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A SUITABLE APPROACH TO IMPLEMENT E-LEARNING IN SECONDARY SCHOOLS IN BOTSWANA: TEACHERS' PERSPECTIVE

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Abstract

A suitable approach to implement e-learning in secondary schools is proposed. This is informed by teachers' attitudes towards e-learning and availability of resources. This paper presents findings from a survey on availability of e-learning tools of computer studies senior teachers from different senior secondary schools in Gaborone, Botswana, to which a 100 % response rate was achieved. It also presents findings from a survey on attitudes towards e-learning of forty teachers from a missionary aided senior secondary school, and a response rate of 90 % (36/40) was achieved. Data was collected using questionnaires and analysed using Microsoft Excel package. From the results, the authors argue that low-impact blended approach where extra online activities are added to a traditional face-to-face method be used as a suitable approach to implement e-learning in secondary schools. E-learning policies aimed at directing the processes involved in blended learning should be put in place in order to reach desired goals.

Keywords:
E-learning;
Secondary school;
Teaching;
Learning;
ICT.

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1. Introduction

E-learning can transform the teaching and learning environment, and has programmes that can deliver improved learning outcomes [1]. Many definitions of e-learning have been offered, such as ‘lectures and practice delivered by instructors to the learners through any technological mode, with the intention of promoting learning’ [2]. In this paper, e-learning is defined as students using information and communication technologies (ICTs) to develop skills and acquire knowledge and understanding.

The rapid change in technology that is affecting our educational environment does not only affect what is taught but also how the teaching is done. Technology is also ever influencing the workplace in which learners will eventually find themselves. It is therefore imperative that learners become fully acquainted with the latest available technology and their teachers introduce new teaching methods and approaches that take advantage of technology. Nowadays it is beyond doubt that ICT has become part and parcel of the education realm. ICTs have made the learning and teaching process much easier. These technologies ease the teacher’s burden and increase his/hereffectiveness through typing, automating examinations, research, marking and making corrections, content multiplication and others. Equally, they enhance self-training of learners [3]. But the most important aspect of ICTs in education is the fact that they have improved the teaching method from a traditional education setting to where students can take control of their own learning through platforms like e-learning.

The traditional educational setting is made in classrooms where a teacher presents learning material to a group of students face to face. Here if there is any educational technology, it depends on the teacher, and the students must physically participate in the learning process. Irrespective of the many advantages of this kind of educational setting, there are also many disadvantages. For example, if a learner is unable to attend class, then he/she will miss the learning material. The rapid growth of ICTs and growing computer knowledge among learners can help address these disadvantages. E-learning is one such platform.

The last three decades have seen an advancement in the use of educational technologies to improve quality, services and opportunities for learning. This advancement in technology has

also seen a growth in the diversity and variety of teaching methods used. Thus, the development and incorporation of these new pedagogies for learning have resulted in important changes in how teachers approach teaching and learners approach learning. Teachers and learners are now using new ICTs to create new teaching and learning models, improve learning outcomes, and place more responsibility for learning on students' shoulders. As [4, p. 121] put it, 'e-learning encourages learners to take responsibility for their learning and build self-knowledge and self-confidence.'

E-learning can help in the achievement of intended objectives in the teaching and learning environment. It introduces flexibility and collaboration in the teaching and learning process as it does not require the teacher and learners to be in the classroom at all times. It can be achieved through deployment of synchronous and asynchronous learning media. Asynchronous e-learning is learning that takes place at a time or place different to when an instruction was made. It can be done through media such as e-mail, blogs, social networking, web based textbooks, documents, and discussion boards. This approach makes it possible for learners to log on to an e-learning environment at any time and download documents or send messages to teachers or peers. Synchronous e-learning on the other hand, takes place at the very time that an instruction is made. This form of learning is facilitated by media that include video conferencing, face-to-face discussion, Skype conversations and virtual classroom where participants directly interact in real time. Learners and teachers use synchronous e-learning as more social, by asking and answering questions in real time [5].

