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The Impact of Tele-education on Learners in Open Distance Learning Environment in Botswana

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ABSTRACT This paper critically evaluates the impact of tele-education system on learners in open distance learning (ODL) in Botswana. It aims to assess the impact of Tele-education as a new ODL mode on learners at a college of Open Distance Learning in Botswana (CODLB). Assessing the impact and success of such implementation is essential to determine the effectiveness of invested efforts in terms of learner satisfaction and individual performance. The study adopts the IS Success/Impact Measurement Framework assessment framework due to its successful application in numerous studies on ODL and its success in multiple dimensions of educational systems. For data collection, 295 students from the CODLB were surveyed. Combinations of qualitative and quantitative approaches were used in this study. Three key areas of assessment were based on: depth of learning and performance, student satisfaction in line with learning pace and grasping of concepts and student productivity as measured by overall pass rates. The research indicates that Tele-Education has improved the way students learn, interpret information and grasp new concepts with greater concentration – leading to better pass rates. Thus, Tele-education has a positive impact on the way students are learning.

INTRODUCTION

Botswana is a developing country in sub-Sahara Africa, located north of South Africa were the digital divide between urban and rural population is the norm rather than an exception. With only two state universities and two private universities, the Botswana government in collaboration with the Indian universities ventured into the Pan-African e-Network tele-education (Pan-African e-Network Project 2014; Suniti and Tara 2012) project to broaden the scope of the ODL interactive and offer a new dimension in the learning landscape in the country to cater for the ever growing number of university students. The whole initiative is aimed at fast tracking the human resource development initiatives through the use of video conferencing technology as a bridge to the digital gap (Oladokun 2014). The targeted audience is those students who intend to earn degrees, but due to time constraints, commitment to work or inaccessible geographical locations that they reside in, they cannot afford to attend the few formal conventional universities. Since some of the CODLB students are from marginalized family backgrounds, the college rolled-out a soft loan payment facility to willing students for them to buy laptops and later payback the money at a little interest over a period of three years. This is meant to ensure that no student enrolled can suffer from lake of laptop/PC to access study materials, including recorded lectures and digital e-books on the Learning Management System (LMS) portal and digital library system.

Tele-education involves the use of internet and other information and communication technologies to provide education to geographically dispersed teachers and students (Simmons et al. 2011; IGI-Global 2014). In the case of Botswana, selected Indian universities host the tele-education LMS portal; comprising the university tele-education delivery system software which incorporates the e-Learning, content management Knowledge Management System (KMS) and digital library solutions for each university as an integrated package. Learning centres located in every town and city in Botswana connect to designated universities in India at predefined lecture schedules for the live, interactive lecture delivery using dedicated IP-based and VSAT networks. The major unique feature of this tele-education system is the offline access (using internet) to lecture content stored in dedicated portals for knowledge management and digital libraries for reviewing learning by students.

Elsewhere in Africa, ODL has achieved great success, for example the African Virtual University (AVU) initiatives in Uganda at Makerere and

Nkosi Universities, Kenya and Zimbabwe. Other great achievements have been witnessed at UNISA in South Africa and the Zimbabwe Open University (ZOU) in Zimbabwe. As indicated by Simmons et al. (2011), most of these ODL initiatives are expensive for most of the impoverished sub-Sahara African countries and thus, they are an initiative and sponsorship of global donor funds from World Bank, InfoDev, Canadian International Development (CIDA), UNESCO, Australian Agency for Internal Development (AusAid), African Development Bank, as well as the Massachusetts Institute of Technology (African Development Fund 2011; Rasungu 2009).

The Pan-African e-Network tele-education project has been implemented elsewhere in Africa previously, and these include Cape Verde in 2010 as a turnkey solution to e-education and e-healthcare and ensure that the project becomes sustainable after five years of conception. In the past two years sub-Sahara Africa witnessed new Pan-African e-Network tele-education projects in Botswana and Zimbabwe in conjunction with the Indian government and universities. The impact of IT is often indirect and is influenced by human, organizational, and environmental factors; therefore, measurement of information systems (IS) success is both complex and elusive (Ahmad and Abawajy 2014). As such, there is a need to undertake in-depth research on how the tele-education system has impacted the individual users, which in this case are ODL students. According to Gable et al. (2008:389-390) "individual impact is a measure of the extent to which (the IS) has influenced the capabilities and effectiveness, on behalf of the organization of key-users".

