Self-Efficacy as a Predictor of Secondary School Students' Academic Achievement in Computer Studies in Delta State

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ABSTRACT

The study investigated self-efficacy as a predictor of secondary school students' academic achievement in computer studies. Two research questions guided the study and two hypotheses were tested at 0.05 level of significance. Correlation design was adopted for the study. The population of the study was 11, 789 senior secondary school 8year two (SS2) students offering Computer studies in Delta North Senatorial district of Delta state. A sample of 600 students obtained using multi-stage sampling procedure was involved in the study. The instrument for data collection was Self Efficacy Questionnaire (SEQ) validated by lecturers in Department of Science Education and Educational Foundations, from Nnamdi Azikiwe University, Awka. The reliability of the instruments were established using Crombach Alpha which yielded coefficient values of 0.77. Data were generated for the study through the administration of the instruments with the aid offive research assistants. The data obtained from the Questionnaires that was administered to senior secondary school student's year 2 (SS II) were analysed using simple and multiple linear regressions. The findings of the study revealed that 0.6% of the variance in computer studies achievement was predicted by students' self-efficacy. Also, achievement in computer studies was significantly predicted by self-efficacy. It was recommended that school teachers should ensure to cover the scheme of work at the appropriate time, to enable students study them in sequential order and in a way that will enable them prepare for test. This should be done to reduce the study load that result in cognitive overload and self-efficacy.

KEYWORDS: *Self-efficacy, achievement, computer, secondary*

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INTRODUCTION

The application of computers and its accessory technologies has become indispensable in all fields of life. According to Carlie (2018) computers play a pivotal role in education and with the rapid changes in computer applications, students are facing continuous challenges in learning and adapting to these applications. The current and advanced features of modern computer technology has made it impossible for students not to use applications such as the internet, e-mailing, word processing, excel spreadsheet and presentation packages. Thus,

being computer literate has become essential for all students to advance academically. Graduate students also need to be computer literate in order to be employable in the post-modern world of today. It is for this importance of computer that computer studies was introduced as a subject in the primary and secondary level of education. In the National Policy on Education (FRN, 2013),

computer education/studies was defined as the knowledge, skills and abilities to manipulate and interpret the language of computer. Computer science studies is skill and craft oriented. It is work-based learning which perceives learning as a continuous process grounded in experience. The National Computer Education Curriculum for primary schools was developed by the Nigerian Educational Research and Development Council (NERDC) in 2012. Until now, computer studies subject matter contents at the primary and secondary level as well as computer studies courses at the university level are based on some document or compilation of topics that lack pedagogical basis and structure in few schools where it is taught. Thus, the National Computer Education Curriculum represents the first deliberate attempt, nationally, to provide guidance to primary and secondary school teachers on what should constitute basic computer literacy concepts and skills to be acquired at that level.

The objectives of the curriculum which are drawn from the national objectives for computer education are to enable students to; Use the computer and thereby acquire basic skills such as using the keyboard, accessing and editing a file at the operating system level; Use the computer to facilitate learning; and Develop rudimentary skills in the use of computer for text writing, computation and data entry activities (National Educational Research and Development Council, NERDC, 2012).

Despite the importance and necessary objectives of computer studies, the West African Examination Council (WAEC) Chief Examiner's Reports have not

indicated any excellence in the students' achievement in computer studies. Although, the subject is relative new with its first maiden examination held in 2014, by 2015 and 2016, when there was basis for comparism, the Chief Examiner reported that students' achievement in 2015 was at par with their achievement in 2014. In 2017, students' achievement was low compared to their achievement in 2016. Although, the students' achievement in 2018 was

better than that of 2017, their achievement in 2019 was comparable to that of 2018. The students' weakness and strength after each examination are identified and noted by the Chief Examiner and presented to the Science Teachers' Association of Nigeria (STAN) and other educational Agencies like NERDC for deliberations. One recommendation that has continued to be made by the Chief Examiner in the light of students' weaknesses is that: teachers should

ensure that there are sufficient practical classes and that students should practice well before examinations. The recommendation is suggestive of the fact there are some fundamental problems especially as it relates to the teaching and learning of the subject. The problem of teaching and learning computer studies according to Nwachukwu and Ndunagu (2021) results from inadequacy ICT facilities/equipment, lack of time to adequately teach computer studies, large teacher/pupil ratio, unreliable or inadequate power supply, lack of trained teachers in ICTs, lack of technical support to maintain and upgrade computing equipment, limited financial resources and lack of internet connectivity.

