business Administration 2. Master of Science (M.Sc.) in Business Studies 3. Master of Science in Development Studies		-MBA Project management -Strategic management Strategic Human Resource management Peace, Conflicts, Resolution and international Relations	Moodle

Target Population

The target population was made up students and lecturers in departments and programs that make use LMS in their teaching and learning process. This study will only target higher institutions and more specifically these departments and programs as they make use of LMS which happens to be the main variable of interest as far as this study is concerned.

Table 2: Target Population of the Study

University	Faculty/school	Program	Personnel	Students	Total
University of Buea	Faculty of Education	DED Master's Program	05	31	36
Catholic University institute of Buea	School of Information Technology	IT	02	37	35
University of Yaounde I	Advanced School of Mass Communication (ASMAC)	Publishing and Graphic Arts	04	228	232
International Relation Institute of Cameroon (IRIC)		Masters in international Cooperation, Humanitarian Action and sustainable development	03	34	37
University of Douala	Department of Geography	Master's program in Computer Applied to Geography Information System	02	32	34
Pan African Institution of Development, Buea (PAID-WA)	Masters of Business Administration	MBA Project Management	02	33	35
Institut Supérieur Traduction, d'interprétation et de Communication (ISTIC)		Corporate Communication	02	107	109
ICT University Yaounde	Faculty of Business Management and Sustainable Development	International Masters in Business Administration	02	41	43
Total			22	543	556

Sample

All the 12 lecturers and e-learning personnel from the eight universities were sampled for this study. Out of the 543 students, a total of 260 were sampled based on the Krejcie and Morgan (1970) sample size table. This means that the total sampled students were 272.

Sampling Technique

The sampling techniques used for this study was multi-stage sampling techniques (cluster sampling, purposive sampling, accidental sampling and the simple random sampling techniques). For cluster sampling, the population of students and lecturers/personnel in higher education institutions was divided into three clusters based on the regions. After the 8 higher education institutions were clustered by regions, the purposive sampling technique was used in selecting only those institutions that make use of LMS. After selecting the institution that make use of LMS for the study, a simple random sampling technique was used in selecting the number of students required from each institution that constituted the target population of the study. According to Hunt (1978) simple random sampling technique should give each and every one in the target population the chance of being selected for the study. This technique is suitable for this study because it gave each student an equal probability of being selected.

The researcher used this technique (simple random) to come up with eight (08) higher education institutions, by writing the names of all the institutions which make use of LMS. After all the names of the schools have been written on separate pieces of papers, a child of seven (7) years was called up to pick up. After each pick, the papers were reshuffled before another draw was made. All these were done so as to give an equal chance to any school to be selected and also that the findings of the study should not be bias. Through this sampling technique, the following institutions were selected for the study: University of Buea, Catholic University Institute Buea, Pan-African Institute for Development West Africa (PAID-WA), University of Douala, University of Yaounde I, ISTIC Yaounde, IRIC Yaounde and ICT University Yaounde. Furthermore, accidental sampling was used in selecting lecturers randomly by asking nearby individuals on campus to direct one to lecturers that meet the inclusive criteria for the study. This was supported by the snow-ball approach.

Instrument for Data Collection

Data were collected using three main instruments; interview guide, observation checklist and questionnaire.

Interview Guide

The researcher used a structured interview guide (with a pre-determined list of questions being asked to each respondent in order to minimize the possibility of bias) to collect data from lecturers. The researcher's decision to use the structured interview schedule was because it is formal and scientific in nature. That is, the researcher remains strictly within the frame of the initially set questions and the same questions are asked exactly the same way and in the same order to the participants. The questions were constructed from the knowledge gained from literature reviewed in chapter two. The interview schedule followed the research objectives of the study. The outlined questions were meant to make sure that all the research objectives are covered. The interview guide was administered to 12 lecturers. The interview schedule was divided into four sections consisting of the introduction, and questions in response to the three research objectives for the study. The introduction will contain information on the research topic, the researcher's information and other information regarding ethical considerations. The interviews were made up of nine questions, three question per objectives to elicit participants' responses on each research question under study. In total, there were 12 questions to cover the three research questions. The outlined questions were meant to guide and make sure that all the research objectives were covered. The researcher used a tape recorder with the permission from the interviewees.

Observation Checklist

An observation checklist refers to a list of things that an observer is going to look at when observing a class. The observation checklist was used to check the level at which students have developed SDL skills. The checklist measured the following; goal setting, self-monitoring, Self-planning, Self-evaluation and Revision. In doing the observation, the researcher observed the online lesson sessions of the various sampled institutions to see whether the students have developed self-directed learning skills of goal setting, self-planning, self-monitoring, self-evaluation and revision.

Questionnaire

The students' questionnaire was designed to gather information about respondents in relation to the concerned variables of the study and complement the experiment making the results generalizable. It was designed into two sections. Section I had 4 items on demographic data (gender, age range, institution and type of digital device used in learning). Section II tackled the different research objectives. The items on the questionnaire were in a closed-response format in which, a four-scale quantum of the Likert scale consisting of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) is used. The items found on the questionnaire coined and adapted from literature on LMS and SDL inventories as seen from the review of related literature. The questionnaire was organized in four sets of items addressing the four different indicators of LMS and one addressing the independent variable of SDL. The various items in the questionnaire were positively cued statements relating to the research questions being addressed by a group of items. The respondents were expected to respond to each of the items by placing a bold tick (✓) on the respond or Likert option they consider appropriate in relation to what prevails on ground.

