

Constraints Encountered by Teachers to the Implementation of Web-based Learning in Uganda

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Abstract—Web-based learning (WBL) is a growing demand in most institutions in different countries in the world. It offers independent and student centered learning to students through which they can work and to explore learning materials at their own pace when they want. They study more deeply in their areas of interest. Although WBL has the potential benefits of widening educational opportunities, many institutions in Uganda as one of the developing countries, are still struggling to integrate and gain benefits from it in their teaching and learning systems due to certain difficulties. The main purpose of this study is to find out the related possible barriers to teachers in implementing WBL in Uganda basing on the reviews and selected documents. After carefully investigating previous literature and related documents, the authors identified difficulties that are: infrastructure related, institutional related, individual teacher related and other problems. Identifying the difficulties to its implementations has impact on finding out possible measures to overcome these difficulties and to formulate related policies on implementing and designing web based learning in Uganda.

Index Terms—ICT, WBL, teaching and learning, Constraints

I. INTRODUCTION

Information and Communication Technology (ICT) has become an important part of education and society in great extent. A substantial amount of studies already showed its positive effect on improving education system in a country [5], [7], [16], [36], [42]. The use of ICT in the education is growing demand, which provides opportunities for teachers, students and administrators to use in teaching and learning contexts and in administrative purposes [38], [28],

[4]. For example, it facilitates teachers and students to continue learning outside school hours; it helps teachers to plan and prepare lessons and to design materials such as course content delivery and to facilitate sharing of resources at anytime and anyplaces which is not restricted to classroom teaching hours. In addition to this, ICT supported tools have the ability to engage students in student-centered activities, as well as to help them solving different complicated problems to enhance deep level of learning [35]. It is also used to develop students skills for communication, problem solving and lifelong learning [3]. In case of administration, ICT is used in a myriad ways such as recording students final grade, organize, control, coordinate, direct, evaluate teachers teaching practices and programmes in a bid to achieve goals of higher institutions [2].

Besides, in a broader perspective, ICT has advanced hardware and software application. It has covered the continuum from instructions on programming skills, self-directed drill and practice, interacting learning software, online training, testing, instructional delivery augmentation, and internet-based accessibility to information, communication, and publication [10]. Due to these features, ICT creates an influential leaning environment and it transforms the learning and teaching process and in many cases introduces new teaching techniques or modify existing one, for example networked learning [12], self-paced learning [37], [41], online discussion [6], web based learning, m-learning [9], and the like. Thus, ICT is seen as an instrument to support new ways of teaching and learning [23]. The rapid growth and adaptation of ICT and World Wide Web (WWW) has paved away for effective use of web-based learning (WBL) and teaching [34]. It is one of the powerful, interactive, and dynamic means for instruction, which is considered to be driven by ICT. There is still much debate about its definition and meaning. For instance, SyhJong Jang [17] defines WBL as an environment which is based on the constructivism in which the

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students can participate in learning in a self-leading way and construct their knowledge in ways that are meaningful to them. Liu [25] defines WBL as any entity of instructional contents or activities delivered through the Web that has four features: (i) it intends to teach a focused concept, (ii) it meets specific learning objectives, (iii) it provides a learner-centered context, and (iv) it is an individual piece that can be used and reused. In this study WBL is defined as one way to deliver instruction, using web-based technologies or tools in a learning process. In other words, students use computers and Internet to interact with the other students, teacher, and learning material. In our views, it consists of technology that supports traditional classroom teaching and learning as well as online learning environments. Hadjerrouit [14] considers that it has four major features whereas we consider that it has five major features as listed below and integrated in Fig. 1:

- 1) It uses Web technologies and internet services and is delivered through the Web;
- 2) It teaches content that meets specific learning objectives aligned with the curriculum;
- 3) It is designed on the basis of a learning strategy and pedagogical procedure;
- 4) It contains reusable elements; and
- 5) It should be integrated with pedagogy and subject content.

