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Adeyinka Tella
University of Botswana

Adedeji Tella
University of Ibadan

C. O. Ayeni
Federal College of Forestry

R. O. Omoba
Redeemer University

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Self-Efficacy and Use of Electronic Information as Predictors of Academic Performance

Adeyinka Tella
Department of Library and Information Studies, University of Botswana
tellayinkaedu@yahoo.com

Adedeji Tella
Teacher Education Department, University of Ibadan, Nigeria
dejtell@yahoo.com

C. O. Ayeni
Federal College of Forestry, Ibadan, Nigeria
toyanu2004@yahoo.com

R. O. Omoba
Redeemer University Library, Nigeria
omoba2K3@yahoo.com

Abstract

Students' ability to find and retrieve information effectively is a transferable skill useful for their future life as well as enabling the positive and successful use of the electronic resources while at school. It is a known fact in this digital era that any student at the higher level who intends to better achieve and go further in academics should have the ability to explore the digital environment. Students are increasingly expected to use electronic information resources while at the university. Research was undertaken to determine the level of influence of self-efficacy and the use of electronic information resources on students' academic performance. This study examined self-efficacy and the use of electronic information as predictors of academic performance. Its participants were comprised of 700 students (undergraduate and postgraduate) randomly drawn from seven departments in the faculty of education, University of Ibadan, Nigeria. Data on the study was collected through the Morgan-Jinks (1999) academic self-efficacy scale and the use of the electronic information scale (UEIS) with r = 0.75. Three research questions were raised to guide the study.

The results indicate that self-efficacy and the use of electronic information jointly predict and contribute to academic performance; that respondents with high self-efficacy make better use of electronic information and have better academic performance; that a correlation exists among self-efficacy, use of electronic information and academic performance; and that the use of electronic information influenced respondents' performance in General Education subjects more than other subjects. Finally, the results reveal that the Internet is the electronic information source students access for information most often. Implications of these results and recommendations are discussed.

Introduction

Improved student achievement ultimately depends heavily on the interplay of their full commitment and the functioning of some of their personality constructs. Learning efforts, as it is known, do not always result in successful learning outcomes because students inevitably face obstacles, interferences and failures; and the most frequent outward sign of their failure is a bad grade. Psychologists and educationists are becoming aware of the fact that an individual's self-efficacy, or his perception of his capability or ability, is intimately related to how he learns and behaves. Many students have difficulty in school not as a result of intelligence or physical impairment, but because they have perceived themselves as unable to do academic work (Esrtrom, 1996). Success in school work or life appears to depend on how much a person feels about the qualities and abilities he possesses or on those qualities themselves. Estrom explained that when a student says "I will never understand this material" he is saying more about himself than about the subject matter. It is likely that such students will not cope essentially because he judges himself as not competent and capable of being successful. Bandura, as outlined in Pajares (2002), concluded that many students have difficulty in schools not because they are incapable of performing successfully but because they are incapable of believing that they can perform successfully, they have learned to see themselves as incapable of handling academic work or they see the work as irrelevant to their perceptual world. Students with a strong sense of personal competence approach difficult tasks as challenges to be mastered rather than as threats to be avoided.

Related to the issue of self-efficacy, is the current debate about influence of technology on students' academic achievement. Research has focused primarily on identifying personality traits associated with tendencies to seek and use electronic information resources. A vast and growing amount of information available through electronic information resources, and its accessibility to the students should be seen as an opportunity to enhance their academic performance. This is because it provides an atmosphere that encourages sharing of knowledge in the creative process and collaborative efforts among educationists, students, researchers, etc. The questions

that arise therefore are: do the students make use of this opportunity? Does this opportunity yield them any positive result? It is the consideration of these great questions that troubles the mind of the researchers, hence the present study examines self-efficacy and the use of electronic information as predictors of academic performance.

Literature Review

Self-Efficacy

Self-efficacy perceptions are judgments regarding one's capability to successfully perform specific tasks and behaviours, (Saks, 1995). It is the belief in one's capability to organize and execute the course of action required to manage prospective situations (Bandura, 1999). In essence, self-efficacy is the confidence that one has in one's ability to do the things that one tries to do. Bandura (1986) earlier defined self-efficacy as people's judgment of their capabilities to organize and execute the course of action required to attain designated types of performances. It is concerned not with the skills one has, but with the judgments of what one can do with whatever skills one possesses (p.391). Thus perceived, self-efficacy is a significant determinant of performance which operates partially independently of underlying skills (Bandura, 1986). It involves a generative capability in which one must organize cognitive, social and behavioral sub-skills into integrated courses of action (Saks, 1995).

