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IMPACT OF E-LEARNING ON ACADEMIC PERFORMANCE: A CASE STUDY OF GROUP LEARNING

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Abstract This study focused on the impact of e-learning on academic performance. The study relates to a level one undergraduate module delivered using traditional lectures and e-learning based methods. E-learning has been revealed in this study not to have a positive impact on academic achievement contrary to the expectations of this study. The paper also examines the data for the presence of interaction effects between e-learning study hours and socio-demographic characteristics. This is undertaken to identify whether or not personal-characteristic-related learning style differences influence the extent to which students benefit from e-learning. It is found that, after controlling for other factors, female students benefited less from e-leaning material than their male counterparts. The methodology that was employed in this study was systematic random sampling for students under traditional study mode and purposive sampling in identification of students under the e-learning study mode. It is concluded that in order to improve teaching effectiveness and academic achievement, higher education should consider aiming to develop e-learning teaching strategies that encourage greater engagement and also take into consideration the different learning styles found within the student body. The study recommends that critical factors such as institutional issue, management issue, pedagogical factors, technological issue, interface design issue, evaluation issue, and resource support issue and the factors within each issue have not yet been investigated with detail coverage. It further suggests that there is need to carry out detail research involving case studies based on survey questionnaires involving various learning institutions which will ultimately give a better understanding of impact of e-learning aspects within implementation process.

Keywords: e-learning, academic performance, group learning

Introduction

Education is a key factor for sustainable development (Chimombo 2005). The significance of education, especially in developing countries, is increasing because of progressing pressure to catch up with the developed world regarding, for example, global competitiveness (Hawkins 2002). Predictably, educational settings are different in developing countries than in developed countries, such as low quality of education and narrow possibilities in attending schools in rural areas because of far distances and high opportunity costs (Ibid 2005). Chimombo, 2005 opines that country-specific circumstances have to be improved regarding compulsory and free education to foster general access to education. In *Article 26 of the 1948 UN universal declaration of human rights* the right of obligatory and free education for everyone is already committed (UN Human Rights 1948).

Every year, more of the world's people become connected to the network, its bandwidth increases and its use becomes more integrated to all that happens in the globe. Connectivity to this network has becomes key to opportunity, success and fulfillment for individuals. Kenya has defined a national ICT policy with a view of creating an e-enabled and

knowledge-based society by the year 2015. Just like the technology has changed the world, it is now changing the learning and teaching environment.

A broad range of learning approaches exists already, for example, e-learning, blended learning (Maier, 2007), and distance learning which utilize information and communication technology (ICT). The use of ICT can benefit, for example, students in rural areas by having them attend classes as distance learners and motivating them to learn like the "Group Learning Sets" (GLS) initiative offers. Regarding this, the potential of e-learning seems very assuring, but because of gaps between developed and developing countries knowledge transfer is not only difficult but also costly.

E-learning denotes the use of ICT by teachers and learners. Schmidt 2005 holds that e-learning consists of conventional training, such as courses, ad-hoc training, selected learning objects, formalization through document collections and community formation which can be achieved via social software.

According to case studies, there are already a number of e-learning programs offered in developing countries (Kohn et al. 2008). These programs are developed by various national and international initiatives, for example, the group learning sets initiated by Computer Aid International in collaboration with Kenyatta University. The growth of e-learning programs according to Lockwood and Gooley, 2002 is driven by the need for and potential of providing education in less expensive ways, increased access to information, effective learning and greater flexibility.

Stephenson, 2001 posits that there is little systematic research into the overall effectiveness of e-learning as a learning medium despite the great interest in it. He acknowledges that while there is much more work to be done, a variety of e-learning courses aimed at making sustainable development a reality have been developed and demonstrate how e-learning can reach thousands if not millions of minds and potentially plant the seeds of change.

Fry 2000 and Wild et al. 2002 describe E-learning as the delivery of training and education via networked interactivity and distribution technologies. Other authors notably Roffe, 2002; Schank, 2002; and Sambrook, 2003 see e-learning simply as learning and communication exercises across computers and networks or for that matter any other electronic sources.

Khan (2005) pointed that E-learning has been described in various ways as learning using a number of different technologies and methods for delivery e.g. Computer Based Training (CBT), Internet-based training (IBT), Web-based instruction (WBI), advanced distributed learning(ADL), distributed learning (DL), distance learning, online learning (OL), mobile learning (or m-learning) or remote learning and learning management systems (LMS).

