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Impact of E-learning on academic performance of science education students: A case study of group learning sets

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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, science education, students

Introduction

Education is a key factor for sustainable development (Chimombo 2005) [15]. 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) [21]. 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) [48].

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.

Electronic Learning (E-learning)

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) [29] 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).

Group Learning Sets

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 marginalized 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 Computer Aid 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 role of e-learning on academic performance

Attitudes concerning e-learning, echoed by scholarly and academic reviews, range from neutral to positive. On one hand, it is noted that e-learning is at least as effective as traditional instructional strategies (Rosenberg, Grad and Matear, 2003), and that there are no major differences in academic performance between the more traditional and more technology-oriented modes of instruction (Cavanaugh, 2001). On the other hand, many reviews go further, reflecting a principally positive attitude towards the impact of e-learning (Mayer, 2003). The current piece sought to demystify e-learning by concentrating on how specific e-learning factors (socio-demographic characteristics, hours spent on-line and prior computer skills) influence individual academic performance.

There is a considerable body of evidence to suggest that different teaching delivery styles can have different degrees of success; as measured in terms of academic results (Emerson & Taylor, 2004). In relation to online teaching, some studies indicate that this medium of delivery has a positive impact on performance, for example, Smith and Hardaker (2000). Other studies however, find that greater online teaching has a negative impact on performance (Johnson, 2005) [24].

Benefits include offering a variety of new possibilities to learners (Breuleux, Laferrière, & Lamon, 2002) [11], in addition to having a positive effect on students' achievement in different subject matter areas (Chambers, 2003) [14]. Other benefits of electronic education include increases in enrollment or time in school as education programs reach underserved regions, broader educational opportunity for students who are unable to attend traditional schools, access to resources and instructors not locally available, and increases in student-teacher communication. According to Barker & Wendel (2001) [7] students in virtual schools showed greater improvement that their conventional school counterparts in critical thinking, researching, using computers, learning independently, problem-solving, creative thinking, decision-making, and time management. A study by Calderoni (1998) revealed that academic advantages over traditional classroom instruction were demonstrated by students in Mexico's Telesecundaria program, who were "substantially more likely than other groups to pass a final 9th grade examination" administered by the state; by students taking a chemistry by satellite course (Dees 1994); and by students learning reading and math via interactive radio instruction (Yasin & Luberisse 1998).

Electronic education is not the most effective choice in all situations. Students may feel isolated, parents may have concerns about children's social development, students with language difficulties may experience a disadvantage in a text-heavy online environment, and subjects requiring physical demonstrations of skill such as music, physical education, or foreign language may not be practical in a technology-mediated setting. Bond (2002) [9] found that distance between tutor and learner in an online instrumental music program has negative effects on performance quality, student engagement, and development and refinement of skills and knowledge. Virtual school students show less improvement than those in conventional schools in listening and speaking skills (Barker & Wendel 2001) [7]. Highly technical subjects have also proven to be difficult to teach well online. The Alberta Online Consortium evaluated student performance on end-of-year exams among virtual school students across the province, and found that virtual school student scores in mathematics, and the sciences lagged significantly behind scores of non-virtual school students (Schollie, 2001).

Kearsley (2000) [27] notes that given instruction of equal quality, groups of students learning online generally achieve at levels equal to their peers in classrooms. Equality between the delivery systems has been well documented over decades for adult learners. Evidence to date convincingly demonstrates that when used appropriately, electronically delivered education—'e-learning'— can improve how students learn, can improve what students learn, and can deliver high-quality learning opportunities to all children" (NASBE, 2001).

A primary characteristic that sets successful distance learners apart from their classroom-based counterparts is their autonomy (Keegan 1996) [28] and greater student responsibility as is noted by Wedemeyer (1981) [51]. A second characteristic that differentiates successful distance learners from unsuccessful ones is an internal locus of control, leading them to persist in the educational endeavor (Rotter 1989).

Theoretical Framework

The focus of this study is built upon the various learning styles theories of online learning, and how learners gain knowledge differently. Facilitation theory and constructivist theory are two popular learning theory concepts which are

used as a representation as a taxonomy for learning (Etmer & Newby, 1993). According Eccles (1999) developing a system of best practices built around these learning theories can assist teachers in encouraging improved student preparedness and instruction presented within an online learning environment of higher education.

Constructivism Theory

Constructivism is the theory that people construct their own understanding and knowledge of the world, through experiencing things and reflecting on those experiences. When learners encounter something new, they reconcile it with previous knowledge and experience. They may change what they believe, or they may discard the new information as irrelevant. To be active creators of their knowledge however, they must be able to ask questions, explore and assess what they know. In the classroom, the constructivist view of learning means encouraging students to use active techniques such as experiments and real-world problem solving using authentic data if possible, and to create knowledge and reflect on their understanding.