Validity of the instrument

Cresswell (2014) defines validity as the degree to which an instrument measures the intended concepts. It is also a degree to which results obtained from the analysis of data actually represents the phenomenon under study. Validity refers to the extent to which an instrument measures what it is set to measure. The instruments for this study were subjected to:

Face Validity. This ensures that, by its appearance, the instrument covers all the areas that were to be measured in the study. It also ensures that the instruments were properly structured with appropriate instructions and good presentations that were easily readable. After constructing the instruments, copies were handed to some colleagues for proof reading and to three scholars, the two research supervisors and a statistician for scrutiny. They were required to review the questionnaires in relation to the objectives of the study, research questions, clarity of the items and compatibility to statistical tools for analyses. In this light, it was ensured that all the items in the instruments reflect the specific objectives of the study. All the items of the instruments were critically examined, some reframed to make them look simple and unambiguous while the unsuitable ones were eliminated. After their inputs and criticisms on the effectiveness of the instrument in achieving the required objectives, the necessary corrections were made.

Content validity: content validity shows the degree to which a measure covers the range of meanings included within a concept. In this study, the content validity was done by sampling the opinions or perceptions of a targeted group of persons about the main topic of interest. With the assistance of the research supervisors and the statistician, it was checked to address the appropriateness of the content, the comprehensiveness of the instruments, the logicity of the instruments in getting at the intended variables, the adequacy of the sample of items or questions in representing the complete content that was intended to be measured and the appropriateness of the format of the instrument.

Reliability

Qualitative study

The parallel method of testing reliability was employed in this study with the participation of two lecturers from CHITECHMA University, Buea. The method is a palliative to most of test-retest methods problems. Rather than submitting people to the same questionnaire in two different occasions, this method gives the same respondents two different but equivalent questions on one occasion. This method although safe from some disadvantages of the test-retest method, may result to a longer instrument. Statistically, this model assumes that all items have equal variances and equal error variances across replications and parallel test can be used to test the reliability of an instrument. This applies when dealing with quantitative studies. However, this method can be used in qualitative research as done in this study, whereby reliability was appraised not mathematically but conceptually which is termed conceptual parallel method (Nana, 2018). In the context of this study, some questions dealing with the same constructs and serving the same objective were framed differently and placed at two different locations in the questionnaire. The objective; committed and consistent students were expected to give similar answers to the two questions posed at two different intervals.

Quantitative study

The reliability of the instrument measures the consistency, objectivity and truthfulness of the participant's responses to the questions enlisted on the questionnaire. Therefore, in order to find out the objectivity and consistency of student's responses, a pilot study was conducted with 10 students from CHITECHMA University, Buea. The respondents for the pilot test were selected because they met the requirements as already stipulated under sampling technique. After the pilot study, the data were analyzed via Cronbach Alpha method (Cronbach, 1951). The internal consistency assumption was not violated with a reliability coefficient value of 0.621, which is good and this trend was almost the same for the final study. This therefore implies that the items on the questionnaire were understood and answered to a satisfactory level of objectivity. As for the final study, the variance was close to 0, thus implying that we are more likely to be faced with skewed distributions, with participants' responses tilting more toward positive or negative views or perceptions. In the other sense, students are more likely to be homogenous in their perceptions of the study indicators and this was verified.

Data collection process

An authorization to carry out the study was obtained from the Faculty of Education of the University of Buea. This authorization was presented to the heads of the sampled institutions for administrative clearance. Student and teachers were then briefed on the objective of the study, their consent sought, and they were then given the questionnaire for response.

Data management and analysis

Analysis of the interviews

These textual data were analyses using the process of thematic analysis whereby concepts or ideas were grouped under umbrella terms or key words. The first stage involved deciding on the level of analysis. At this level, single words, clauses and sets of words or phrases were coded. The researcher did not initially decide on how

many different concepts to code and for this reason, a pre-defined or interactive set of concepts/categories was not initially developed and concepts or umbrella terms emerged from the data. However, pre-established standardized terminology was used to enrich the umbrella terms that emerged from the study as to make the findings more comparable. The primary documents of textual data were coded for every independent idea as it emerged from the data and for frequency of concepts. Precautions were taken to clearly determine the meaning of themes or umbrella term and what they stand for. In the context of this study, to satisfy this requirement, findings were organized in code-quotation tables whereby themes or codes were clearly explained or described, backed by their related quotations. The code-quotation table ensures the objectivity and reliability of qualitative analysis in the sense that if code/concepts/umbrella terms and their descriptions can be subjective to relative error, the quotations are grounded and real, thus helping to compensate for potential bias (Nana, 2018).