This paper evaluates the impact of tele-education initiatives in Botswana on students learning. Much of the researches done so far for these ODL tele-education initiatives in Sub-Sahara Africa have focused on the evaluation of the success of the system itself and financial gains, leaving little literature on the impact of such systems on students. This study adopts the IS Success/Impact Measurement framework (Gable et al. 2008) to evaluate the impact on individual students. The researcher adopted three key assessment criteria from this model for use in my study: depth of learning and performance, student satisfaction in line with learning pace and grasping of concepts, and student productivity as measured by overall pass rates. The significance of this study is that it provides a new form of evaluation of tele-education systems based on tried and tested impact assessment models. As a result it can be adopted by numerous countries in the sub-Sahara Africa region that have recently embarked on the same tele-education initiatives.

The next section of this paper outlines literature review related to tele-education in Botswana (Pan-Africa e-Network Project 2014) and the IS Impact Measurement Model (Gable et al. 2008). This is then followed by an outline of the methodology and the analysis and discussion of the results. The study concludes by offering recommendations for future work and directions to enhance further impact assessment of tele-education systems.

IS- Impact Measurement Model

Tele-education often includes correspondence courses, radio, television, satellite, telephone, video conferencing and virtual universities as some of the ways to promote distance education (Bogen et al. 2014). In the context of Botswana, synchronous satellite transmission and broadcast gives underprivileged students from rural areas and those students who cannot attend conventional universities the opportunity to interact with specialist professors from renowned universities in selected universities in India and ask questions (Simmons et al. 2011). Given this context, tele-education is one of the many types of an Information Systems (Chipps et al. 2012). Contemporary researches done in the context of tele-education systems in Botswana and developing countries in general, focused a lot on initiatives undertaken to bridge the digital divide and democratize access to quality education (Pena-Bandalaria 2007). However, there has been little research done to evaluate the effectiveness of tele-education systems as an open and distance learning on students (Pena-Bandalaria 2007).

In the assessment of the effectiveness of the tele-education system at the college of Open Distance Learning in Botswana, the researcher used the IS-Impact measurement model (Gable et al. 2008) because it takes into account the success of educational systems by measuring multiple dimensions of the information system (Cao and Elias 2009; Alkhalaf et al. 2012). The

researcher also considered the dimensional theory by Gable et al. (2008) with parameters that could be used to measure the IS impact. The IS–Impact measurement model focuses on six crucial aspects of IS Success related to system quality, use, information quality, individual impact and organizational impact (Cao and Elias 2009; Gable et al. 2008; Petter et al. 2008). This paper focuses on user satisfaction and user impact on students – which is further expanded to depth of learning and performance, student satisfaction in line with learning pace and grasping of concepts, and student productivity. Gable et al. (2008) also states that this model should cover the maximum environment that may affect the quality of using any system like the e-learning system and tele-education is part of such IS.

The decision to adopt the IS-Impact measurement model for this study was reached after considering many relevant contemporary models and techniques used for evaluating the success of tele-education systems. For example, there are DeLone and McLean's (1992) IS success model and their updated (2003) model and Sedera and Chan's IS-Impact model (2008). Out of these two models, it was discovered that the DeLone and McLean's (1992) IS success model is the founding model on which all the other contemporary models are built on and is widely cited in researches related to IS success. This is the reason why this study adopted it as well. Furthermore, Gable et al. (2008) and Rabaa'i and Gable (2009) emphasised that user satisfaction and IS use are a result of the success (before and after), rather than a contributing factor to success (Alkhalaf et al. 2012). Moreover, both system quality and information quality affect use and user satisfaction (Wang et al. 2007; Alkhalaf et al. 2010). Hence, there is a relationship amongst these factors.