Efficacy belief varies in level, strength and generality, and these dimensions prove important in determining appropriate measurement. In academic settings, self-efficacy instruments may ask students to rate their confidence in solving specific problems, performing particular reading or writing tasks, or engaging in certain self-regulatory strategies. Social indexes are also used to ask students to express their confidence of success in various social situations (Pajare, 2002).

Most investigations on self-efficacy in academic settings have sought to determine the predictive value of self-efficacy belief on varied performance. This is why Bandura (1996) argued that the stronger the self-efficacy, the more likely the person is to select challenging tasks, persist at them and perform them successfully. Academic achievement depends heavily on the students' personal conviction of being in charge of their own fate. The high achievers did not ascribe their fate to luck or to the vagaries of chances, but rather to their own personal decisions and efforts (Coleman in Richardson; Norman and Sharon 1998). In the same vein, students who rarely experience success in the classroom and perceive themselves as academic failures often develop a syndrome that includes a variety of self-defeating motives. For example, such students are far more apt to develop an external locus of control, they are low in self-regulated learning strategies, they have low levels of self-efficacy and

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low motivation (Richardon, 1998). Frank and John in Tella and Tella (2003) said that prior determinants such as ability and previous performance attainments help to create self-efficacy perceptions and are also strong predictors of subsequent performance. Waldman (2003) "asserts that it is important to note that academic self-efficacy beliefs vary according to subject matter, in that students may have high self-efficacy in one subject but not in another: mathematics self-efficacy is independent of writing self-efficacy, depending on their mastery and vicarious experiences in each subject." (p. 11). Since "people are generally more interested in performing activities in which they have high self-efficacy" (Ren, 2003: 323), we can now infer that students with high self-efficacy will be more likely to take advantage of what is around them (e.g., electronic information). If they are familiar and feel comfortable with electronic information (Internet, electronic journals, CD-ROM database, etc.), they will use them, and if they feel that learning through these electronic information resources will enhance their academic performance, they will learn about them.

Studies already conducted on self-efficacy and the use of electronic information and suggest that the two variables may be related to academic performance. Lent, Lopez and Beischke (1993) showed how efficacy can be tailored to varying levels of academic outcomes and still remain highly predictive. In other studies, researchers reported that girls perform as capably as boys in varied academic tasks but nonetheless report lower self-efficacy, particularly at higher academic levels (Pajares and Johnson, 1996; Pajares and Miller, 1994). Studies have further confirmed that the self-efficacy of students is more predictive of their interest in major school subjects than their prior achievement or outcome expectations and that male students report higher self-efficacy than female students (Lent, Lopes and Miller, 1993). Tella and Tella (2003) report that self-efficacy has a significant relationship with academic achievement and is a better predictor of academic achievement. In a study of library instruction and self-efficacy, Ren (2000) also showed a positive correlation between students' self-efficacy and the frequency of use of library electronic resources.

Pajares and Johnson (1996) investigated the influence of writing self-efficacy on high school students essay writing using a path model. They reported that students' self-efficacy perceptions had a direct effect on their writing performance. Furthermore, Smith, Arnkoff and Wright (Pajare, 1996), tested the predictive power of three theoretical models on the academic performance of college students. They found out that the variables within each model predicted performance to some degree but self-efficacy was a weak predictor.

Use of Electronic Information

Students' use of information systems can be in the form of communicating or posting of information or material by way of electronic mail, bulletin boards, World Wide

Web (Internet), or other such electronic tools (Mischnick, 1998). In recent years, the use of electronic information has become prominent in the drive for making information and data transfer available to users, especially students. The need for electronic information for the purpose of research and learning in various institutions has posed challenges in relation to system connections, working ability, and access. Electronic information has many functions and benefits which can be of immense use to students in schools and educational sectors, particularly research institutions. Once the user is connected to the internet, the user can link up with any part of the world for whatever purpose the user intends (Osunrinde, Adekiya and Adeyemo, 2002).