Analysis of observations

As for the observations, they were analyzed by simply counting the number of classes where a particular toll was used. Also, observations were analyzed both qualitatively and quantitatively. The qualitative part was based on the researcher comments and remarks. The quantitative part consisted of counting the number of time a skill was observed to be developed, partially developed or improvement needed and weighed them comparatively. Scores were aggregated within conceptual components using Multiple-Responses Analysis (MRA).

Analysis of students' questionnaire

These quantitative data were entered using EpiData Version 3.1 (EpiData Association, Odense Denmark, 2008) and analyzed using the Statistical Package for Social Sciences (SPSS) Standard version, Release 21.0 (IBM Inc. 2012). The questionnaire was made of categorical variables and data were analyzed using counting techniques namely frequency and proportions while MRA was used to calculate the aggregate score for conceptual components (Nana, 2018). Binary Logistic Regression was used to assess the predictive effect of the independent variables on the dependent variable. As for the inter-item correlation, a non-parametric test was used.

Choice of correlation test

The test of normality was used to assess whether the variables that will be involved in the correlation test follow a normal distribution or not. In this line, Kolmogorov-Smirnov and Shapiro-Wilk test for normality were used concurrently to test the normality assumption. These two tests using the measures of central tendencies and dispersion assume a theoretical normal distribution for the data and plot the real distribution against this theoretically-assumed normal distribution. A non-significant asymptotic significant (P-value >0.05) is expected for the distribution of a variable to be assumed not deviating significantly from the theoretical-assumed normal model. In the other sense, the real distribution shall not deviate significantly from the theoretically-assumed normal distribution that logically follows the Gaussian shape. From the table 3, we can see that all the variables have violated the normality assumption from both Kolmogorov-Smirnov and Shapiro Wilk perspectives (P<0.05) in all instances. The non-parametric Spearman's Rho correlation test was then used for inter-item correlation.

Table 3: Test of normality

Conceptual components	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Content delivery	.235	260	.000	.878	260	.000
Learning assessment	.231	260	.000	.898	260	.000
Teacher-student interaction	.252	260	.000	.868	260	.000
Self-directed learning skills	.157	260	.000	.958	260	.000

Ethical Considerations

The protection of human subjects through the application of appropriate ethical principles is important in any research study (Arifin, 2018). Leedy and Ormrod (2016) accentuate that the use of human subjects in research is quite common and whenever human beings are focus of investigation, they must look closely at the ethical implications of what we are proposing to do, so trust becomes extremely important. The researcher ensured that the subjects were aware of the purpose of the research and the manner in which it would be conducted. Participation in the research was voluntary, and withdrawal was possible at any time. Measures were taken to ensure confidentiality. Specific details or references which could easily lead a reader to deduce the identity of the participant were made more generic. This was a particular concern in sections dealing with potentially sensitive issues.

A letter of introduction and authorization was collected from the Faculty of Education, University of Buea, signed by the Vice Dean in charge of Research and Cooperation and addressed to the authorities of the various government and educational institutions to be visited by the researcher in line with the study. Ethical consideration and obligations are very necessary in any research work to respect participants' rights. The researcher sought the consent of the participants for them to willingly take part in order to give appropriate information for better results.

It was believed that the researcher has worked with most of these individuals and has built a reputation for being open-minded, change-oriented, and tactful, assisted in these efforts. At the beginning of the permission, the purpose of the research was clearly specified as well as the fact that there will be no compensation for participating and the main benefit is to have contributing in enhancing education for common interest..

Findings

Demographic characteristics of students

Gender

Both male and female students were well represented in the sample, with proportions of 40.8% (106) and 59.2% (154) for male and female students respectively (table 4). This was good for the representativeness of the sample; female being more that the male somehow aligns with the national demographic characteristics. In fact, considering the inputs of male and female students in the study was ethically important as it is generally perceived that female children should be given a chance for education as well.

Age range

The mode age was 18-25 years with proportion of 55.8% (145). The least represented age range was <18 years 0.4% (1). The distribution of age follows a pyramidal shape matching the national trend. This indicates a good distribution of age which is an added value for the validity of the data. Cumulatively, 93.5% of the students was aged 35 years or below. Given their level, students were not actually too young considering the fact that they are supposed to leave high school at 18 years. This could be explained by the fact they were mostly embarked in professional training that are generally expensive and accessible mostly to workers who are already generating income before coming back to school.

Institution

Altogether, 8 institutions were sampled for the study, notably ASMAC 27.3% (71), ISTIC 16.5% (43), ICTU 14.2% (37), UB 10.8% (28), CUIB 9.2% (24), IRIC 8.1% (21), UMIDOU 7.3% (19) and PAID-WA 6.5% (17). Both private and state universities were included in the study and this was good for institutional stratification and statistical validity.

Level

The three targeted levels were all represented, namely level 300 27.3% (71), level 400 16.5% (43) and level 600 56.2% (146).

Specialty

Their specialties were diversities, ranging from Corporate Communication, DED (Diplôme en Etude de Développement), Information and Communication Technology (ICT), In't Corp & Sustainable Dev't. M.Sc in Computer Applied to Geography, Master in Business Administration (MBA) to Publishing and Graphic Arts. Students were equally diversified in their specialty and this was good for the representativeness of the statistics and contextualization prospects.