Hypothesis of Measuring Individual Impact of Tele-education

This study sought to evaluate the impact of tele-education as a new ODL mode on learners at a college of Open Distance Learning in Botswana. Evaluating the impact of Information Technology (IT) is one of the critical issues in IS literature (Oladunjoye and Audu 2014), as the impact of IT are often indirect and influenced by human, organizational, and environmental factors (Petter et al. 2008). According to Gable et al. (2008:289), "the 'individual impact' is a measure of the extent to which [the IS] has influenced the capabilities and effectiveness, on behalf of the organization, of key-users" (Alkhalaf et al. 2012). The individual impact items (Gable et al. 2008) were customized to suite this tele-education study.

Individual Impact Assessment Items

Individual impact assessment items are as follows:

1. Tele-education system has increased my depth of learning and performance.
2. Tele-education system has enhanced my awareness of the dynamics and requirements of open distance education system.
3. The use of tele-education system increases my productivity and overall pass rate as a student.
4. As a student I am satisfied with the learning pace and grasping of concepts gained from using the tele-education system.

Based upon these constructs and that a tele-education system is an IS, the researcher draws the following hypothesis for the study: "*the use of tele-education system has a positive impact on individual learners*".

METHODOLOGY

This study adopts a positivist research paradigm. Tekin and Kotaman (2013) outline that the positivist school is when researchers achieve substantive information and discover facts in a way that could be replicated by other researchers. According to Tekin and Kotaman (2013), the objectives of the study can be achieved through the use of scientific methodologies and mainly logical rules, calculations, and assumptions that are used to test theories and to obtain independent and unbiased results. The researcher used the positivist research approach mainly because the study has a hypothesis that the researcher seek to test against a given theory and because of the application of the IS-Impact measurement model.

The target population for this study was students pursuing their Masters (MSc) in the discipline of Information Technology and Finance and Investment Analysis for the five major learning centers of the CODLB across five major towns and cities in Botswana. The population

of this study was 984 students doing their masters degrees. For the purpose of this study, 30% of the 984 students were chosen, that is 295 students composed of almost balanced number of female and male students. It is desirable to always limit the number of respondents since the use of the entire population would demand more time and financial resources, all of which were not available. Furthermore, the use of such a small population could ensure comprehensive and quality analysis since concentration and focus will only be on a manageable part of the population.

The study employed simple random sampling of the 295 students across the five major campuses of the CODLB. According to Kondo et al. (2014) a simple random sampling draws a portion or sample of a population so that each member of the population has an equal chance of being selected.

For data collection method, the researcher utilised questionnaires and secondary data. The open-ended questionnaires were designed based on the IS measurement model of Gable et al. (2008) and were distributed to 295 masters students doing Distributed Programming and Finance and Investment Analysis courses. Out of the returned questionnaires 291 were fully completed and the remaining 4 were either spoiled or incomplete. For data analysis, the researcher used a combination of qualitative methods and quantitative data analysis using descriptive statistics. Three key areas of assessment were based on: depth of learning and performance, student satisfaction in line with learning pace and grasping of concepts and student productivity as measured by overall pass rates.

RESEARCH FINDINGS

This section analyses statistics of the 295 questionnaires using SPSS and results from secondary data about the students' performance. Data obtained from questionnaires is analysed and presented using frequencies and percentage of responses for the four variables and their relative significance (Table 1).

Table 1 shows the Chi-squared Goodness of Fit Test for the four variables analysed for the individual impact. All values for the Chi-squared are higher than the critical value of 5% and with a probability of 21.03 for a significance of 12 degrees of freedom for all items. This shows significant correlation between expected and actual value – thus the results are not mere statistical coincidence. There is a relationship between the use of tele-education system and individual impact on learners.

The majority of the students had a positive view on how the tele-education system has increased their productivity and pass rate as indicated by the highest mean score of 58.8, a relative weight of 25.15 and an order of 1. Moreover, Figure 1 shows that 38.4% of the students agree that the tele-education system has increased their productivity, whilst 32.7% strongly agree to the notion. Thus, their conviction support the fact that tele-education as a new open distance learning system has a positive impact on their learning. Such sentiments are in line with several previous studies, for instance Ashok (2014) note that a substantial number of distance education applications provide better achievement results, are viewed more positively, and have higher retention rates than their classroom counterparts.