II. BACKGROUND

The previous literature reports that WBL provides much benefits in teaching and learning [25], [26]. More particularly the use of the web as an educational tool has provided learners and educators with a wider range of new and interesting learning experiences and teaching environments that is not possible in traditional class room teaching contexts [26], [17]. For example, it offers independent and student centered learning to students, where they can work at their own pace [19], influences their own learning by adapting different learning styles depending on their own needs [24], enables to study more deeply motivated by their areas of interest [14], encourages exploring material on their own and enables to skip over materials already mastered, enables students to join discussions at any time and encourages also those who do not speak during face-to-face classroom situation to learn [25], It allows learners to have access wide ranges of courses, which enables to reduce travel time and costs, encourages interaction between students and instructors [33].

Additionally, students can share their ideas with other students, which may help to understand the material better and they can study anywhere and anytime if they have an access to computer and Internet.

Considering its potential benefits, many educational institutions in the world have already integrated it into their systems [32] such as United States [8], Singapore, Australia [30], Scotland [37], Taiwan [26] etc. In case of some other mediocre developed countries, for instance, higher institutions of learning in Malaysia have gradually employed web-based teaching learning approach (WBTLA) [33]. However, in spite of the huge growing demand and benefits of web based learning to widen the teaching and learning opportunities, the developing countries including Uganda have not fully optimized their use and benefits due to many confronting constraints [24]. In spite of the constraints and challenges that Uganda is facing, there is a growing interest in integrating web-based education in teaching and learning process. Web-based education or learning continues to be appreciated as an important innovation within higher education. As a means for delivering university instruction, for instance, it is gradually gaining acceptance in the conventional universities in Uganda. In order to realize these demands, the aim of this paper is to identify constraints faced by teachers to implementing WBL in higher education in Uganda. The future of technology-enhanced WBL in Uganda, however, will depend very squarely on how we go about addressing the constraints. Due to the importance of WBL in the current education system and society in Uganda, identifying the possible constraints to teachers to its implementations in higher educational institutions would be of novelty and an important step in improving the quality of teaching and learning.

III. METHODOLOGY

The review of studies draws the attention of constraints to teachers in implementing WBL in teaching and learning process and these were located through wide search of existing academic database (e.g. Educational Resources Information Center (ERIC), Google Scholar, Ovid, Springer Link, Web of Science, Internet search engines etc.) for research in the areas of barriers to the implementation of WBL. The authors identified, studied and carefully evaluated 65 articles, which were the focus of the review. However out of these 65 papers only 44 had the related content that was

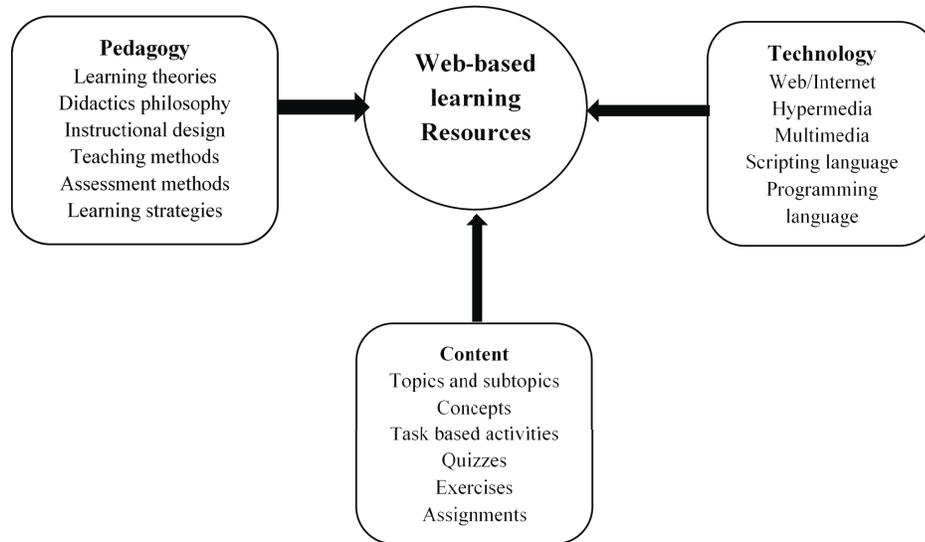


Fig. 1: WBL resources; main characteristics [14]