Type of digital device used in learning

The types of digital device used in online learning were laptop 37.7% (98), smart phone 35.4% (92), desktop computer 21.2% (55) and ipad 5.8% (15).

Type of Learning Management System used

As for the Learning Management Systems used, they were Moodle 65.0% (169) and Google classroom 35.0% (91) for the main ones.

The sample was globally well stratified cutting across the required diversities of background indicators. This is important as to inform policies or changes within system, so that they can match the contextual reality for a better efficiency and sustainability.

Table 4: Demographic characteristics of students

Sex	n	%
Male	106	40.8
Female	154	59.2
Age range	n	%
<18	1	.4
18-25	145	55.8
26-35	97	37.3
36-49	14	5.4
50 and above	3	1.2
Institution	n	%
CUIB	24	9.2
PAID-WA	17	6.5
ICT-U	37	14.2
UNIDOU	19	7.3
ASMAC	71	27.3
ISTIC	43	16.5
IRIC	21	8.1
UB	28	10.8
Level	n	%
300	71	27.3
400	43	16.5
600	146	56.2
Specialty	n	%
Corporate Communication	43	16.5
DED (Diplôme en Etude de Développement)	28	10.8
Information and Communication Technology (ICT)	62	23.8
In't Corp & Sustainable Dev't	20	7.7
M.Sc in Computer Applied to Geography	19	7.3
Master in Business Administration (MBA)	17	6.5
Publishing and Graphic Arts	71	27.3
Type of device	n	%
Smart phone	92	35.4
Desktop	55	21.2
Ipad	15	5.8
Laptop	98	37.7
Type of LMS	n	%
Moodle	169	65.0
Google classroom	91	35.0

Answering of the research objective

The objective of this study is to find out how the use of learning management systems (Moodle and Google Classroom) influence learners' development of self-directed learning in higher education institutions in Cameroon.

Three predictors of learning management system were considered in this study, content delivery, learning assessment and teacher-student interaction. The dependent variable of course was learners' development of self-directed learning skills.

Students were generally satisfied with content delivery with weight of 82.9%, learning assessment with weight of 76.2% and teacher-student interaction with weight of 85.8%.

Development of self-directed learning skills

Students generally had developed self-directed learning skills with weight of 87.3%. The most developed skill was self-monitoring (100%), followed by revision (88.9%), self-planning (85.2%), goal setting (81.5%), then self-evaluation (77.8%), table 5 and figure 1.

Table 5: Development of self-directed learning skills

Development of self-directed learning skills	Not Developed	Partially developed	Developed
Goal setting			
Willingness to learn	0.0% (0)	0.0% (0)	100% (9)
Attentiveness	0.0% (0)	11.1% (1)	88.9% (8)
Interest	0.0% (0)	44.4% (4)	55.6% (5)
MRA	0.0% (0)	18.5% (5)	81.5% (22)
Self-planning			
Class attendance	0.0% (0)	11.1% (1)	88.9% (8)
Taking down notes	0.0% (0)	11.1% (1)	88.9% (8)
Personal research	0.0% (0)	22.2% (2)	77.8% (7)
MRA	0.0% (0)	14.8% (4)	85.2% (23)
Self- monitoring			
Sharing ideas with the teacher	0.0% (0)	0.0% (0)	100% (9)
Sharing ideas with classmates	0.0% (0)	0.0% (0)	100% (9)
Cross-matching with literature	0.0% (0)	0.0% (0)	100% (9)
MRA	0.0% (0)	0.0% (0)	100% (27)
Self- evaluation			
Asking questions for clarity	0.0% (0)	22.2% (2)	77.8% (7)
Answering questions asked by the teacher	0.0% (0)	22.2% (2)	77.8% (7)
MRA	0.0% (0)	22.2% (2)	77.8% (14)
Revision			
Openness for corrections	0.0% (0)	11.1% (1)	88.9% (8)
Ability to take to instructions	0.0% (0)	0.0% (0)	100% (9)
Doing assignments	0.0% (0)	22.2% (2)	77.8% (7)
MRA	0.0% (0)	11.1% (3)	88.9% (24)
Overall MRA	0.0% (0)	12.7% (16)	87.3% (110)