Table 1: Numerical distribution and standards of the table

Responses	*Item 1*		*Item 2*		*Item 3*		*Item 4*	
	No.	*%*	*No.*	*%*	*No.*	*%*	*No.*	*%*
S. Agree	89	30.5	107	36.8	96	32.7	94	32.2
Agree	96	32.9	95	32.6	113	38.4	108	37.0
Neutral	51	17.5	43	14.2	41	13.9	35	12.0
Disagree	35	12.0	22	7.5	29	9.9	38	13.0
S. Disagree	21	7.2	24	8.2	15	5.1	17	5.8
Mean	58.4		58.2		58.8		58.4	
SD	29.5		35.9		38.6		35.8	
χ^2	74.5		110.8		129.2		109.7	
Relative Weight	24.98		24.89		25.15		24.98	
Order	2		3		1		2	

χ^2 values denote level of significance: 5% level of significance.
Items 1-4 in Table 1 refers to elaborated Individual Impact Assessment Items.

With regard to item number 1 and 4, the results showed that students had equal sentiments that the tele-education system has increased their depth of learning and are satisfied with the learning pace which result in better grasping of concepts yielding to better performance. This is indicated by their equal mean values of 58.4, relative weights of 24.98 and orders of 2. Figure 1 shows that the majority of surveyed students (63.4%) for item 1 and (69.2%) for item 4 either strongly agree or agree that tele-education system have positively impacted their learning. Furthermore, Figure 1 indicate that for all items from 1 to 4, and for the strongly agree and agree responses, the percentages score were highest with ranges from 30.5% to 38.4%.

Furthermore, the results indicated that the majority of the students (69.4%) agreed that tele-education has enhanced their awareness of the dynamics and requirements of open distance learning, which in turn has ripple positive effects on the realization of the other three remaining items. The major reason behind the majority of surveyed students agreeing or strongly agreeing may be attributed to the adoption of the tele-education system which has made it easier for them to search for and obtain information related to their learning in the LMS portal and the attempted effort to close the gap between them and the administration through making available most of the information online.

The results also confirmed that a smaller percentage of students either disagree or strongly disagree (ranging from 15.7% - 19.2% combined) that tele-education system has positively changed their way of learning in one way or another. However, for both 4 items, a percentage rang of 12-17.5% of students were neutral as to the effects brought about by the tele-education system on their learning. The results of this study are in-line with Alkhalaf et al. (2012) who found that the use of e-learning systems, which is associated with tele-education system, positively increased students' understanding of information and relevant activities in their departments.

DISCUSSION

The study shows that the majority of the students indicate that tele-education system has had a positive effect on the way they are learning and performing at the College of Open Distance Learning. This is evidenced by the highest percentage scores of above 30% of students for the "agree" or "strongly agree" responses to all the four key items of evaluation for the individual impact as in Figure 1. Such findings correlate to studies done by Alkhalaf et al. (2012) which found that the majority (71%) of the surveyed students either agree or strongly agree that using e-learning systems increases their

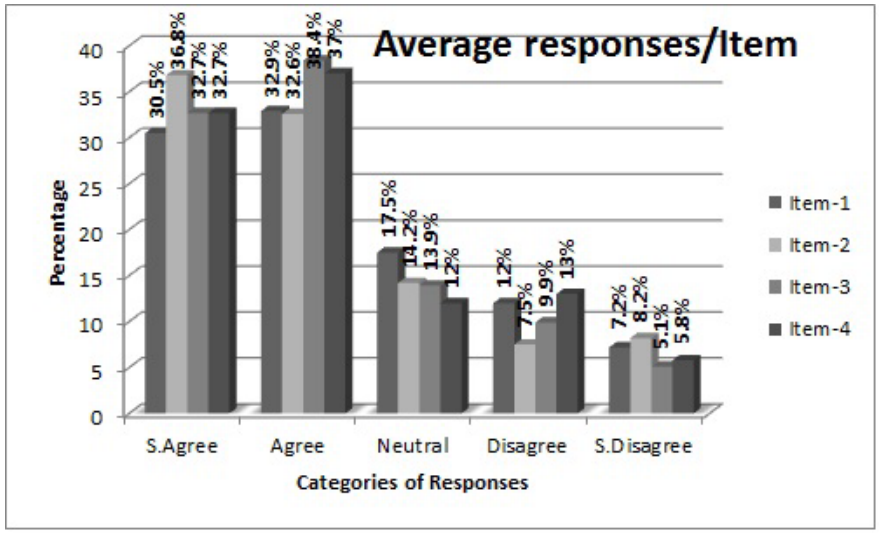

Fig.1. Percentage summary of responses per item by students

productivity. This positive feedback from these students could be attributed to the fact that the use of the tele-education system gave them autonomy over their studies and brought in challenges to explore technological innovative way of collaborative learning to achieve set learning goals. Similar sentiments are also echoed by Popescu (2014) who states that student learning through blogs or similar collaboration tools is more effective than from teacher or textbooks.