The worst of all the factors according to Nwachukwu and Ndunagu is poor instructional delivery and poor attitude of teachers towards the subject. These

problems present some level of difficulty for the computer studies students resulting in issues of self efficacy.

Self-efficacy is, according to psychologist Albert Bandura who originally proposed the concept, a personal judgement of how well or poorly a person is able to cope with a given situation based on the skills they have and the circumstances they face. It refers to an individual's belief in his or her capacity to execute behaviours necessary to produce specific performance attainments (Majid, 2018). Self-efficacy according to Mafla, Divaris, Herrera-López and Helf (2019), is an important cognitive mediator of academic achievement because self-efficacy favors cognitive processes.

This is because when students have an adequate level of self-efficacy, they can generate beliefs of expectation value, which would allow them to anticipate their actions and emotions in different academic situations (Doménech-Betoret, Abellán-Roselló, & Gómez-Artiga, 2017).

Moreso, a high level of computer anxiety according to Gomes, Soares, Kieling, Rohde and Gonçalves (2019), has been found to negatively correlate with learning computer skills, resistance to the use of computers, and poorer task achievement due to test anxiety.

Self-efficacy has some relationship with metacognition, a process that allows monitoring and controlling cognitive processes and executive functions (Gutiérrez-García, Huerta-Córtes, & Landeros-Velázquez, 2020; Medina, Castleberry, & Persky, 2017). Students with low self-efficacy often make more mistakes in metacognition tasks during tests, which result from the under-estimation made by the student in relation to his or her judgement of personal performance based on the prediction and monitoring of his or her own performance (Gutiérrez-García & Landeros-Velázquez, 2018). This is relevant because self-efficacy influences how people feel, think and act. A high sense of self-efficacy facilitates information

processing and cognitive performance in different contexts, including decision making and academic achievement (Mafla et al., 2019).

It can be inferred that computer studies students could develop low self-efficacy owing to their poor judgement of their literacy level, knowledge and skills which results from lack of practical classes. The possibility of low self-concepts can also be related to poorly understood concept of computer self-efficacy. Derived from the concept of self-efficacy, computer self-efficacy is the extent of an individual's perceived ability to use a computer" (Seyed, Alma & Razieh, 2016). Carlie (2018), defined computer self-efficacy as the degree to which computer users are confident with their capacity to comprehend and apply computer skills and knowledge. Carlie found that individuals with high computer self-efficacy feels knowledgeable and skilled in using computer hardware and software. However, those who have low computer self-efficacy may experience difficulty in using computers. Computer self-efficacy has been found to be associated with student's perceived ability toward computer technology. According to Ogunmakin and Osakuade (2014) a student's confidence or self-efficacy about computer skills may affect the willingness to learn computer skills. However, it can result in emotional or physical distress, difficulty in concentrating, and emotional worry affecting academic achievement.

Low achievement arises not because of intellectual problems or poor academic preparation, but because testing situations create a sense of threat for those

experiencing low self efficacy. Low self efficacy resulting from the sense of threat then disrupts attention and memory function.

Thus, low self efficacy leads to poor academic achievement in computer studies.

Academic achievement or academic performance is the extent to which a student, teacher or institution has attained their short or long-term educationalgoals. Achievement may be measured through students' grade point average or grades at examinations and test. Achievement is widely known to be affected by test-anxiety of students. This is because, from the ongoing discourse, absence ofknowledge about computers can generate psychological anxiety, thus, decreasing the development of confidence. This psychological anxiety, or fear of working with computer-based technology, embraces losing control, losing important information, and embarrassment of not being competent enough to learn computer technical vocabulary. The need arises therefore, that an investigation into the understanding of the prediction of achievement in computer studies by self efficacy be conducted.

Purpose of the Study

The purpose of the study was to investigate self efficacy as a predictor of secondary school students' achievement in computer studies. Specifically, the
study determined the:

1. Relationship between self-efficacy and secondary school students' academic achievement in computer studies.
2. Contributions of the dimensions of self-efficacy (general self-efficacy, domain-specific self-efficacy, task-specific self-efficacy and self-efficacy for self-regulated learning) in the prediction of secondary school students' academic achievement in computer studies.