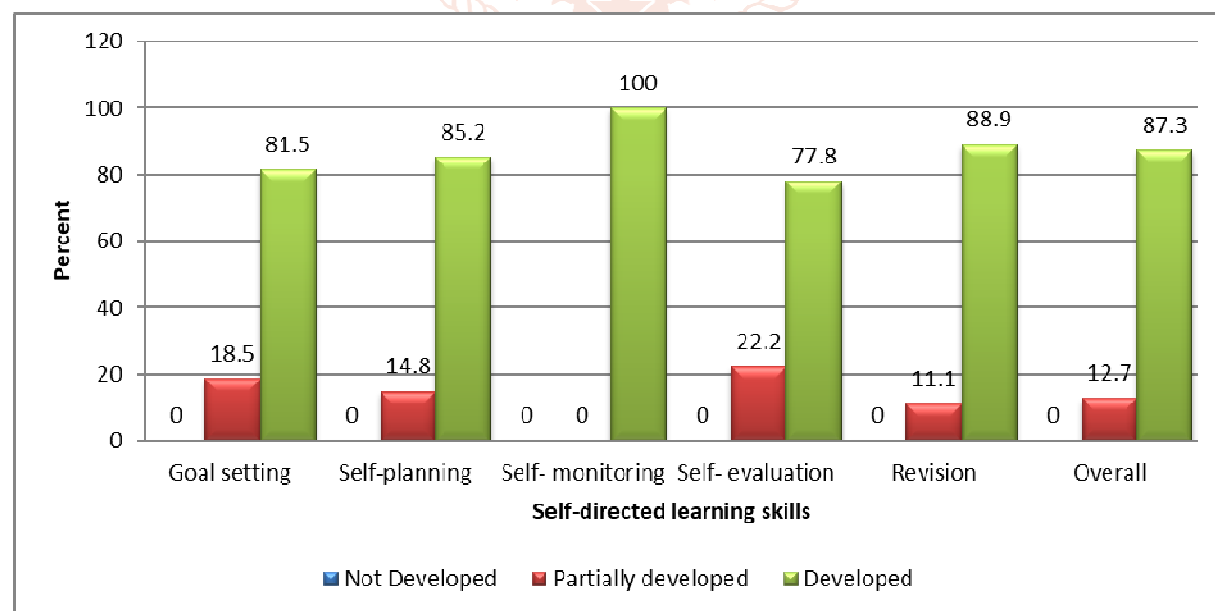
**Figure 1: Development of self-directed learning skills**

Table 6: Inter-items correlation

			Content delivery	Learning assessment	Teacher-student interaction
Spearman's rho	Content delivery	Correlation Coefficient	1.000	.380**	.442**
		Sig. (2-tailed)	.	.000	.000
		N	260	260	260
	Learning assessment	Correlation Coefficient	.380**	1.000	.232**
		Sig. (2-tailed)	.000	.	.000
		N	260	260	260
	Teacher-student interaction	Correlation Coefficient	.442**	.232**	1.000
		Sig. (2-tailed)	.000	.000	.
		N	260	260	260

**. Correlation is significant at the 0.01 level (2-tailed).

There was a significant positive correlation among content delivery, learning assessment and teacher-student interaction, thus implying that they interact and complement each other (table 6).

Integrated Value Mapping

The full model (IVM) only explains 17.3% of the variability (table 7). This suggests that while the parameters taken into account in this study have a significant impact on students' acquisition of self-directed learning skills, other parameters, of course dominant, that were not taken into account, that could be extraneous factors or confounders that could potentially have a significant impact on students' acquisition of self-directed learning skills. Teacher-student interaction had the strongest explanatory power, while content delivery had no significant impact. The model thus suggests that the more teachers deliver content to students, the lesser their propensity to develop self-directed learning skills. But on the opposite, more and adequate teacher-student interaction coupled with more assessment will foster the acquisition of self-directed learning skills.

Table 7: Binary Logistic Regression depicting the contribution of Online Teaching Method to the acquisition of Self-Directed Learning skills by Students

Conceptual component	Omnibus Tests of Model Coefficients	Explanatory Power (Cox & Snell R Square)	N
Content delivery	$\chi^2=9.419$ P=0.224	3.6%	260
Learning assessment	$\chi^2=23.206$ P=0.002	8.5%	260
Teacher-student interaction	$\chi^2=24.365$ P=0.001	8.9%	260
IVM (Overall teaching method)	$\chi^2=49.250$ P=0.000	17.3%	260

Table 8: Wald Statistics depicting significant and critical predictors of the development of self-learning skills by students

Predictive indicators	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Our teachers always inform us on the content to be presented	-.216	.377	.328	1	.567	.806	.385	1.687
Content is taught in a systematic way	.167	.389	.185	1	.667	1.182	.551	2.535
Our teacher deliver their lessons in slides	.543	.442	1.511	1	.219	1.722	.724	4.093
Students are free to ask questions during content presentation	-.314	.682	.212	1	.645	.731	.192	2.779
I understand the content delivered by teachers	-.274	.479	.326	1	.568	.761	.297	1.945
Assignments are always given to us at the end of the content material	.199	.346	.331	1	.565	1.221	.619	2.407

The learning content presented to us by our teachers are usually not interesting	.090	.352	.066	1	.798	1.094	.549	2.180
Our instructor ask questions before presenting content to test our previous knowledge	-.042	.455	.008	1	.927	.959	.393	2.342
In the course of the content, we are given short quizzes	1.356	.379	12.825	1	.000	3.879	1.847	8.145
Feedback is provided to us when we respond to questions	.407	.466	.762	1	.383	1.502	.603	3.745
There is always a section for assessment at the end of the lesson	.192	.313	.374	1	.541	1.211	.656	2.238
Our instructor divides us into small mixed ability groups and assign tasks to us	-.116	.448	.067	1	.796	.891	.370	2.143
Students are less active during assessments	-.761	.326	5.440	1	.020	.467	.247	.886
It is sometimes difficult to provide assessment for students in e-learning	.284	.299	.906	1	.341	1.329	.740	2.386
We are given the room share ideas at the point of content delivery	-1.002	.547	3.350	1	.049	.367	.126	1.074
Sharing ideas with the instructor makes us understand the learning material better	1.091	.621	3.082	1	.079	2.977	.881	10.063
The instructor always checks for our understanding	-.845	.492	2.952	1	.086	.429	.164	1.126
Majority of students participate when the teacher ask questions	1.160	.350	10.957	1	.001	3.189	1.605	6.337
We are allowed to ask questions during lessons	.184	.517	.127	1	.722	1.202	.436	3.313
We are more motivated to learn when we cooperate with our instructors.	.473	.407	1.351	1	.245	1.605	.723	3.565
Our instructor does everything alone making us passive during the teaching learning interaction	-.157	.375	.175	1	.676	.855	.410	1.782

