

SJAH Vol. 4, Issue 6, Page: 06-12, June

2019, ISSN: 2676-2803

Impact Factor (SJIF): 9.305

Journal DOI: 10.15373/22501991

International Peer Reviewed & Refereed

Journal with Indexed Journal Platforms

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The Role of Prior Computer Skills on Performance in E-Learning Setup

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Abstract

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, IT Education

1. INTRODUCTION

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 become 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.

2.0 BACKGROUND OF THE STUDY

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). Benefits include offering a variety of new possibilities to learners (Breuleux, Laferrière, & Lamon, 2002), in addition to having a positive effect on students' achievement in different subject matter areas (Chambers, 2003). 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) students in virtual schools showed greater improvement than 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 & Lubers 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) 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). 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) 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) and greater student responsibility as is noted by Wedemeyer (1981). 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).

3.0 METHODOLOGY

This chapter describes the methods that were used in the study. It explains the research design, the study population, sampling method and procedures, data collection procedures and instruments, data analysis, reporting and ethical issues.

3.1. Research Design

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.

3.2 Unit of Analysis

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).

3.3 Unit of Observation

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

3.4 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 3.1 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: 3.1 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%

Source Gay (1987)

3.5 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.

3.6 Data 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.

3.7 Data Analysis and Reporting

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.

4.0 DATA ANALYSIS

4.1 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.

4.2 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 4.1 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 4.3 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	

4.2 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 4.4 Model Summary

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

4.3 ANOVA

In trying to establish significance of the model the study employed ANOVA. From table 4.3 the significance value is 0.009 which is less than 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.

4.4 Regression Coefficient

Table 4.5: 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			

a. Predictors: (Constant), Action in-case of computer complication, Difficulty in using computers, Study hours in a day, Mode of study

b. Dependent Variable: Average score for college courses

Multiple regression analysis was conducted as to determine the relationship between academic performance and the four variables. As per the SPSS generated table 4.4 the equation

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

$$Y = 1.180 + 0.0498 X_1 + 0.017 X_2 + 0.3209 X_3 + 0.2527 X_4$$

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 4.6: Regression Coefficients

	Unstandardized Coefficients		Standardized 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

4.0 CONCLUSION

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.

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