Research Questions

The following research questions guided the study:

1. What is the relationship between self-efficacy and secondary school students' academic achievement in computer studies?

2. What are the contributions of the dimensions of self-efficacy (general self-efficacy, domain-specific self-efficacy, task-specific self-efficacy and self-efficacy for self-regulated learning) in the prediction of secondary school students' academic achievement in computer studies?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. Self-efficacy does not significantly predict secondary school students' academic achievement scores in computer studies.
2. The contributions of the dimensions of self-efficacy (general self-efficacy, domain-specific self-efficacy, task-specific self-efficacy and self-efficacy for self-regulated learning) do not significantly predict secondary school students' academic achievement scores in computer studies.

Method

The design adopted for the study is correlation design. The study was carried out in Delta North Senatorial district of Delta State. The population of the study is 11,789 senior secondary school year two (SS2) computer studies students in Delta North Senatorial District. The sample size for the study is 600 SS2 computer studies students. The sample for the study was drawn using multi-stage procedure. The step in each of the stages is as follow: First random sampling was used to select six local government areas out of the nine local government areas in Delta North Senatorial District. Secondly, random sampling was used to select five public secondary schools each from each of the local government areas giving a

total of 30 schools. In each 30 secondary schools drawn for the study, 20 secondary school computer students were selected at random for the study yielding a total of 600 students. The instrument for data collection was Test Anxiety Questionnaire (TAQ) adapted from Frances, Diana, Tobias, Sonja and William (2015). It was made up of 20 items designed to generate information on the thoughts and feelings students generally experienced in test and examination situations. TAQ has four domains focusing on worry, emotionality, interference and lack of confidence. The scale worry

examines disruptive concerns about individual performance and the consequences of failure; emotionality deals on emotional and physical tension;

interference will elicit information on distraction from the task by irrelevant thoughts; and lack of confidence measures low confidence to master academic

challenges. TAQ has a four-point scale namely: never (1), almost never (2), almost always (3) and always (4). The major change in the TAI was that the

numerical values of the scale were named as never, sometimes, always and almost always. Also, the incomplete statements in the instrument were restructured to convey a better meaning of what was being said. Computer studies teachers Diary is an inventory book to which the computer studiesteachers in each school records their students' academic achievement in computer studies each term. Achievement scores for two most recent terms in computer studies were obtained from the teachers'diary in each school.

The instrument was validated by two experts from Nnamdi Azikiwe University, Awka. The reliability of the instrument was established using Crombach's Alpha. The instruments were administered to 40 computer studies students in two schools not involved in the study. The scores generated were collated and computed using Crombach's Alpha to determine the reliability coefficient. The coefficient of internal consistency obtained for TAQ was 0.78. The instrument was administered with the aid of five research assistants. The research assistants were briefed on the purpose of the study and how to administer the instruments. Each research assistant with the assistance of the researcher covered all the selected schools in one local government area. They obtained the permission of the required authority and with the assistance of computer studies teachers in each school and obtain the students' achievement scores in computer studies. Each students' serial number in the diary were written on the copy of the instrument that were given to the student. The instruments were collected the same day they were administered while checking to ensure that they are completely filled.

The research assistants provided every guidance to the students need in the course of filling the instruments. Every instrument was scored and the scores collated and sent to the

researcher along with the instruments for further analysis. Data obtained for the study was analyzed using simple linear and multiple regressions. The Pearson correlation coefficients was used to answer the research questions while regressions was used to test the hypotheses. The interpretation of the correlation coefficient was according Nworgu (2015) whoprovided a three-way guide for interpreting correlation coefficient values when a large number of pairs of scores have been correlated.

They are as follows: low relationship, moderate relationship and above, high relationship. The null hypotheses was tested at 0.05 alpha level. The decision rule was to reject the null hypothesis whenever P-value is less than 0.05 or equal to 0.05 ($P \leq 0.05$), not reject null hypothesis whenever P-value is greater than 0.05 ($P > 0.05$).

Results

Research Question 1: What is the relationship between self-efficacy and secondary school students' academic achievement in computer studies?