For indicators significantly predicted the development of self-learning skills ($P < 0.05$), namely 'in the course of the content, we are given short quizzes', 'students are less active during assessments' with a negative influence, 'we are given the room to share ideas at the point of content delivery' and 'majority of students participate when the teacher ask questions'. Two of them were critical predictors ($P < 0.05$; $OR > 1$ and $LB-OR > 1$); they were 'in the course of the content, we are given short quizzes' and 'majority of students participate when the teacher ask questions'.

Discussion

Concerning the influence of content delivery on learners' development of self-directed learning skills in higher education institutions in Cameroon, the above findings are supported by a study conducted by Hunt et al., (2016) on the effect of content delivery media on student engagement and learning outcomes. The purpose of this study was to systematically analyze the effect of content delivery media on student engagement, learning outcomes, and instructor behavior in two sections of the same lecture-based college Biomechanics course. The results illustrate that even though different media can be used to deliver the same content, the different instructional approach does not necessarily result in a change in interaction between the instructor and student, or between the student and the content, or differences in student learning.

Concerning research the influence of learning assessment on learners' development of self-directed learning skills in higher education institutions in Cameroon, the above finding is in line with a study on the impact of Assessment for Learning (AfL) on learner performance in life science carried out by Oluwatoyin and Sitwala (2019). This study investigated the impact of 'assessment for learning' on learner performance in Life Science.

The result revealed that learners following an AfL instructional approach performed statistically higher than those following normal classroom instruction. This result was discussed, and recommendations made in respect of both classroom practice and further research. The findings of this study had implications for policy, further research as well as instructional and assessment approaches to be used in the teaching of Life Science in the South African education system.

Similarly, the finding is in line with Abdul's study in 2017 on the impact of assessment for learning on students' achievement in English for specific purposes; A Case Study of Pre-Medical Students at Khartoum University: Sudan. This study identified the effect of assessment for learning on a group of Sudanese pre-medical students' performance in English for Specific Purposes (ESP). The study also attempted to identify students' perception and attitudes toward this type of assessment. Comparison of the scores of the students revealed a significant difference between the two groups in favor of the experimental group. Students' attitudes toward assessment for learning were checked through a questionnaire and interviews. Qualitative and quantitative analysis of the students' responses show their positive attitudes toward this type of assessment. The study ended up with a set of recommendations and suggestions to improve assessment for learning practice and to make it more effective in a Sudanese setting.

Concerning the influence of teacher-student interaction on learners' development of self-directed learning skills in higher education institutions in Cameroon, the findings are in line with the Connectivism theory by George Siemens (2004) which posits that students can easily connect to classroom learning via the use of technological platforms such as LMS. In the course of the connection, they interact with their teachers/facilitators to easily construct knowledge for themselves as part of their decision making process. The idea of connectivism accepts the medium of technology as a part of the student's decision-making process. Students not only process previous knowledge, but current knowledge from online articles, their best friend's tweet about a profession, or their role model's Instagram account. Students' digital feeds are influencing them (Pasquini, 2013). Connectivism admits that students can learn from devices and "decision-making is itself a learning process" (Siemens, 2004, p. 25). This is not a new concept, but students today have access to more technology, digital devices, and social networks than ever before (McHaney, 2011). Students are not only polling their parents, friends, or relatives to help them make decisions, but using their digital devices for decision making as well. The above finding is also supported by Wanders, et al. (2019) in their study on the effect of teacher-student and student-student relationships on the societal involvement of students. The goal of this study was to examine the relation between teachers and students and between students on societal involvement in Dutch secondary schools. The results showed that teacher-student relations and student-student relations were positively associated with societal involvement. The level of societal involvement differed between students from households with lower incomes, level of education and employment, even though parenting styles seemed unrelated to societal involvement. Students from higher educated parents were found to benefit more from these positive relationships with teachers. This advantage arguably amplifies the differences in societal involvement between students with lower and higher educated parents.

Conclusion

The main aim of this study was to investigate the influence of learning management systems on self-directed learning in higher education institutions in Cameroon. The specific objectives were to find out the relationship between content delivery and learners' development of self-directed learning skills in higher education institutions in Cameroon; to find out the relationship between learning assessment and learners' development of self-directed learning skills in higher education institutions in Cameroon; to find out the relationship between teacher-student interaction and learners' development of self-directed learning skills in higher education institutions in Cameroon. The findings for research objective one revealed that there was no significant impact of content delivery on students' acquisition of self-directed learning skills. This implied that the more teachers dwell on content online, the lesser students acquire self-directed learning skills. Therefore, it can be concluded that, course content delivery does not necessarily influence learners' development of self-directed learning skills in higher education institutions and that they should be given more opportunities to search by themselves.