Sound e-learning is founded on instructional design principles; pedagogical elements that take into account learning theories to assist learners in achieving the stated goals and objectives. There is a need to assess availability of e-learning tools in schools and attitudes of teachers towards e-learning as they are an important stakeholder in the teaching and learning process. Availability of e-learning resources coupled with positive attitudes towards e-learning would make it easy to infuse e-learning to traditional methods of learning and teaching. Because of its ability to use a device connected to the network, e-learning is available in various forms such as computer-mediated learning, blended or hybrid learning, web-based learning and mobile learning [6]. In view of this, the researchers wanted to solicit teachers' views on the most suitable

approach to implementing e-learning in senior secondary schools in Botswana. Hence, the objectives of the study were to:

a) Establish availability of e-learning tools in senior secondary schools in Botswana,
b) Investigate senior secondary school teachers' attitude towards e-learning,
c) To find a suitable e-learning design that will be suitable for senior secondary schools in Botswana.

The principal research question for this study was: *What is the most suitable form of e-learning that should be implemented in senior secondary schools in Botswana?* This was supported by the following specific research questions:

a) Which form of e-learning will be convenient for senior secondary schools in Botswana?
b) Which form of e-learning are the available tools appropriate/suitable for?
c) Are senior secondary school teachers experienced in designing different teaching and learning techniques?
d) Which form of e-learning is suitable for senior secondary school teachers' skills set?
e) Is there enough interest on e-learning from senior secondary school teachers?

Curriculum and e-learning

Since e-learning is technology-driven education, it is important to do the implementation systematically and be driven by pedagogy. A curriculum that provides rich learning activities allows students to learn with computers rather than from computers. The change in learning context affects student-teacher relationships by improving interaction among learners through a variety of online materials and other internet users while teachers become facilitators and mentors [7]. The Curriculum Development Unit in Botswana encourages integration and infusion of specific topics of the curriculum that can be mediated through ICTs. According to [8], integration has been practiced in subjects such as Mathematics, Science, Business Studies, English and Social Studies. The ultimate goal of infusion is to make ICT an integral part of teaching and learning as well as institutionalise ICT for skills development and cognitive

development. They also pointed out that the infusion policy is uncoordinated and its effectiveness not evaluated.

E-learning tools

In order for smooth implementation of e-learning, appropriate and relevant tools need to be in place. Some schools will already have e-learning development tools. Others will have to evaluate the many options available and choose one that fits their school, through auditing staff skill levels as well as in terms of information technology (IT) requirements. IT support is important when designing and implementing e-learning. E-learning may be facilitated through several tools and media. It has been reported that the media delivers text, audio, images, animation and streaming video. Technology applications and processes include audio tape, satellite TV, CD-ROM and computer based learning as well as intranet/extranet and web based learning. Numerous open source software that can be installed, have a wide user community and offer complete e-learning functionalities, such as e-front, Moodle, Dokeos and plenty more are available in the market [9].

E-learning design approaches

Before implementing e-learning programs, one needs to do some needs assessment by looking at available tools, an e-learning readiness score, existing teaching and learning methods. Also to be considered are a list of advantages and potential obstacles to e-learning adoption, and a list of possible e-learning designs. The skills set and attitude of teachers and learners should also be taken into consideration. How the two groups (teachers and learners) are likely to react to e-learning should be identified. One needs to determine if they been exposed to e-learning before, if they have computer skills and what their general reaction to change is. These are some of the factors that should be considered before e-learning can be implemented at a school. One also has to consider learning method. As the teacher designs an e-learning module/topic, he/she has to anticipate all the likely issues that may arise and include the content accordingly. He/she should determine whether the topic should exclusively rely on e-learning, or whether there should also be some face-to-face interaction. Thus, some e-learning implementations are very basic, while others are very complicated and detailed. In some basic implementations, the ‘chalk and talk’ teaching methods are simply replicated with new technology. This approach may seem attractive

due to possibility of cost savings because of opportunities of scalability. The downside to this implantation approach is that it mostly leads to a poor learner experience, poor educational benefit, dissatisfied students, and disillusioned teaching staff.