needed and therefore, were included in this paper. Fig. 2 presents the percentage of reviewed articles. In order to include a study in this review, there had to be evidence within the paper of having related data, which could provide important insight to this present study. In contrast those studies, which were not related to current study, were left out. The criteria for selection of studies for this study was done from the general approach of WBL and its problems, barriers to ICT integration in the teaching and learning process; however much concentration was on constraints encountered by teachers in the implementation of WBL during the analysis of these studies. Within this review, the main purpose of the analysis was to identify how the authors have described the various barriers in implementing WBL and how data was defined and analyzed. First, each study was scrutinized to identify the problems, and the way authors categorized them. The barriers identified were examined across all studies and when differences were found, the papers were reexamined to look at how the problem was analyzed to make sure it was not taken out of context. The analysis of the selected studies was supported by the previous literature in this domain. The authors constructed ideas and contents from these selected studies through reading and rereading them. Further sources cited were relevant government and institutional documents which were reviewed through document analysis and

got the insight of constraints to teachers towards the implementation of WBL. By using different techniques and approaches, the researchers intended to strengthen the validity of the results.

IV. RESULTS

Based on the analysis, we found that although most institutions are committed to implementing WBL in their programs, the process is hindered by a number of constraints. After carefully analyzing, we categorize four broader areas of constraints, such as: (i) infrastructure related problem, (ii) institutional related problems, (iii) individual teachers related problems and (iv) other problems. Each category are described in more detail below:

A. Infrastructure related problem

The infrastructure related problems as discussed in this paper refer to hardware, software and connectivity to access WBL. It includes availability of electricity and telephony; basic requirement for computer-based or online learning; access to computers in schools, communities, and households; as well as affordable Internet service.

1) *High speed internet access*: WBL includes a wide variety of learning strategies and ICT applications for exchanging information and gaining knowledge through applications like video conferencing,

Reviewed papers

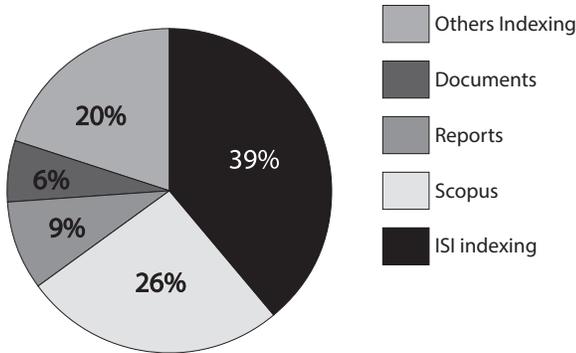


Fig. 2: Statistics of all reviewed papers

mobile technologies, electronic learning platforms, and other web-based technologies which require quite high speed Internet connection. Slow Internet connection can be the biggest challenge in the implementation of the above-mentioned services. It is in line with [39] in where they stated that developing countries are using slow broadband connections and their magnitudes are still on a low scale. In Uganda, it is seen that Internet is concentrated in the urban areas and a few economic towns but not in the rural areas. Therefore having slow Internet connection in most areas in Uganda is one of the constraints facing in implementing WBL throughout the country.

2) *Access to web based equipment:* Lack of equipment such as laptops, computers, servers, is a significant barrier to use ICT for WBL. It is not only for the newer computer-based ICT, but also even for the more traditional ICT such as audio and video, radio and television broadcasting [26], [27]. Besides, ICT equipment like laptops, computers, web cameras, servers which are needed for web based education, requires huge money to purchase software like blackboard, school keep, Moodle, articulate storyline, etc. require to be updated regularly. Using up-to-date hardware and software resources is a key feature to diffusion of WBL [35], [13]. Whatever limited access there may be: few computers and the Internet, which is usually concentrated in the major urban centres. These limited facilities are mostly found at the workplace rather than in educational institutions and peoples home in Uganda. Therefore, there is less scope for accessing resources for implementing WBL.