Table 1: Relationship between self-efficacy and secondary school Students' Academic Achievement in Computer Studies by Academic Self-Efficacy

Model	R	R^2	Adjusted R^2	Unstandardized coefficients (b)	Std. Error	Decision
Constant Self-efficacy	.118[a]	.014	.012	57.291 .198	14.717	Low positive relationship

a. Predictors: (Constant), self efficacy

Table 1 shows a low positive relationship (R = 0.118) exists between students' self-efficacy and their achievement in computer studies. The R-Square value of 0.014 indicates that 1.4% of the variance in computer studies scores is predicted by self-efficacy.

Research Question 2: Self-efficacy is not a significant predictor of secondary school students' academic achievement scores in Computer Studies?

Table 2: ANOVA on Significance of Relationship between self-efficacy and secondary school Students' Academic Achievement in Computer Studies by Academic Self-Efficacy

Model	Sum of Squares	df	Mean Square	F	Sig.

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1836.862	1	1836.862	8.481	.004[b]
	Residual	129515.031	598	216.580		
	Total	131351.893	599			

a. Dependent Variable: Achievement

b. Predictors: (Constant), Self-efficacy

Table 2 shows that self-efficacy is a significant predictor of achievement scores in computer studies F (1, 598) = 8.481, P (0.004) < 0.05. The null hypothesis is rejected meaning that self-efficacy is a significant predictor of secondary school students' achievement scores in computer studies.

Since test anxiety is a significant predictor of achievement scores in computer studies, the regression model (Y= a + bX) for the prediction of achievement score in computer studies as derived from Table 3, where constant = 57.291 and b value = 0.198 is:

CSA = 57.291+ 0.198(SES)

Where, CSA = Computer Studies Achievement and SES = Self-efficacy

Hypothesis 1: Self-efficacy is not a significant predictor of secondary school students' academic achievement scores in Computer Studies.

Table 3: ANOVA on Significance of Relationship between self-efficacy and secondary school Students' Academic Achievement in Computer Studies by Academic Self-Efficacy

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1836.862	1	1836.862	8.481	.004[b]
	Residual	129515.031	598	216.580		
	Total	131351.893	599			

a. Dependent Variable: Achievement

b. Predictors: (Constant), Self-efficacy

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CSA = 57.291+ 0.198(SES)

Where, CSA = Computer Studies Achievement and SES = Self-efficacy

Hypothesis 2: The contribution of the dimensions of test anxiety self-efficacy (general self-efficacy, domain-specific self-efficacy, task-specific self-efficacy and self-efficacy for self-regulated learning) in the prediction of secondary school students' achievement scores in computer studies is not significant.

Table 4: ANOVA on Significance of Prediction of Academic Achievement in Computer studies by the Individual Dimensions of Self-Efficacy

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7682.808	4	1920.702	9.241	.000[b]
	Residual	123669.085	595	207.847		
	Total	131351.893	599			

a. Dependent Variable: Achievement

b. Predictors: (Constant), Self-efficacy for self-regulated learning, General Self-efficacy, Domain-Specific self-efficacy, Task-specific Self-efficacy

Table 4 shows that all the individual dimension of self-efficacy, jointly, predicted the students' achievement scores in computer studies significantly F (1, 595) = 9.241, P (0.000) < 0.05. Also, data contained in Table 4 shows the significance of the contributions of the individual dimensions to the prediction of achievement scores in computer studies.

Table 4 shows that general self-efficacy is not a significant predictor of achievement scores in computer studies, t = 1.350, P (0.178) > 0.05, domain-specific self-efficacy is a significant predictor of achievement scores in computer studies, t = 4.002, P (0.000) < 0.05, task-specific self-efficacy is a significant predictor of achievement scores in computer studies, t = 4.652, P (0.000) < 0.05, and self-efficacy for self-regulated learning is also a

significant predictor of achievement scores in computer studies, t = 1.165, P (0.045) < 0.05. Thus, all the dimensions of self-efficacy except general self-efficacy are significant contributors to the achievement of students in computer studies. The regression model ($Y = a + bX_1 + cX_2 + dX_3 + eX_4$) for the prediction of achievement score in computer studies , where constant = 55.320 and b value = 0.116, c value = 0.531, d value = 0.863, e value = 0.237 is:

CSA = 55.320 + 0.116(GSES) + 0.531(DSSES) + 0.863(TSSES) + 0.237(SESSRL)

Where, CSA = Computer studies Achievement and GSES= General self-efficacy, DSSES = Domain-specific self-efficacy, TSSES = Task-specific self-efficacy, SESSRL = Self-efficacy for self-regulated learning.