Many schools find mixing e-learning with face-to-face contact an effective teaching approach. This is made even more appealing by rapid developments in technology, where now there are software products that enable classroom style teaching with audio, video and text communication by learners in different locations. By examining different processes of designing blended learning courses, [10], came up with three distinct design approaches: Low-impact blend where extra online activities are added to a traditional face-to-face teaching; an easy type of blend that helps inexperienced teachers build their first blended learning approaches and has potential to encourage hesitant teachers who may think that blended learning is very complex and highly technical. Medium-impact blend involves redesigning a subject by replacing some of the face-to-face activities by online components. In this approach some parts of the subject would be more effective as online activities. This approach allows teachers to start simply and implement incrementally, replacing subjects components as required [11]. High-impact blend approach is when the blended learning course is built from scratch. This approach can be a full redesign, total redesign, or a radical change. Instead of looking at an entire subject, the teachers look at each single subject learning outcome. For each outcome, the teacher determines the best delivery option of that outcome. When applying this approach at the learning outcomes level, teachers can get the most effective blend of technologies and can produce a better curriculum.

Stakeholders' attitudes towards e-learning

Students' attitudes towards technology are influential in determining the educational benefits of online learning resources and experiences. [12] found that students' characteristics such as computer self-efficacy, internet self-efficacy, computer experience, internet experience, computer anxiety and attitudes towards e-learning are regarded as critical success factors in e-learning in developing countries. [13] observed that reserved attitudes towards technology based learning in Botswana are gradually disappearing. In developing countries the most significant factors are related to increasing awareness, improving learning content, requiring computer training, motivating users to utilize e-learning systems and high level of support from the

institutions [12]. Students', teachers' and principals' attitudes towards e-learning are influenced by an individual's computer experience that includes type of training, years of using the computer, ownership of the computer, and intensity of computer use. Access to reliable and convenient ICTs reflects students' attitudes towards e-learning. Teachers and learners will hold positive attitudes towards e-learning if they recognise that e-learning will help them improve learning and teaching effectiveness and efficiency. Positive learning climate and performance expectations provide greatest contribution to learning satisfaction.

ICT Policy in Botswana

On realising the need to harness the potential of ICTs to improve the quality of education it delivers to its citizens, the government of Botswana has come up with a number of documents to guide the integration of ICTs in the teaching and learning process. These are the Maitlamo National ICT Policy, the 1994 Revised National Policy on Education and the 1996 Vision 2016. The national ICT policy recommended that ICT programmes, projects and applications that can provide learning and guidance be adapted to meet the country's education needs [14]. This policy also has a component called ThutoNet, which deals specifically with the promotion of e-learning in schools. This policy also aims to improve the low levels of computer literacy and enrolment in secondary education as they have been identified to be constraints to development. In order to support this, the government decided that by the end of 2010 all schools were to be equipped with computers and have internet connectivity, and that all teachers should have attained basic computer skills [15]. Government schools from primary up to tertiary are thus equipped with computer laboratories where both learners and their teachers can work to improve their ICT skills. In addition, the government has introduced ICT introductory subjects in secondary schools, and as core courses in tertiary institutions. Despite this, it has been found that about 60 % of primary school teachers lack skills on using computers for instructional or teaching purposes [16]. This is despite 78.9 % of them being aware of the advantages of technology in an educational and instructional environment.

The Botswana Revised National Policy on Education (RNPE) of 1994 points that it is necessary for learners at all levels of schooling (primary, secondary and tertiary levels) to be taught computer skills in order to allow modern technology to help them learn better. According to [17],

this policy called for the introduction of new subjects that advanced computer education. These subjects were to be introduced as a compulsory computer awareness subject at junior secondary schools and as an optional subject at senior secondary schools. Vision 2016 also talks about equipping schools with ICT resources for improved teaching and learning. The document captures this by stating that 'all schools will have access to a computer, and to computer based communications such as the internet', [18, p. 7].

Since the government of Botswana realises that education and skills development lie at the centre of ICT solution, programmes that will ensure increased numbers of enrolment must be identified to improve the overall level of education. E-learning is therefore an approach that can be used to increase the enrolment. The government sees e-learning as a new knowledge-based industry, able to take advantage of advanced educational systems to produce products and services that could be internationally appealing. Hence, it wants to use e-learning to improve quality of the education it offers and produce graduates that are technology-savvy, and that are able to use new technologies in growing the economy.