Constructivism modifies the role of the teacher so that teachers help students to construct knowledge rather than reproduce a series of facts. The constructivist teacher provides tools such as problem-solving and inquiry-based learning activities like in e-learning setup so that students can formulate and test their ideas, draw conclusions and inferences, and convey their knowledge in a collaborative learning environment. The teacher must understand the students' preexisting conceptions and guide the activities to address this knowledge and then build on it. Constructivist teachers encourage students to assess how the activity is helping them gain understanding. By questioning themselves and their strategies, students become expert learners as they learn how to learn, with the use of computers online and/or offline. The students then have the tools necessary to become life-long learners.

The teaching-learning method in e-learning is assumed to be self-directed learning (SDL), which is supported by the educational philosophy of constructivism. According to constructivism theory, e-learning is an active information process because knowledge generation is accomplished through individual experience, maturity and interaction with one's environment. Due to this point of view, the educational philosophy of constructivism is distinguished from objectivism in that the learner is regarded as a passive recipient of information (Rovai, 2004).

Learning performance in regards to e-learning is possibly lower than a crammed educational style based on objectivist educational philosophy, with the exception of a strategic approach relating to the efforts and studies for the pleasure of the self-learner. Lee *et al*., (2007) point that the SDL teacher is available as an assistant and guide for learning, not as a unilateral knowledge source and messenger.

Learners take the lead in self-regulated learning for the development of a total learning process that involves problem perception, adoption, and assessment of alternatives (Lee, 2004) [34]. Learners play the same roles that the producers do by organizing or re-organizing knowledge like a consumer, by selecting knowledge and using it practically (Thatcher & Pamela, 2000).

E-learning must be considered as one of many SDL strategies. The reason is that an e-learner attends a lecture only to register the time, place, subject, and to alter the order of attending lectures. Proper monitoring of the learner is difficult in comparison with the off-line education already being used, not only because the learning progress method of evaluation is being altered, but because personal meetings with the teacher are also no longer part of the process. Therefore, it is important to manage one's ability to organize self-learning time, process information, plan data, and control data.

Conceptual Framework

Academic performance is the dependent variable in this study, how does academic performance vary based on the independent variables. Attitude which deals with the overall perception of the learner about learning style and hence influencing performance is the intervening variable. Regardless of the variance of the independent variables, the intervening variable's influence is constant. Teacher – student contact is the moderating variable that provides the interaction effect where it moderates the relations between the independent variables. Academic performance in an e-learning setup can be influenced by varied variables either positively or negatively.

Students Average Scores

Figure 1 is a presentation of the findings on the average performance of the respondents that participated in the study.

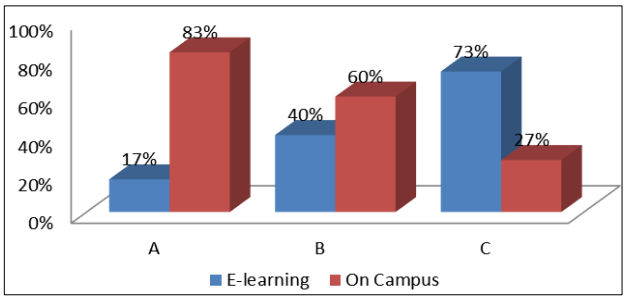

Fig 1: Average score for college courses

The study sought to establish the average scores of the students, figure 1 is a presentation on the students' performance [1], the average score for the pupils was distributed as shown in the figure, of the A's scored 83 percent was by those under conventional study mode and 17 percent under e-learning system, 40 percent and 60 percent of the students who scored B were on e-learning and conventional study mode respectively, for the C's recorded 73 percent and 27 percent respectively was by students on e-learning and conventional study modes respectively. From the figure above, it can be deduced that the performance of students under the conventional study mode was better than those under e-learning mode, this they (e-learning students) said was due to the responsibilities they have making them not to fully concentrate on studies.

[1] The scores are as stated by the respondents and were not confirmed by the examination department as such information could only be given to the students themselves

Online Study Hours

The study sought to establish the number of hours students spent studying online. Figure 2 depict the findings as revealed by the respondents that participated in this study.