Electronic information serves as a motivating factor to students as it provides them opportunity to transmit, acquire or download, process and disseminate information on a subject of interest. Electronic information sources offer today's students opportunities different from their predecessors (Ray and Day, 1998). Brophy (1993), details the advantages of networking for the user as being: "the information needed which can be delivered from the most appropriate source to the user; the user can re-specify his or her needs dynamically; the information is obtained when it is wanted, so becomes 'just in time' rather than 'just in case'; the user selects only the information needed to answer the specific question and finally, the information is only stored should user wish." Other advantages according to Ray and Day (1998: 5) include the fact that "electronic information sources are often faster than consulting print indexes, especially when searching retrospectively, and they are straighter forward when wishing to use combinations of keywords. They open up the possibility of searching multiple files at one time, a feat accomplished more easily than when using printed equivalents. Electronic resources can be printed and searches saved to be repeated at a later date; they are updated more often than printed tools." Related to these, Internet is used as a medium of expression to educate the learner, provide information needs at their desktop, and send hitch-free and cross-referenced data to the appropriate location. It could be said that improved data transmission facilities will go a long way to reduce the incessant hardship faced by students in the acquisition and generation of data which serves as the basis for research and academic performance improvement. This is because it seems the use of electronic information by students enhances their performance in academic activities. Among the electronic information system students use to get most of their information are: Internet, e-mail, electronic journals, bulletin boards, telephone, telex, CD-ROM databases, electronic journals, and electronic books.

Some studies on the use of electronic information and academic performance (e.g. Day and Bartle, 1998) reveal that the academic community has accepted that electronic information sources have an impact on their work. However, services currently available to academic staff and students are not being used to their full

potential and some are hardly being used at all. These same authors report that, of the social sciences respondents, 43% explained that they never referred to electronic journals. That is compared to the use that academics have made of e-mail, where almost 60% use it on a daily basis. About a third of the respondents to the posted questionnaire hardly ever consulted the Internet but about a third did so on almost daily basis. There is a large number of reasons for the use and non-use of the Internet but mainly, it was how the academics perceived the Internet and what it was capable (or not capable) of doing which influenced the extent it was referred to.

Swan and Brown (1996) reported that in the academic situation, a huge proportion of respondents had access both to Internet facilities and online services provided by the library, yet usage figures for these media were quite low. Corporate respondents indicated that they are not confident of their abilities to use these media effectively and anecdotal evidence suggests that academic end users feel similarly. Academic end users rated journals as the most important sources of information with 86% undertaking a systematic search of these journals in print form in their institutional library. The academic respondents were overwhelmingly in favour of greater access to electronic information.

Elliot (1996) supported the idea that the use of computers in the education of young children promoted social interaction and academic achievement. He suggested that there should be provision for an introduction to computers in early childhood settings to enrich learning opportunities and guidance provided to teachers to find developmentally appropriate software and hardware. In the same analysis "minimal communication between school and home" was found by Burden (1995) to contribute to low performance by students. He described the experience of establishing a computer-based telephone message system in a high school, and involving parents, teachers, and students in its use. The results of his survey further showed that at the end of nine weeks of system use, there was a positive increase in school/home communication and in provision of classroom information by teachers, even though only one of six expected outcomes was achieved.

In a study on the use of computer technology in the delivery of a core education in biology, world culture, English and algebra, by Hecht (1994), it was evident that demographic and prior achievement levels of students in the project homeroom, project schoolroom and regular school varied little. Students in the project schoolroom group tended to achieve statistically significantly higher grades than the students in the other groups in each of the four subject areas considered. Bishop (1991) argued that the potential of the National Research Education Network had dramatically changed the nature of education, and scholarship was becoming more apparent, particularly when the library and education communities are continuing to expand their use of electronic networks. He suggested that students may use the electronic