E-learning implementation in secondary schools

Although there is lack on research on implementation of e-learning in secondary schools in Botswana, several studies have been conducted on the implementation and infusion of e-learning in secondary schools in other countries. In their study on the application of ICTs in Nigerian secondary schools, [19] report that even though the government of Nigeria has made efforts to ensure that ICTs are available to be used in secondary schools, this is the case in only 10 percent of Nigerian public schools. The other 90 percent of public schools have difficulties with costs hence only use limited, if not none of ICT in teaching They report that that these schools blend ICTs with the traditional chalkboard and textbook method that continue to dominate teaching and learning activities. This is in agreement with [20] who said that in Nigerian schools, the commonest type of e-learning adopted is when the learning material is recorded on Compact Discs and can be played when the learners desire. They found a problem with this approach as the numbers of students per computer make classes un-interactive as compared to when the material is offered by the teacher standing in front of the class. This has made some schools to adopt the use of intranet facilities, although this is also hampered by never-ending power

problems and high cost of operating standby generators [20]. Blended learning is also preferred in Tanzanian secondary schools [21] and British secondary schools [22].

The African Union has a programme, New Partnership for Africa's Development (NEPAD), which aims to help its member countries to achieve socio-economic inclusion of their citizens through universal access (e-learning). To achieve this, some schools referred to as NEPAD schools, were set up as centres of excellence in ICT integration and provided with equipment and material to implement e-learning. [23] carried out a study where they compared the application of e-learning in NEPAD schools to non-NEPAD schools. Their findings showed that e-learning produces significantly better results in the teaching and learning process in secondary schools. They attributed this to appropriate ICT infrastructure and better qualified teachers. NEPAD schools had 89 percent of their teachers being qualified in ICT while non-NEPAD schools had only 67 percent of teachers being adequately qualified in ICT. Their study revealed that NEPAD schools were better equipped with e-learning tools like Internet, smart boards and e-libraries while non-NEPAD school were deficient in these ICT infrastructure. Based on the study findings, they recommended that schools be provided with appropriate ICT infrastructure and teachers be appropriately trained in order to fully enjoy the benefits of e-learning.

Interestingly, the lack of sufficient and appropriate training on how to integrate new ICT technologies in teaching is not only restricted to developing countries as [24] reported that teachers in Hong Kong are also not fully prepared to use e-learning technologies for teaching and learning. This is despite the fact that secondary school teachers and students in Hong Kong have been given the opportunity to use computers and related technologies on a daily basis for over twenty five years, and that the majority of secondary school teachers in Hong Kong are university graduates, the majority of whom have had the chance to use these ICTs during their university studies.

According to [25], a web-based type of e-learning is preferred for secondary schools in Palestine. This is due to the mobility of learners because of the unstable political situation. They report that the Ministry of Education and Higher Education in Palastine has developed an interactive web-based application prototype called the Alaws Educational Network (AEN) which has a number

of methods that promote student-centred learning process. Some of the methods that AEN offers are e-training courses, virtual classrooms and discussion forums. The AEN has fairly wide recognition and depends mainly on informal networks of committed teachers from various places in Palestine [25]. [26] report the use of tablet-based e-textbooks in South African high schools. In this approach, e-textbooks are loaded onto tablets and used to complement formal classroom learning. Enthusiasm and improved grades are reported for learners who use tablet-based e-textbooks. However, it was observed that even when using tablet-based e-textbooks, physical interaction with a teacher was still needed. This points to blended learning approach.

2. Research Method

This was qualitative and followed a case study design. In-depth interviews with student teachers (mature entry students who are secondary school teachers) at the Botswana University of Agriculture and Natural Resources (BUAN) were conducted to examine the validity and reliability of the research model. Then, a questionnaire was developed based on the survey instruments from literature and feedback from interviewees. The questionnaire was given to BUAN lecturers from Statistics Unit, and Educational Technology Unit to improve face and content validity. Questions were structured using a five-point Likert scale designed as follows: 1 = Strongly Agree, 2 = Agree, 3 = Neutral, 4 = Disagree and 5 = Strongly Disagree. The respondents were asked to rate their level of agreement to closed questions using this scale. A pilot test of the questionnaire was conducted with 10 teachers from Ledumang Senior Secondary School.