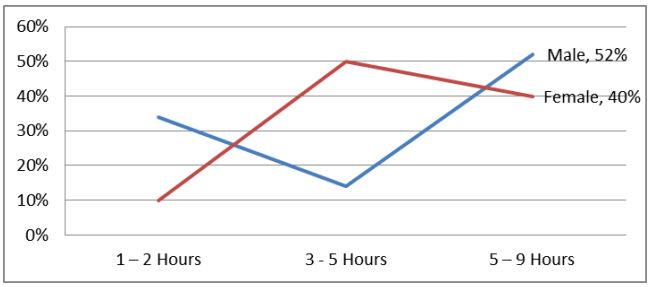

Fig 2: Hours dedicated for online studies per day

Data presented on Figure 2 shows that 34 percent and 10 percent of male and female respectively constituted those who study for 1-2 hours. 14 percent and 50 percent of those who study for between 3-5 hours were male and female respectively, 52 percent and 40 percent of male and female respectively indicated that they study for between 5 – 9 hours. The findings reveal that male students on e-learning mode spent more hours studying a day than their female counterparts. One female respondent had this to say "*masomoni mazuri, lakini kazi za nyumbani pia lazima tuyafanye, kwa hivyo inabidi tujipange*" meaning, in as much as studying is OK, we must also do household chores, we therefore must manage out time well. The female graph is seen to rise towards 5 hours spent a day in studies the falls drastically, this is explained by the number of duties women have to attend to in a day limiting the number of hours they spend studying. The male graph on the other hand shows a different behavior where towards 9 hours a day spent on studies the graph rise meaning that the male have more hours of study as compared to their female counterparts.

Study Hours Impact on Academic Performance

This section presents the impact of study hours on one's academic performance

Study Hours in a Day

Figure 3 depicts the findings on the number of hours students dedicated for their studies per day.

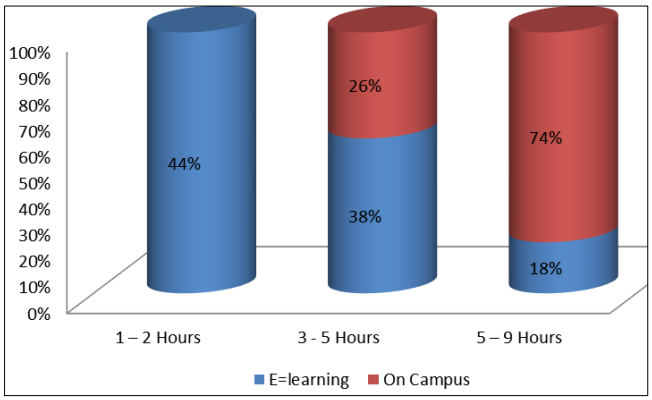

Fig 3: Study Hours in a Day

The study sought to establish the number of study hour's students under e-learning system and those in conventional study mode employ in a day. Most (44 percent) of students in e-learning mode studied for between 1 and 2 hours a day, figure 4.4 reveal that 38 percent and 26 percent of e-learning and conventional mode students respectively spent between 3 and 5 hours a day studying. Of those who study for between 5 – 9 hours a day, 18 percent and 74 percent were on e-learning and conventional study mode respectively. The findings reveal that students under the conventional study mode spend more hours a day studying than their counterparts on e-learning study mode. It can therefore be deduced that students under conventional study mode are likely to perform better than those under e-learning mode considering the time both sets dedicate to studies.

Impact of study hours on academic performance

Figure 4.5 is a presentation of the findings on the impact of the number of hours the students spent studying on their performance.

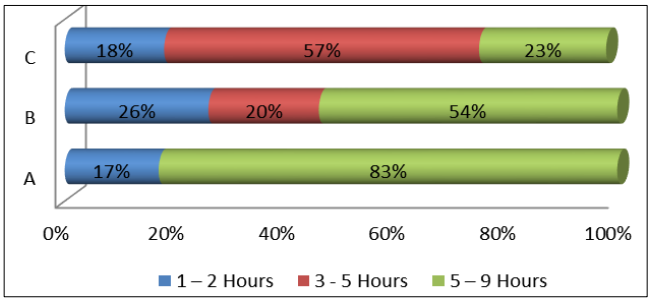

Fig 4: Impact of study hours on grade scored

The study sought to establish the impact of study hours in a day on academic performance; Figure 4 reveal that those who spent between one and two hours accounted for 17 percent, 18 percent and 18 percent, of the students scoring A's, B's and C's respectively. Those who spent between three and five hours accounted for 20, 58 percent of the students scoring B's and C's respectively. Those who spent between five and nine hours accounted for 83 percent, 54 percent and 23 percent of the students scoring A's, B's and C's respectively. From the revelation, it can be deduced that the more hours students spent studying the better their performance in academics regardless of whether the students are under the conventional study mode of e-learning mode of study.