In the 70s and 80s distance learning became popular and was done via mail until the rise of Internet usage. In late 90s the digital learning environment was heightened and World Wide Web started as a distributed learning mechanism to support on campus student and distance learners. With the use of this delivery technology learners can get a range of resources like discussion forums, multimedia, chat, video conferencing and electronic black boards (Gulatee and Combes, 2007).

In E-learning system, students are able to interact anytime from wherever with different instructional material (text, sound, pictures, video and so on) through Internet. In addition, learners can communicate with teachers and classmates both individually and as a group discussion with the use of message boards, instant message exchanges and video conferencing (Al-Ammari and Hamad, 2008).

Khan 2005suggests that e-learning system is used for an open, flexible, and diverse E-learning environment. Moreover E-learning system can be analyzed as an inventive

approach for delivering, learner-centered, interactive, and facilitated learning environment to anyplace, anyone, anytime by utilizing the features and resources of different digital technologies along with other types of learning materials suited for an open, distributed, and flexible learning environment (Ibid, 2008).

Computer Aid provided over 1,500 PCs to Kenyatta University. Many of these computers are being used for the university's cutting edge e-learning project, which is enabling rural students to pursue university courses remotely. Kenyatta University has made its courses accessible to people living and working in those communities. In particular, the university is targeting people who are already engaged in work that is vital to the social and economic development of rural and marginalised areas. These 'key workers' include nurses, teachers, entrepreneurs and agricultural advisors. The University is encouraging students to study together and benefit from each other. In order to facilitate this collaborative learning, the University through the help from ComputerAid further put in place mechanism of providing students with computers. Students are encouraged to form small learning groups of five or six students called Group Learning Sets (GLS).

The importance of education is increasing because of increasing pressure to catch up with the developed world regarding, for example, global competitiveness (Hawkins 2002). Before the introduction of e-learning many people who wanted to obtain university degree had to compete for the few places that were offered by the public universities. Those offered places had to apply for study leave as they had to go through the traditional learning system. This kind of further education system was characterized by limited number of students that could be absorbed per an academic year and consequent removal from their places of work for the duration of their study.

From the reviewed literature, it can be deduced that there seems to be no research studies on the joint contributions of e-learners' socio-demographic, hours spent online/offline and prior computer skills variables to their academic performance. Whereas, researchers and theorists (Coldeway, 1986; Calvert, 1986; Garrison, 1987; Kumar, 2001) have stressed the need for a comprehensive approach, taking into account all the experiences of e-learners as well as the unique aspects of e-learning environment. In addition, it has also been observed that little research has been devoted to exploring factors that predict the academic performance of e-learners (Cookson, 1989) while those that even exist concentrated largely on demographic correlates as a component in their studies (Kumar, 2001).

Several studies have been carried out on academic performance especially on conventional students, but not much on e-learning students within the Kenyan educational system. The need to sever this ground so as to extend the frontier of knowledge in order to help improve the unimpressive e-learners' academic performance necessitates and serves as the motivating factor for undertaking the present piece of research so as to fill the existing important research gap.

This study sought to establish whether the "Group Learning Sets" offer its beneficiaries ability to develop the associated concepts; does e-learning help the students improve their grades, skills, values, procedures and technology necessary to apply in their jobs. The study endeavored to answer the following questions, what role does prior computer skills play in improving student's performance: In so doing, the study sought to measure the ability of the students to use e-learning tools such as internet/intranet, computers, and software for particular purposes. What is the role of personal characteristics on academic performance? To measure personal characteristics the study sought to identify variables such as gender, students with special needs, gifted students, and religion these helped the researcher know

such personal issues that may influence a student's usage and acceptance of the technology as may be informed by individual's socialization. Lastly, what is the impact of hours spent online/offline has on students?

Methodology

The research design was an analytical survey. Analytical surveys also referred to as diagnostic studies attempt to describe and explain *why* certain situations exist. In this approach two or more variables are usually examined to test research hypotheses. The results allow researchers to examine the interrelationships among variables and to draw explanatory inferences. In this study, the researcher sought to establish the relationship between prior computer skills; socio-demographic characteristics; and level of student engagement effect on academic attainment.