network to learn by engaging in electronic conversations with distant peers who are native speakers and libraries may create and "publish" electronic information resources over the network to an audience far broader than their tradition patron group. Bandura also looked at how self-efficacy related to computer use, linking computer use with educational achievement, especially since computers provide "a ready means for self-directed learning. Disparities in computer skills can create disparities in educational development" (Bandura, 1997: 434). He stressed further that "belief in one's efficacy to master computers, predicts enrollment in computer courses independently of beliefs about the instrumental benefits of knowing how to use them" (Bandura, 1997: 435). Waldman (2003), when drawing inference from Bandura's position, asserts that "students with high self-efficacy regarding computers would also be more likely to explore new technologies, software or databases. Additionally, they would be more likely, for example, to explore a library's website and find that the library has specialized resources, and they might even try some searches on those resources without, or with less, prompting from professors and/or librarians and without necessary taking library workshops."(p. 12) General user opinion towards the use of electronic information resources, in particular, CD-ROM, has been positive, with students enjoying using these sources and finding relatively few problems while using them. Surveys undertaken by Schultz & Salmon (Ray and Day, 1998) on students' satisfaction with CD-ROMs discovered that 83% of students surveyed felt that using the source saved them time and that it was relatively easy to use. Two-third of those surveyed stated that if the CD-ROM was unavailable, they would wait for it to become free rather than use the print tool. These surveys show how greatly CD-ROM was impacting the achievement of users.

In the same vein, Eastman and Krendl (1984) examined the effects of using a microcomputer for electronic research on the achievement and attitude of eight-grade boys and girls. Their result showed no unpredicted differences by treatment group, but significant sex-related differences in their writing and attitudes towards computer and sex roles. With all these empirical evidence above, the focus of this study still remain to determine the predictability of self-efficacy and use of electronic information on academic performance of the subjects. To achieve this objective, six research questions were determined.

Research Questions

1. What is the joint contribution of self-efficacy and use of electronic information to academic performance of the subjects?
2. What is the relative contribution of each of use of electronic information and self-efficacy to the prediction of academic performance?
3. What is the influence of respondents' levels of self-efficacy (high and low) on their use of electronic information and academic performance?

4. Is there any correlation among self-efficacy, use of electronic information and academic performance?
5. Is there any difference in the subject by subject performances of the respondents based on their use of electronic information?
6. Which electronic information sources do students use most often?

Methodology

Design

This study adopted a descriptive survey research approach to find out the prediction of academic performance of the respondents through their use of electronic information and their self-efficacy.

Population and Sampling Procedure

The population of this study comprised 700 undergraduates and graduate students from the faculty of education, University of Ibadan, Nigeria. These were randomly selected from the seven departments that make up the faculty. One hundred students were selected from each of the department. This gave a total of seven hundred students that took part in the study. Of these respondents, 377 (53.9%) were male and 323 (46.1%) were female; 490 (70%) were undergraduate students and 210 (30%) were graduate students. Their age ranged from 25 to 45 years, with a mean age of 35 years and a standard error of 10.

Instruments

Self-efficacy Scale

The Morgan-Jinks student self-efficacy scale developed by Morgan and Jinks (1999) was used. The instrument is a thirty-item scale and had an overall reliability coefficient of r= 0.8. The sub-scale Alpha was 0.78 for talents, 0.70 for context and 0.66 for efforts. The instrument has a response format ranging from Really Agree (1) to Really Disagree (4).

Use of Electronic Information Scale

The use of electronic information scale, coupled together from various standardized scales developed to measure impact of information technologies on academic achievement, was adapted and revalidated. Responses to the instrument ranges from strongly agree to strongly disagree. The reliability co-efficient of the scale yielded r= 0.82 using a test retest reliability method of two weeks interval.

Academic Performance Data

Data on academic performance of the respondents were collected through an aptitude test developed in the field of general knowledge which includes English Language and Mathematics and General Education. It is a multiple choice scale which was scored over 100%. The test contains 40 items with a reliability coefficient of r= 0.81 obtained through a split halve reliability method.

Procedure for Data Collection

The three instruments were administered to all the 700 respondents who participated in the study. Since all the respondents were drawn from the faculty of education, University of Ibadan, the administration took place at a time in a hall under a normal examination condition. This was to reduce the mortality rate of the instrument and to disallow respondents from talking to each other which might distort the results of the study. The degree of maturity demonstrated by the respondents made the exercise a hitch-free one and, as a result, there was no report of any loss items as return rate recorded was 100%.