Discussion

The findings of the study revealed that the lack of confidence to pass a test, followed by emotionality and worry all culminate in cognitive interference, a phenomenon in which mental processing is made slower and less accurate by competing mental processes. Interference effects occur when two or more perceptual or cognitive processes are in conflict. Students' perception and cognition involve many different mental systems that parse and process information independently of one another. The outputs of these systems are communicated to working memory, where they are interpreted. When the outputs are congruent, the process of interpretation occurs quickly and performance is optimal. When outputs are incongruent, interference occurs and additional processing is needed to resolve the conflict. The additional time required to resolve such conflicts has a negative impact on academic achievement, explaining why test anxiety negatively affected academic achievement in computer studies.

The findings of the study are in line with the findings of Ogunmakin and Osakuade (2014) that computer knowledge and computer anxiety significantly combined to predict performance in computer based test. The findings of the study contradict the findings of Eman, Hind, Rufa, Nadiah and Brouj (2016) that a negative none statistically significant relationship between test anxiety scores and undergraduate nursing students Grade Point Average.

The findings of the study showed that self-efficacy predicted 1.4% academic achievement in computer studies, with only domain-specific and task-specific self-efficacy significantly predicting academic achievement of computer studies students. The findings of the study can be explained from the fact that individuals with high self-efficacy develop high motivation for learning and achievement. The motivation for achievement uses the skills,

efforts, and abilities of an individual that will be needed to achieve goals, and before the individual reaches these goals, the individual had believed in his abilities. The students with high levels of self-efficacy attribute their failures to lower attempts rather than lower ability, while those with low self-efficacy attribute their failure to their low abilities. Therefore, self-efficacy can influence the choice of tasks and perseverance while doing them.

Students with a strong sense of efficacy believe they can accomplish even difficult tasks. In the face of impending failure, these students increase and sustain their efforts to be successful. They approach difficulty or threating situations with confidence that they have control over them. Conversely, students who doubt their ability to accomplish difficult tasks see these tasks as threats and give up quickly. This can lead to task avoidance, passivity, lack of engagement and a resignation that failure is inevitable Positive academic self-concept facilitates positive academic perspectives and behaviours such as persistence at academic tasks, positive academic choices, educational aspirations and academic achievement.

The more distant the goal, the more students lose the benefit of self-efficacy. Self-efficacy increases as students note progress, attain goals, and set new challenges. This belief, specific to a task or an area of knowledge or performance, shapes the behaviours and strategies that help the student pursue their goal. High self-efficacy reflects confidence in the ability to exert control over one's own motivation, behaviour, and environment, and allows students to become advocates for their own needs and supports. It suggests that self-efficacy can boost student achievement, foster emotional health and well-being, and serve as a valid predictor of motivation and learning. Students with high levels of self-efficacy participate more in class, work harder, persist longer, and have fewer adverse emotional reactions when encountering difficulties than students with lower self-efficacy leading to better academic achievement.

The findings of the study support the findings of Maria (2014) and a significant relationship exists between self-efficacy and academic achievement. The findings of Victor and Abdulwahid (2018) that self-efficacy is important in students' achievement and significantly predicts it support the findings of the present study. The findings of the study also supports the findings of Abd, Andi and Muhammad (2020) that self-efficacy has a positive relationship and is also a predictor in determining academic achievement.

Conclusion

The study concluded that self-efficacy is significant predictor of students' achievement in Computer studies. Again, the lower a students' self efficacy, themore likely, the students' achievement in computer science may reduce.

Recommendations

The following recommendations are made based on the findings of the study:

1. Secondary school teachers should ensure to cover the scheme of work at the appropriate time, to enable students study them in sequential order and in a way that will enable prepare for test. This should be done to reduce the study load that result in cognitive overload and test anxiety.
2. School counsellor should find effective strategies to manage students self-efficacy especially during mid-term test and end of term assessments and examination.

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