Moreover, the findings for research objective two indicated that there was a significant impact of learning assessment on students' acquisition of self-directed learning skills. This implied that the more teachers assess students, the more they acquire self-directed learning skills. Therefore, it can be concluded that learning assessment has an influence on learners' development of self-directed learning skills in higher education institutions. Lastly, the findings for research objective three revealed that there was a significant impact of teacher-student interaction on students' acquisition of self-directed learning skills. This implied that the more

teachers interact with their students, the more they acquire self-directed learning skills. It can therefore be concluded that teacher-student interaction has an influence on learners' development of self-directed learning skills in higher education institutions.

Generally, this study concludes that the use of LMS is evident in some higher education institutions in Cameroon, however in the course of using any LMS platform aimed toward the development of learners SDL skills, the focus is on learning assessment given to the students and the way the teachers interact with their students.

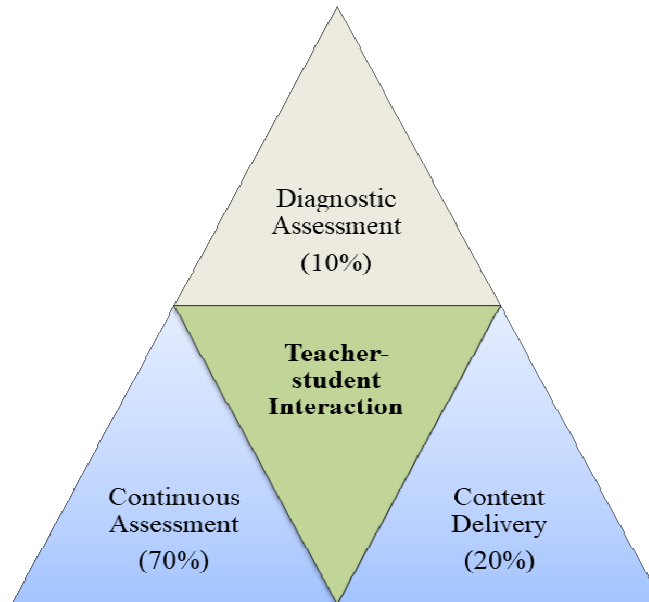


Figure 2: Proposed Framework for implementing LMS

For a proper implementation and use of any LMS aimed toward developing learners' SDL skills, be it in Universities or secondary schools, the above framework is proposed (figure 2). The above framework is made up of four triangles having a percentage of priority at each stage. The implementation and use of any LMS aimed toward developing SDL amongst learners should begin with a diagnostic evaluation so as to capture the minds of the learners toward the lesson. The teacher/instructor is not supposed to begin by presenting content, but by asking some questions based on previous knowledge vis-à-vis the lesson to be presented. Thereafter, the teacher/instructor can present a brief but appealing content to the learners. The content should not be bulky but should be summarized and simple so that the learners can easily assimilate. Because, when the content is too bulky, it may become monotonous to learners. So the content should be summarized and should give students the opportunity to add to the content presented, by so doing, they will become independent of their learning. The percentage attached to content delivery is 20% meaning it should not be loaded. Also, teacher-student interaction continues at the point of delivering content. Furthermore, the process stage having the highest proportion (70%) is continuous/formative assessment as the more students are assessed formatively the more likely they may develop SDL skills. The assessment at this stage, takes the form of quizzes, assignments, games, and so on and so forth. Still in the course of the continuous/formative assessment, teacher-student interaction prevails.

This study also proposes a scale which has been tested to measure SDL skills, as shown below in table 9.

Table 9: Proposed scale for measuring SDL

Development of self-directed learning skills	Developed	Partially developed	Not developed
Goal setting			
Willingness to learn			
Attentiveness			
Interest			
Self-planning			
Class attendance			
Taking down notes			
Personal research			

Self- monitoring			
Sharing ideas with the teacher			
Sharing ideas with classmates			
Cross-matching with literature			
Self- evaluation			
Asking questions for clarity			
Answering questions asked by the teacher			
Verification with literature			
Revision			
Openness for corrections			
Ability to take to instructions			
Doing assignments			

The above measuring scale was used in this study and has been tested to be an effective and efficient way of measuring SDL skills. Presented in a table, it has the various indicators of SDL such as; goal setting, self-planning, self-monitoring, self-evaluation and self-revision. To measure the level of attainment of these skills, a rubric has been attached: Developed, partially developed and improvement needed. The proper implementation of this scale will better capture the level of SDL skills in Universities and Secondary schools across the globe.

Recommendations

The recommendations were done based on the objectives of the study;

For research objective one, the findings indicated that there was no significant impact of content delivery on students' acquisition of self-directed learning skills. This implied that the more teachers dwell on content online, the lesser students acquire self-directed learning skills. Based on the finding, it can be recommended that teachers who teach using LMS in higher education institutions should be properly trained so they don't load content online for students to assimilate as it may be monotonous to them. The emphasis during online teaching should not be on overloading content, but making students create content out of the little given to them.