Data Analyses

Data obtained from the study was analyzed using Multiple Regression analysis, Pearson Product Moment correlation matrix, and simple percentage statistical tools.

Results

The results of the analysis are presented in tables 1-6 below.

Research Question 1: What is the joint contribution of self-efficacy and use of electronic information to academic performance of the subjects?

Table 1: Regression Analysis on Performance Data

Source	DF	Sum of squares	Mean Square
Regression	2	337.47657	112.49219
Residual	697	3257.80343	4.674036485
F=24.77		*Sign F= .0986*	

Multiple R = .30638
R - Square = .09387
Adjusted R – Square = .05531
Standard Error = 8.32556
Analysis of Variance

Going by the results presented in Table 1, the two independent variables [self-efficacy and use of electronic information] made a joint contribution of .9% to academic performance of the respondents. The result of the analysis of variance [ANOVA] that was done on multiple regression data produced an F-ration 24.77 of which was significant at 0.05 Alpha level.

Research Question 2: What is the relative contribution of each of use of electronic information and self-efficacy to the prediction of academic performance?

Table 2: Relative Contribution of the Use of Electronic information and Self-efficacy to Academic Performance

Model	Unstandardized co-efficients		Standardized co-efficients	t	P
	B	*Standard Error*	*Beta*		
Constant	15.360	3.213		5.24	<0.05
Use of electronic information	0.378	0.037	0.227	2.45	<0.05
Self-efficacy	0.292	0.063	0.118	2.03	<0.05

Table 2 above shows that each of the variables made a significant contribution to the prediction of academic performance. Use of electronic information made the most significant contribution (Beta = .227; t = 2.45; P = < .05). Self-efficacy also made a significant contribution (Beta = .118; t = 2.03; P < .05)

Research Question 3: What is the influence of respondents' levels of self-efficacy (high and low) on their use of electronic information and academic performance?

Table 3: Levels of Self-efficacy, Use of Electronic Information and Academic Performance

Levels of S.E	Number of Respondents	X	Use of Electronic Information	Academic Performance
High SE	476	66	0.385**	0.334**
Low SE	224	34	0.323*	0.296*

Table 3 shows that respondents with high self-efficacy use electronic information more and perform better than their counterparts with low self-efficacy. High self-efficacy respondents (use of electronic information r = 0.385; academic performance r

= 0.334) had values greater than respondents with low self-efficacy (use of electronic information r = 0.323; academic performance r = 0.296).

Research Question 4: Is there any correlation among self-efficacy, use of electronic information and academic performance?

TABLE 4: Correlation Matrix among the Variables

Variables	Academic Performance	Electronic Information	Self-Efficacy
Academic Performance	1.0000		
Electronic Information	0.2779*	1.0000	
Self-Efficacy	0.1559*	0.0991	1.0000

The table above reveals that significant correlation exists among use of electronic information, self-efficacy and academic performance. Electronic information (r = 0.2779*); self-efficacy (r = 0.1559*)

Research Question 5: Is there any difference in the subject by subject performances of the respondents based on their use of electronic information?

Table 5: Mean/Standard Deviation of the Respondents Subjects by Subject Performance

Subjects	Number of Respondents	Mean	Standard Deviation
General Education	700	58.9	0.84
English Language	700	51.7	0.72
Mathematics	700	49.2	0.70

The results in table 5 shows that respondents use of electronic information actually have greater influence on their performance in General Education than in the two other subjects, English and Mathematics. General Education (Number = 700; X = 58.9; SD = 0.84). English Language (Number = 700; X = 51.7; SD = 0.72). Mathematics (Number = 700; X = 49.2; SD = 0.70).

Research Question 6: Which electronic information sources do students use most often?

Table 6: Sources of Electronic Information Consulted

Sources	Number of Respondents	Rank	Percentage
Internet	248	1	35.42
E-Mail	128	4	18.29
Electronic Journals	131	3	18.71
Bulletin Boards	24	6	3.43
CD-ROM Databases	143	2	20.43
Electronic Books	26	5	3.71

From the table above, the result reveals that electronic information source students use most often to search for information is Internet with 248 respondents (35.42%). This is followed by CD-ROM databases with 143 respondents (20.43%). Electronic journals are next with 131 respondents (18.71%); followed by e-mail with 128 respondents (18.29%), electronic books with 26 respondents (3.71%) and bulletin boards with 24 respondents (3.43%).