Ease in Keeping Up with Reading Hours Required for Online Courses

Figure 5 depicts the findings on the respondents ease in keeping up with the reading hours required for online hours.

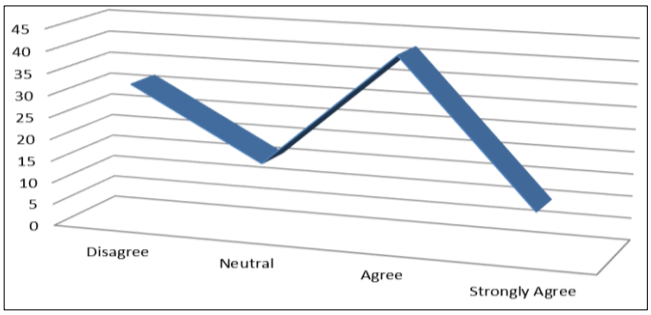

Fig 5: Ease in keeping up with reading required for online courses

The study sought to establish whether the students in e-learning mode of study found it easy studying online; Figure

5 reveal that 32 percent of the respondents indicated that they found difficulty studying online, 16 percent were not sure, while 42 percent indicated that they found no difficulty studying online, only10 percent of the students on e-learning strongly agreed that studying online was easy to keep-up with. This can be deduced to mean that the performance of e-learning students may be affected negatively by the fact that not so many easily adhere to the study hours required by the program.

Ease in finding time to complete online courses

Figure 6 presents the findings of the respondents' ability to easily find time to do their studies

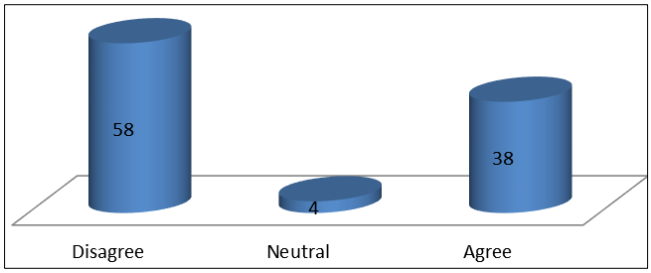

Fig 6: Ease in finding time to complete online courses

The study sought to establish whether the students found time to do their studies online; Figure 6 reveal that 58 percent of respondents reported that it was not easy finding time for online studies, 4 percent were undecided while only 38 percent indicated that they found time to study online. It can be deduced that not so many e-learning students find study time; this may be reflected in their performance.

Comparison between Difficulty in Using Computer and Average College Score

Figure 7 is a presentation of the findings on the comparison between average performance and difficulty in using computers

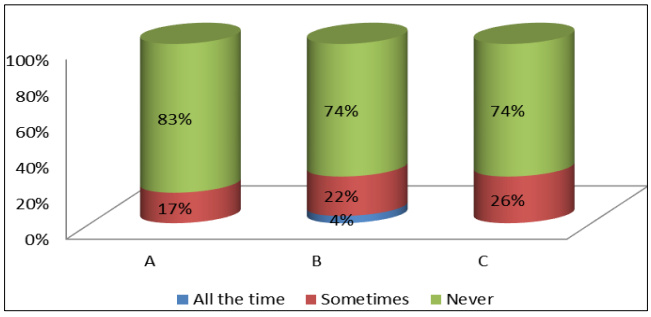

Fig 7: Difficulty in using computer and average college score

The study sought to establish the impact of difficulty in using computers on average college score. Figure 7 reveal that majority (83 percent) of students who scored an aggregate of A in their studies never experienced difficulty in using computers, only 17 percent who scored A had difficulty in using computers. The majority (74 percent) of those who scored B had no difficulty using computers, 22 percent who scored B sometimes had difficulty using computers while 4 percent who scored B had difficulty using computers. It was noted that 74 percent of those who scored C on average had no difficulty using computers, 26 percent sometimes had difficulty using computers. It can be deduced that the more the difficulty in using the computer the higher the chances of performing poorly in academic performance. One is likely to have difficulty using computers when they have no prior skills in computers. It can be concluded that prior computer skill has a positive impact on academic performance for students on e-learning program.

Action in Case of Computer Complication

Figure 8 is a presentation of the findings on what the respondents' do in case of computer complication

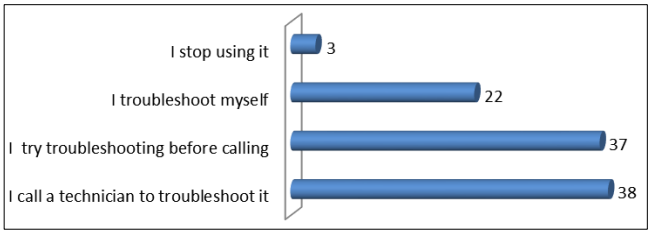

Fig 8: Action in case of computer complication

The study sought to establish the actions the students took in case of computer breakdown, figure 8 above reveal that 38 percent, 37 percent, 22 percent and 3 percent of the respondents indicated that incase of computer breakdown they would call a technician to troubleshoot, try to troubleshoot before calling a technician, troubleshoot themselves and stop using the computer respectively. This shows that about 50 percent had skills of troubleshooting a strong indication of prior computer skills.