B. Institutional related problems

It refers to those constraints, which teachers might encounter due to educational institutions and that are discussed below:

1) *Technical support:* Many developing and under developing countries are struggling to integrate WBL in their education due to lack of technical support [38], such as China [27], Oman [4], Nigeria [2]. This includes issues like installation, fixing, operation, care, network, management, and security of WBL facilities. Teachers usually do not have courage to use computers because they were not sure where to turn for help when something went wrong while using computers in their instructions. It was found that most institutions are not giving adequate technical support hence affecting the implementation of web based learning [34]. Jones [18], reported that if there is a lack of technical support available in an institution, then it is likely that technical maintenance will not be carried out regularly, resulting in a higher risk of technical breakdowns. Therefore, lack of technical support is very stressful for teachers, which may affect the teachers willingness in the adoption of WBL in Uganda.

2) *Administrative support:* Administrative support is critical to the successful integration of web based learning into teaching and learning processes in Uganda. Administrators can provide the conditions that are needed, such as WBL related policy, incentives and resources [2], therefore lack of administrative support can affect the implementation of WBL in education system in Uganda [26]. For the broad use and integration of WBL, administrators should have a broad understanding of technical, pedagogical, administrative, financial and social dimensions of web based learning in education. Therefore, lack of administrative support may hamper teachers use of WBL in Uganda.

3) *Lack of funds:* Acquiring or accessing the necessary equipment required to use during WBL have significant cost, not only in terms of the capital cost or purchasing the equipment, but also those pertaining to maintenance and servicing [1]. It is found that developing countries like Uganda still have unreliable power, high-energy costs, inadequate transportation infrastructure, and corruption which inhibit economic development and investor confidence. With the above constraints, the cost of hardware and software are high which may result in many institutions failing to accommodate it hence becoming a barrier to the teachers to implement WBL. Besides, use of ICT equipment

and access to the Internet through an internet service provider (ISP) incurs costs, training learners and teachers to acquire skills may be another expense to both the teachers, institutions and students [15]. Since Uganda is one of the developing countries having lack of funds and resources that result difficulties of implementing WBL.

C. Individual teachers related problems

Teachers in Uganda may face problems in the integration of WBL due to their personal weaknesses which is referred as individual related problems. The detailed discussion is presented below:

1) *Lack of skills, knowledge and competence:* Some teachers concerned about WBL have not (yet) developed an understanding of how current Web resources could be used interactively to improve the teaching and learning experience of students [37]. Most of them lack technical knowledge, skills and competence of how to create interactive exercises on the Web. However, previous studies reported that the success of educational innovations depends largely on the skills and knowledge of teachers [14]. Alternatively lack of training in use and integration of WBL also hinders its implementation [17]. Thus teachers skills and competences related to WBL is the biggest challenge.

2) *Lack of time:* Recent studies show that some teachers have competence and confidence in using computers in teaching, but they still make little use of technologies because of time [27], [11], [40]. Studies have identified time limitations and the difficulty in scheduling enough web based classes as barriers to implement WBL [34], [8]. The constraint of time exists for teachers in many aspects of their work as it affects their ability to complete tasks and time required to learn how to use the technology. This included the time needed to locate hardware, prepare materials to use, explore the web and practice to use technology, deal with technical problems, and receive adequate training and many other busy schedules [4], [20]. Some teachers workload is heavy rendering them no time to prepare and develop web based materials suitable to their local needs [1], [22].