The questionnaires were self-administered by the researchers. A sample of respondents was selected from St Joseph's College and computer studies senior teachers in secondary schools in Gaborone. The study areas to assess availability of e-learning tools were St. Joseph's College, Naledi Secondary School, Gaborone Secondary School and Ledumang Secondary School all in Gaborone, Botswana. Four computer studies senior teachers were selected to respond to the questionnaires that assessed the availability of e-learning tools in schools; one from each participating school. Respondents on attitudes of teachers towards e-learning were teachers at St. Josephs College, a government aided mission secondary school that has relatively more resources compared to other government schools. St Joseph's College is one of the secondary schools interested in using e-learning technology to enhance teaching and learning. All

questionnaires given to senior teachers in four different senior secondary schools were completed and returned. Of the 40 questionnaires given to teachers at St. Joseph's College, 36 were completed and returned. This gave a response rate of 90 %.

In this research, Microsoft Excel 2013 was used to analyse the data. Descriptive statistics were used to summarise and interpret the data collected from the respondents. These statistics included frequencies, means and standard deviations. To qualify information across the whole date set, the analysis process also included comparing responses with relevant documents.

As is the case with all empirical research, this study has some limitations that should be considered when interpreting the results. The respondents to the survey are only teachers from an urban area, and as thus will not reveal any differences between what obtains in schools in rural and urban areas. The school that was chosen for the survey on teachers' attitudes towards e-learning has relatively more resources as compared to other government schools, and as such may not be fully representative of government schools. This school was intentionally chosen for this survey because of its documented interest in using technology to enhance teaching and learning. Nevertheless, the results of this study should be a starting point for research on finding suitable approach to using e-learning in the teaching and learning environment in government schools in Botswana.

3. Results and Analysis

Availability of e-learning tools

For successful implementation of e-learning, there is a need for proper e-learning tools to be in place. Four computer studies senior teachers (one from each school) were asked to give their views on availability of selected e-learning tools at their respective schools. These views are summarised in Table 1 below.

Table 1: Availability of e-learning tools in senior secondary schools

Item	Mean	Standard Deviation	Response %					Scale
			Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	
Computers	2.00	0.82	25.00	50.00	25.00	0.00	0.00	Agree
Computer aided instructional software	3.00	0.82	0.00	25.00	50.00	25.00	0.00	Neutral
Interactive whiteboard	3.25	0.96	0.00	25.00	25.00	50.00	0.00	Neutral
Digital cameras	4.25	0.50	0.00	0.00	0.00	75.00	25.00	Disagree
Mobile and wireless tools	4.00	0.82	0.00	0.00	25.00	50.00	25.00	Disagree
Communication tools	4.00	1.41	0.00	25.00	0.00	25.00	50.00	Disagree
Web-based learning platform	4.25	0.96	0.00	0.00	25.00	25.00	50.00	Disagree
Internet	3.00	0.82	0.00	25.00	50.00	25.00	0.00	Neutral

The results in Table 1 above indicate that except for desktop computers, all other tools are either not available or not satisfactory. Majority of respondents (75.00 %) both strongly agree and agree that computers are available in their schools. Respondents were non-committal on the availability of computer aided instructional software, interactive whiteboards and the Internet.

This is shown by mean values of 3.00, 3.25 and 3.00 respectively. On the issue of the Internet, 25.00 % agree that the Internet is available while the same percentage disagree that it is available. This variance could be due to the fact that, although the schools are connected to the Internet, it is either slow or in some instances computers connected to the Internet are not functioning properly. Respondents disagreed that digital cameras, mobile and wireless tools, communication tools and web-based learning platform are available in their schools as shown by means of 4.00 and above. Respondents feel very negative about the availability of mobile and wireless tools and web-based platform as none of them agrees that they are available in their schools. Lack of availability (other than computers) of e-learning tools may hamper e-learning as teachers and students may not be able to implement e-learning as planned. This calls for low impact blended e-learning infusion in the curriculum.

Attitude

This part aimed to investigate senior secondary school teachers' attitude towards e-learning. The results are displayed in Table 2 below. The statements in Table 2 are described as follows.