Inferential Analysis

The section below presents coefficient of correlation, coefficient of determination, ANOVA and regression coefficient. Coefficient of correlation shows the relationship between the dependent variable and the independent variables, coefficient of determination shows the contribution of independent variables to the dependent variable, ANOVA tests the significance of the regression model while the regression coefficient shows the effect of unit increase independent variable to the independent variable.

Coefficient of Correlation

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 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 variable

Table 1: 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 2: Model Summary

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

Anova

In trying to establish significance of the model the study employed ANOVA. From table 1 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 3: 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			

Regression Coefficient

Multiple regression analysis was conducted as to determine the relationship between academic performance and the four variables. As per the SPSS generated table 2 the equation

$(Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \varepsilon)$ becomes:

$Y = 1.180 + 0.0498 + 0.017\ X_2 + 0.3209\ X_3 + 0.2527\ X_4$

The regression equation above has established that taking all factors into account (hours spent online, gender, location setting and subject) constant at zero, academic performance will be 1.180. The findings presented also shows that taking all other independent variables at zero, a unit increase in hours spent online will lead to a 0.0498 increase in academic performance; a unit increase in gender will lead to a 0.017 increase in academic performance; a unit increase in location setting will lead to a 0.3209 increase in academic performance and a unit increase in subject will lead to a 0.2527 increase in academic performance. This infers that location setting contribute most to academic performance followed by subject then hours spent online while gender contributed the least to academic performance.

Table 4: Regression Coefficients

	Unstandardized Coefficients		Standardize Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.180	0.3303		0.5449	0.5881
Hours spent online	0.541	0.1530	0.0498	0.3731	0.0201
Gender	0.507	0.1658	0.0170	0.1210	0.0262
Location setting	0.518	0.1502	0.3209	2.4461	0.0252
Subject	0.528	0.1398	0.2527	1.9406	0.0223

Summary of Findings

The majority of the respondents in this study were male (52 percent), indicating that more male than female are admitted in higher learning institutions. The findings of the study show that majority of students (47 percent) have never been married and are in the conventional learning system, on the other hand 46 percent of students on e-learning program are married. The findings also show that 19 percent of the respondents had between 1 – 2 children, 22 percent had between 3 – 5 children, while the majority 58 percent had between 5 – 9 children.

On comparison, students on conventional learning mode performed highly as compared to those on e-learning, of the students who scored A's, 83 percent were on the conventional learning system, those on e-learning program was only 17 percent of the total A's scored. Conversely, majority of the students who scored C's were those on e-learning (74 percent) mode of study.

It was revealed that gender was a factor that influenced the number of hours the respondents studied. Majority (52 percent) of those who studied for 5- 9 hours were male while the majority (50 percent) of those who studied for 3 – 5 hours were female. It was revealed that male who studied for 3 – 5 hours were only 14 percent of the population.

On comparing the study hours students under e-learning and

those on–school program spent studying per day, it was found that majority of 44 percent of the student on e-learning mode studied for less than 2 hours a day while the majority (74 percent) of those under the conventional learning program spent between 5 – 9 hours studying a day. It was further revealed that study hours per day significantly influence the academic performance of students, students who spent between 5 – 9 hours a day accounted for 83 percent of the total A's scored.

To measure the impact of prior computer skills on academic performance, the study sought to know whether the students were anxious while using computers, 1 percent of the respondents indicated that they were somewhat anxious, 10 percent of the respondents were found to be a little anxious, the majority 89 percent however indicated that they were never anxious while using computers. As for the extent of anxiety, only 2 percent of the respondents indicated that they are somewhat anxious, however 10 respondents are a little anxious whereby out of this 10, 9 scored an average score of B representing 9 percent of the total respondent who are a little anxious the remaining respondents scored an average score of C, hence all the 12 respondents who scored an average score of A are not anxious at all, and 40 and 37 respondents who are not anxious at all scored an average score of B and C respectively. The findings can be deduced to mean that the more anxious a student gets while using computers the higher the chances of not performing well for the students on e-learning mode.

Conclusion

This short 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

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:

1. 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.
2. 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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