Concerning research objective two, the findings showed that there was a significant impact of learning assessment on students' acquisition of self-directed learning skills. This implied that the more teachers assess students, the more they acquire self-directed learning skills. Based on the finding, it can be recommended that teachers who teach using LMS should be sensitized to prioritize the use of continuous assessment strategies than on overloading students with much content. Different assessment strategies can be adopted like quizzes, assignments, group tasks and games in order to inculcate the development of learners' SDL skills.

Lastly, based on research objective three, the findings revealed that there was a significant impact of teacher-student interaction on students' acquisition of self-directed learning skills. This implied that the more teachers interact with their students, the more they acquire self-directed learning skills. It can therefore be recommended that at every stage of using LMS, emphasis should be laid on teacher-student interaction. This can be made possible via training sessions organized by each University to train teachers on maximizing the use of LMS.

Generally, in the course of collecting data, the researcher observed some challenges that teachers and students encounter in the use of LMS, these challenges are presented in the figure 3 below together with some recommendations to overcome them;

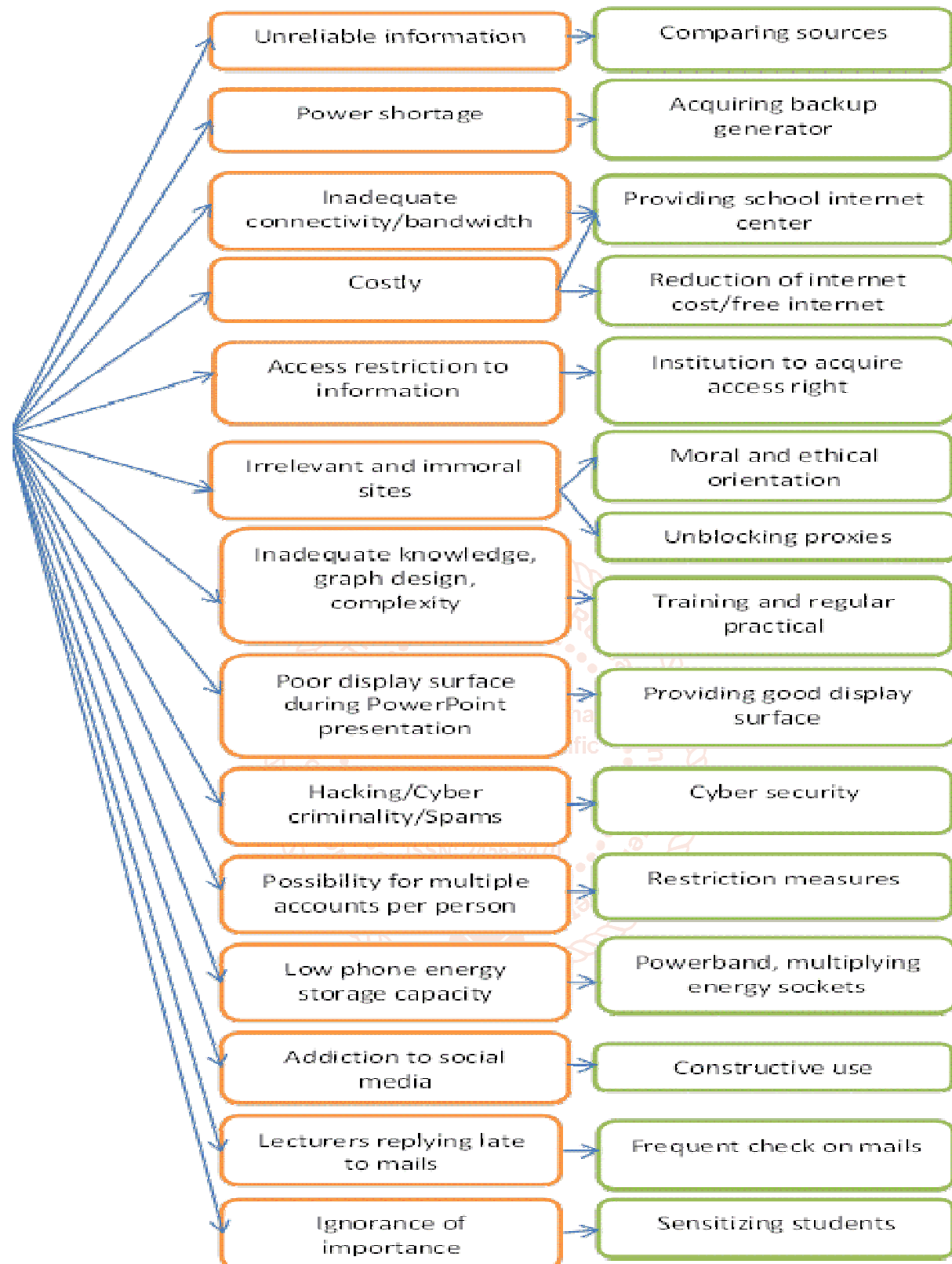


Figure 3: Challenges faced in the use of LMS and response measures

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