Attitude1: I enjoy using ICT for work.
Attitude2: I have confidence in using computers.
Attitude3: e-learning enhances teaching experience.
Attitude4: e-learning is convenient.
Attitude5: e-learning results in increased quality of learning.
Attitude6: e-learning results in increased student satisfaction.
Attitude7: I am interested in using e-learning.
Attitude8: e-learning is useful.
Attitude9: e-learning results in increased workload.
Attitude10: I know different forms of e-learning.
Attitude11: I have experience in designing for e-learning.
Attitude12: I need incentives for online activities.
Attitude13: e-learning is extra work.

Table 2: Attitudes of senior secondary school teachers towards e-learning

Item	Mean	Standard Deviation	Response %					Scale
			Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	
Atitude1	1.92	0.77	33.33	41.67	25.00	0.00	0.00	Agree
Attitude2	2.03	0.88	27.78	50.00	13.89	8.33	0.00	Agree
Attitude3	2.03	0.61	16.67	63.89	19.44	0.00	0.00	Agree
Attitude4	2.14	0.93	22.22	52.78	16.67	5.56	2.78	Agree
Attitude5	2.25	0.77	13.89	52.78	27.78	5.56	0.00	Agree
Attitude6	2.00	0.68	22.22	55.56	22.22	0.00	0.00	Agree
Attitude7	2.08	0.77	19.44	58.33	16.67	5.56	0.00	Agree
Attitude8	1.42	0.60	63.89	30.56	5.56	0.00	0.00	Strongly Agree
Attitude9	2.75	1.23	22.22	13.89	38.89	16.67	8.33	Neutral
Attitude10	3.22	1.29	11.11	16.67	33.33	16.67	22.22	Neutral
Attitude11	3.19	1.12	5.56	19.44	41.67	16.67	16.67	Neutral
Attitude12	3.00	1.12	11.11	16.67	44.44	16.67	11.11	Neutral
Attitude13	2.25	0.87	19.44	44.44	27.78	8.33	0.00	Agree

The sample in Table 2 is based on case study of St Joseph's College teachers. The results show that senior secondary school teachers are enthusiastic about and have very positive attitudes towards e-learning. This is shown by mean values of 1.92, 2.08 and 1.42 for issues of enjoying using ICT in their work, interest in using e-learning and usefulness of e-learning respectively. Almost all respondents (94.45 %) both strongly agree and agree that e-learning is useful in teaching and learning. The results also show that secondary school teachers embrace e-learning as an important element that the can be used to enhance their teaching experience. Teachers are neutral when it comes to whether they know different forms of e-learning as shown by the mean value of 3.22 for that element. Teachers recognise that e-learning will help them improve learning and teaching effectiveness and efficiency. The results show that teachers do not have

prior experience in designing for e-learning but are prepared to use e-learning with or without incentives as they view it to be useful. They however see e-learning as increased workload probably because they have not used it as another method of teaching. This attitude could change as they get to implement e-learning as part of curriculum.

4. Conclusion

The use of ICTs in education has allowed the modernisation of secondary education to produce a workforce that is capable of leading countries into globalisalised and knowledge-based economies. Countries have introduced many new policies and projects that gravitate towards this, with e-learning being one such approach. E-learning in secondary school education is a means to an end, rather than the end in itself. Utilizing e-learning can result in greater educational opportunities for learners while at the same time enhancing teachers' effectiveness and efficiency. However, this potential of e-learning assumes a certain level of institutional readiness in human and infrastructural resources that is not always present in secondary schools. School readiness for e-learning adoption ensures the alignment of new tools to the educational, pedagogical and economic context. Results from this study point to introducing e-learning at a lower level design approach – (low impact approach) in secondary schools in Botswana because of the unavailability of e-learning tools, and the fact that teachers do not have prior experience in designing for e-learning. This calls for a need to equip schools with necessary e-learning tools in order for the blended learning to be successful. Even though teachers are confident in using ICT, they require some training to impart necessary skills needed in designing for blended learning approach.

5. Recommendations

The need for educational technology policy is vital for secondary schools because of the potential of educational technologies and the magnitudes of changes they may bring in education. Explicit e-learning policies aimed at directing the processes involved in blended learning should be put in place in order to reach desired goals. More research that will evaluate the attitudes of students and the community (parents and legal guardians) should be undertaken as these too are key stakeholders necessary for the success of e-learning in secondary schools.

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