3) *Teachers Attitude towards Computer:* Teachers attitudes have been investigated to be main forecasters of the use of new technologies in instructional situations [29] and this affects the implementation of web based learning in Uganda. The effective use of

technology in the classroom depends to a great extent on the teachers attitudes toward these tools [15]. If teachers have negative conceptions and beliefs about the effectiveness of WBL in education then the efforts would not be successful.

D. Other problems

Apart from the above three stated problems, there were two more problem areas such as relevance of content and lack of awareness that were identified and placed under other problems. The detailed discussion is as follows:

1) *Relevance of Content:* Learners encounter difficulties in WBL content, for example some courses like medicine, engineering and many other courses require practical lessons. These subjects are generally difficult to be involved through WBL environment. According to Adam [1], while ICT literacy is generally on the rise, skills for the application of ICT to subject areas in natural sciences, engineering, medicine, social sciences, and art have not been fully developed. The learners may not be able to grasp and comprehend with the learning because they are not physically present in classes and not having hands on skills. The skills of accessing, assessing, and evaluating information on global networks are taught on a low scale in universities and colleges in Uganda.

2) *Lack of awareness:* This is observed that administrators, academic policy makers, and other administrative officers who are involved with integrating WBL in Uganda, also possess lack of overall understanding about how to reorient teaching, learning, and research with the digital domain [11]. Therefore, teachers were not receiving proper and adequate supports to use WBL in their teaching.

V. DISCUSSIONS AND CONCLUSIONS

Integrating the use of WBL in teaching and learning process is a big challenge to many institutions in Uganda and other developing countries hence many countries have not embraced its use at a large scale. WBL has a significant impact towards widening Ugandas education opportunities as earlier indicated. These benefits will encourage more Ugandans who are busy at their work to enroll for further studies since they can learn from anywhere, anytime as long as they are connected to the Internet and have access to their course content. Therefore knowing how WBL changes teaching practices as well as the ways in which students

learn, is fundamental for evaluating its effectiveness and fully integrate it into teaching and learning for all higher institutions in Uganda. Identifying the possible constraints to teachers to WBL implementations in Ugandas higher educational institutions would be of novelty and an important step in improving the quality of teaching and learning. It also acts as a guideline for policymakers and curriculum developers who are working on implementing and designing web based learning in developing countries.

It is important to acknowledge the limitation of this study. We identified the constraints based on the selected studies and document analysis, which were not validated by empirical data. However, there are many other studies in existing literature that were based on reviews and they contributed in the related fields [22], [31], [21]. Therefore, further research in this topic is necessary in Uganda and other developing countries to explore more about barriers and to find out the best possible ways to overcome these difficulties. In order to reap much from WBL, we recommend that governments and donors should be encouraged to support institutions in Uganda to overcome the fore mentioned constraints when implementing WBL. Uganda and other developing countries could be benefited by taking advantage of WBL, therefore, need to train teachers on how to use this technology, to provide updated hardware and software to support, to provide infrastructure and resources needed and to find ways in resolving all the difficulties hampering implementation of WBL. The Institutions and universities need to expose students and teachers to more ICT skills in all faculties and putting more support in extending IT to lower levels like primary and secondary schools since it is not yet effectively integrated at these levels. As these difficulties may typically change over time, they could be further studied by comparing the findings from other researchers.

In conclusion, it is important for educational organizations to be aware of the barriers that hinder staff from implementing Web-based approaches/learning in teaching and learning process in higher education. The potential of WBL can only be satisfied if teachers have the opportunity and motivation to use this technology. Significant investments in ICT by universities will mean nothing if staff are overwhelmed by the difficulties they encounter. In order to create positive awareness of using WBL among teachers, it is necessary for understanding the barriers that teachers

face in implementing WBL. Thereafter, it is needed to provide proper ways and alternatives of controlling these barriers. For instance, proper training of teachers in applying web technologies is essential for building teachers competences in the area of WBL. In that way the shortcomings of WBL will be reduced and will gradually escalation its degree of diffusion into the educational system.

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