The study also found that proper orientation on the use of the tele-education system has increased students' awareness of the dynamics and operations of the open distance learning systems. This includes the key administrative processes about their learning. This could be attributed to the fact that most of the surveyed students did their first degrees in the same college; hence they are now well versed with most processes, requirements and expectations of the ODL. Mbah (2010) notes that students feel that appropriate use of ICTs would have a positive impact on their study habits, and can help them improve on their academic performance since ICTs accelerate information access and academic success by making information available.

The study revealed that a large percentage of students (63.4%) either agree or strongly agree to the sentiments that tele-education system has increased their depth of learning since they could venture and explore extensively into online learning portals of data, digital libraries and engage in online collaboration and conversations with their colleagues and professors to discuss all learning aspects. This finding supports the assertions made by Global Partnership (2013) and Abbot et al. (2009) that the use of ICT and social media can change the culture and climate of educational organizations, such that there is greater potential for deep learning. They further state that the use of ICT can be seen in and of itself as a skill which can be learnt and developed. With increasing confidence and competence, it can become a facilitator rather than a barrier to learning. Therefore, the use of such ICTs in tele-education should enhance the way students master concepts, retain the knowledge and are able to relate conceptual issues across subjects and make links between multiple areas of their lives.

Regard student satisfaction with learning pace and grasping of concepts, the study found that the majority of students were contented. This could be attributed to the use of synchronous video conferencing that gave them the opportunity to interact and pose questions to the professors as the lecture progresses and get immediate feedback. Furthermore, it was found that the same lecture is recorded live and put in the online learning repository for future reference and follow-up if certain information is not properly grasped during video conferencing. However, there is no adequate literature to support the correlationship between students satisfaction with pace of delivery. Nevertheless, this has been a phenomenal discovery in this research which can always be taken for further research and verification.

CONCLUSION

This paper evaluated the impact of tele-education as a new open distance learning mode on students in Botswana. For the assessment framework, the study adopted the IS Success/Impact Measurement Framework. The results showed that the use of tele-education system in open distance learning has positively increased the students' depth and satisfaction of learning, and increased their awareness of the requirements of such learning system. Furthermore, it has increased their performance and making critical decisions on a wide range of information at their disposal in the LMS. Therefore, research findings proved the study's hypothesis that the use of tele-education system in universities and colleges has a positive impact on the way students learn and present their work. Finally, the paper outlined the usefulness of the IS Success/Impact model in evaluating the impact of tele-education learning system on students.

RECOMMENDATIONS

Based upon the insights gained from this study, the researcher recommends among other things that before institutions embark on tele-education system, they must conduct an in-depth research on how to design and adapt content materials to suit their students at micro-level, manage information and ensure that they have the necessary modern ICT equipment in place with reliable internet connectivity to facilitate an uninterrupted online service for students whose entire educational requirements depends on it. Furthermore, universities and colleges should properly orient students with all the tele-education processes and the LMS so that they would be able to use the systems, including the digital library in order to achieve institutional

learners' goals. Often, tele-education systems are highly technically advanced; thus demanding students to be at their highest best level of competence, otherwise they would find the ODL system tougher than the conventional universities. Such endeavors in acquainting all students at entry point ensure that overall institutional goals are easily attained. Moreover, professors and lecturers who administer tele-education sessions should endeavour to use modern online blogs like Facebook, YouTube and Whatsapp; and pose discussion questions for the students to debate on and widen their reasoning. Since nowadays most students are knowledgeable and use these social networks, they would be motivated and find the tele-education system very interesting. The ODL universities and colleges offering the tele-education should also be very supportive of such initiatives and avoid blocking such services from being accessed by students whilst on college websites.

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