According to Mugenda and Mugenda (2003) units of analysis are units that are designed for purposes of aggregating their characteristics in order to describe some larger group or abstract phenomenon. Nachmias and Nachmias (1996) describe the units of analysis as the most elementary part of the phenomenon to be studied. To Singleton et.al (1988; 69) they are "what or whom to be analyzed". In this study, the unit of analysis was the different categories discussed in this paper as the 'study modes' (e-learning and conventional).

The unit of observation in this study was the individual students whose performance was aggregated to inform category performance.

Study Population

In this study, the population of interest is beneficiaries of the 1500 computers that were provided by ComputerAid international. Each computer was to be used by five e-learning students. The total population of the beneficiaries is (1500 * 5) 7500 students. An equivalent population was targeted for students under the conventional learning mode so as to avoid overrepresentation of one category. The total population in this study was thus fifteen thousand, (7500 * 2 = 15000) being seven thousand five hundred on the e-learning program and seven thousand five hundred on the conventional study mode. From the total population, a sample of one hundred and fifty students' constituting seventy five on e-learning mode and seventy five on the conventional study mode was targeted. This is a total sample population of 150 which is 1 percent of the total population. The sample 75 for each category was guided by Dr. John Curry Professor of Educational Research,

North Texas State University (now retired), who provided his research students (fall, 1984) with the "rule of thumb" on sampling (Gay, 1987) presented in the table 1 below. The sample size was also deemed appropriate when it was noted that the beneficiaries of the group learning sets are spread across the country, time and finances did not allow for inclusion of a bigger number. On the same note, in the bid to have equal representation, the number seventy five was settled for students under traditional learning mode.

Table 1. Population sample size

Size of population	Sampling percent
0-100	100%
101-1,000	10%
1,001-5,000	5%
5,001-10,000	3%
10,000+	1%

Sampling Method and Procedures

Through a systematic random sampling procedure where a neutral start point was identified by the researcher where the first student was identified randomly, within the study location. It was key to consider gender parity in the study, as such for those under conventional study mode, if a male student was picked the next was to be a female respondent. Identification of the starting point was done at the gate of Kenyatta University, the data collection was done on one side of the road towards the administration block, upon reaching the administration block, and the other side of the road was taken towards the gate. After identification of the first respondent, five students were past then the sixth was included in the study, if the sixth student was not of the opposite gender, five more students were past till the opposite gender was found. The process was repeated until seventy five respondents were interviewed.

To identify e-learning respondents, a list of students was obtained from the institution, systematic random sampling was then used to select seventy five students. A starting point was first randomly picked then every fifth name in the list was included in the sample. Questionnaires were then sent online to the selected seventy five students.

Collection Procedures and Instruments

The main instrument of data collection in this study was questionnaires. The items in the questionnaire were structured (closed ended) and unstructured (open ended). The structured questions measured the subjective responses to clarify the objective responses and at the same time, enhance formulation of recommendations of the study. The researcher used trained research assistants to collect data.

According to Devellis (1991), as cited by Mugenda, (2004) reliability is the proportion of variance attributable to the time measurement of a variable and estimates the consistency of such measurement over time from a research instrument. It is a measure of the degree to which a research instrument would yield the same results or data after repeated trials. In order to ensure reliability the researcher issued the questionnaires to the respondents, collected them and checked on the responses. After two weeks the questionnaires were re-tested by administering it at again to respondents with the same characteristics. This ensured internal consistency of the questionnaire and affirmed the responses from the selected sample.

Validity establishes the relationship between the data and the variable or construct of interest. Its estimates how accurately the data obtained in a study represents a given variable or construct in the study Mugenda, (2004). To ensure accuracy of the data the researcher pre-tested the questionnaires and analysed the results and made corrections on the questions that were not clear.

The questionnaires provide accurate data due to the process of pre-testing in the selected sample to maintain validity. The researcher visited the sampled student's to make them aware of the need of the study. This ensures validity of the data collected.

According to Miles and Huberman (1994) data analysis is an iterative process. Data analysis consists of three activities: Data reduction, Data display, and Conclusion drawing/verification".

Data reduction, this process is applied to qualitative data and focus remains on selection, simplification and transformation of data. In this continuous process the data is organized throughout the research to draw and finalize a conclusion (Miles and Huberman, 1994). In this research, the data was reduced from critical elements in implementation of E-learning to students' academic performance.

In data display the data is displayed in an organized form or the data has to be put into an order to easily draw the conclusion. Tables and graphs are used to indicate distinct frequencies of various factors of E-learning implementation and academic performance.