Discussion

The results of the first and second research questions on this study reveal that self-efficacy and use of electronic information jointly predict and contribute significantly to academic performance of students. This corroborates previous findings by Tella and Tella (2003) and Pajares and Johnson (1996) that self-efficacy is a better predictor of academic performance. On the use of electronic information, Eliot (1996} supported the use of computers in the education of children by stating that it promotes social interaction and academic achievement. Similarly, Day and Bartle (1998) buttress the present findings by showing that electronic information sources had an impact on the academic staff and the students.

The results of the third research question reveal that respondents with high self-efficacy made the best use of electronic information and this eventually made them perform better than their low self-efficacy counterparts. This is in line with the assertion by Ren (2003) that people generally are more interested in performing activities in which they have high self-efficacy. They also take advantage of what is around them. Hence it is not surprising that the better use of electronic information by

high self-efficacy respondents results in better performance than the low self-efficacy group in this study.

The finding of the fourth research question reveals that correlation exists among the independent variables (self-efficacy and use of electronic information) and the dependent variable (academic performance). The reason for this correlation may be due to the fact that academic performance often depends on students' personality variables. No doubt self-efficacy is a personality variable, hence the correlation. Additionally, gathering of qualitative relevance information through e-mail, electronic journals, electronic books, CD-ROM databases and the Internet, as well as effective use of the same, can bring about good academic performance. It can also be stressed that students find it more interesting gathering information through electronic sources, which influences their performance.

It is shown from the results on this study that respondents' use of electronic information influences their performance in general education subjects more than English language and mathematics. This may be because the respondents on this study were basically teachers in training whose core courses were education. The fact that education was their major may have caused them to seek more information in that area. That may have been responsible for their better performance in education than the other areas or subjects as revealed in this study.

It is evident from the result of the sixth research question that the electronic information source students use most often is the Internet. This runs contrary to the report by Day and Bartle (1998) that about a third of the respondents to a postal questionnaire hardly ever consulted the Internet. Their result favoured electronic mail where almost 60% reported using it on a daily basis. The fact that the electronic information students use most often is the Internet, as revealed in this study, is not surprising. This is because there is a growing awareness in Africa about the quality of information available on the Internet which is actually useful for students, academics, and researchers. A recent report by NCREL (2006) found that about 99% of schools in the United States have access to the Internet. In similar report by Hitlin and Rainie (2005) approximately 87% of American youth use the Internet on a daily basis. With these youth, it can be seen that in the developed world, computers are like a pen and pencil, while in Africa, it is still considered a luxury. As this study has shown the effects of the Internet on students' academic performance, it is high time for schools in Africa to make sure that efforts are being made for the provision of Internet connectivity in all schools. This will afford the students and lecturers the opportunity to keep pace with the trend of global activities and not be totally cut off, as before.

It is hereby concluded that, the two independent variables used on this study jointly predict and influence academic performance. More so, correlation exists among all the

variables and the source of electronic information student use most often these days is the Internet. This can be seen as a result of the information explosion.

In the light of the issues outlined surrounding personality variable of self-efficacy and the use of electronic information (the Internet in particular) it would be helpful to finish by making some recommendations that may help to improve the use that both staff and students make of the Internet and other electronic information sources. Academic staff and students should be made aware that the information available on the Internet is beneficial and of interest. Training and guidance in making use of electronic information sources (including the Internet) should be offered to both academic staff and students. It would be beneficial if new skills were integrated into the curriculum so that students could be taught how to conduct effective searches. This would enable them to be able to discriminate between good and bad articles and reference material. Electronic information resources should be available for use at any time. Information literacy as a course should be made compulsory for all students irrespective of their discipline. This will go a long way in increasing the knowledge level of the learners regarding the use of electronic information.

It should be noted that very many students still lack the knowledge of how to locate information using electronic sources. Therefore, librarian and information professionals working in school libraries are called upon to use their discretion to identify such students during library teaching and provide the necessary support for them accordingly.

Lastly, students are encouraged to have a strong belief about themselves and their ability to perform academic tasks. This will enable them to tackle any academic rigour and consequently achieve success.

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