Results

To compute the correlation (strength) between the study variables and their findings the study used the Karl Pearson's coefficient of correlation (r). The findings as shown in Table 2 below revealed that there was a positive correlation between academic performance and hours spent online as shown by a correlation figure of 0.557, even though the correlation is positive, the relationship between academic performance and hours spent online is not significant. It was also clear that there was a positive correlation between academic performance and gender with a correlation figure of 0.512, even though the correlation is positive, the relationship between academic performance and gender is not significant. It was also revealed that there was a positive correlation between academic performance and location of setting with a correlation figure of 0.52, likewise even though the correlation is positive, the relationship between academic performance and location setting is not significant. Finally, a positive correlation between academic performance and subject with a correlation value of 0.538 was realized. Even though the correlation is positive, the relationship between academic performance and subject is not significant. This shows that there was a moderate correlation between academic performance and hours spent online, gender, location setting and subject. The lack of significance in the individual relationships could be due to interactive effects with the other variables.

Table 2. Coefficient of Correlation

		Academic Performance	Hours spent online	Gender	Location setting	Subject
Academic Performance	Pearson Correlation	1				
	Sig. (2-tailed)					
Hours spent online	Pearson Correlation	0.557	1			
	Sig. (2-tailed)	0.3079				
Gender	Pearson Correlation	0.512	.320	1		
	Sig. (2-tailed)	0.1855	0.0194			
Location setting	Pearson Correlation	0.520	0.1846	0.1107	1	
	Sig. (2-tailed)	0.0023	0.1857	0.4300		
Subject	Pearson Correlation	0.538	0.0072	0.2335	0.1027	1
	Sig. (2-tailed)	0.0422	0.9591	0.0925	0.4642	

Coefficient of Determination

Coefficient of determination explains the extent to which changes in the dependent variable can be explained by the change in the independent variables or the percentage of variation in the dependent variable (academic performance) that is explained by all the five independent variables (hours spent online, gender, location setting and subject).

From the findings, 54.5 percent academic performance is attributed to combination of the four independent factors (hours spent online, gender, location setting and subject) investigated in this study. A further 45.5 percent academic performance is attributed to other

factors not investigated in this study. Therefore, there is a dare need for further research that should be conducted to investigate the other factors (45.5 percent) that contribute to the academic performance.

Table 3. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.738	0.545	0.214	0.160

In trying to establish significance of the model the study employed ANOVA. From table 4 the significance value is 0.009 which is less that 0.05 thus the model is statistically significance in predicting how hours spent online, gender, location setting and subject impact to academic performance. The F critical at 5 percent level of significance was 2.70. Since F calculated is greater than the F critical (value = 9.793), this shows that the overall model was significant.

Table 4. ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	12.624	4	3.156	9.793	.009
	Residual	30.616	95	.322		
	Total	43.240	99			

Discussion

This study highlights the impact of electronic learning on academic performance of students. Many students are not well prepared to take the challenge of studying through e-learning, because of the unexpected complexities of the application of IT as a learning tool that requires commitment as there is no strict rules on the learning times.

The perception is that the world has become smaller as a result of the immense progress made in the field of information and communication technologies. IT is accessible to all across the continents and the oceans through the satellites, cables, and other such devices that have made man more independent and have increased his mobility by making distances shorter and communication faster.

As the analysis of data gathered on a small sample of a hundred people, has shown that, there are still many issues that need to be closely considered before we can safely state that e-learning and other related learning methods have contributed to the enhancement of the performance of students at the higher levels of our education system, irrespective of individual differences due to heredity and/or environment. It can be confidently said that there is still a long way to go before we can make the whole world harvest the benefits from the progress of science and technology.

Recommendations for Further Reading

This research elicited and examined a number of extreme points of views about the impact of E-learning on academic achievement. Although it was discovered that certain issues have not yet been properly addressed to E-Learning implementation processes, as the prime focus of the research was on prior computer skills, number of hours individual spend studying and socio-demographic characteristics. The following are the recommendations of this study:

- Critical factors such as institutional issue, management issue, pedagogical factors, technological issue, interface design issue, evaluation issue, and resource support issue and the factors within each issue have not yet been investigated with detail coverage.

- The need to carry out detail research involving case studies based on survey questionnaires involving various learning institutions which will ultimately give a better understanding of impact of e-learning aspects within implementation process.

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