

SELF-EFFICACY AND LEARNING STYLES AS PREDICTORS OF ACADEMIC PERFORMANCE AMONG SECONDARY SCHOOL CHEMISTRY STUDENTS IN ANAMBRA STATE, NIGERIA

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Abstract

The study examined self-efficacy and learning styles as predictors of academic performance among secondary school Chemistry students in Ogbaru Local Government Area. The study was guided by three research questions, and three hypotheses (tested at 0.05 level of significance). The study is a cross-sectional survey research which adopted a predictive design. The study population comprised of 647 Senior Secondary two (SS2) Chemistry Students from 11 public school selected in Ogbaru local government area. Using a purposive sampling technique, a total sample size of 99 was drawn from the population. Two research instruments were given out to respondents, they include, the General Self-Efficacy questionnaire (GSE) developed by Schwarzer et al., (1995) and Visual Auditory Read-write Kinesthetic (VARK) learning style questionnaire to assess learning styles, developed by Flemming (2012). Academic performance was measured using Chemistry test score of students provided by the teachers. Research instruments were validated by experts from the Department of Science Education, Nnamdi Azikiwe University Awka, and internal consistency was established using Cronbach's alpha coefficient. Data collected from respondents were analyzed using the multiple regression statistical method. Findings show that self-efficacy and learning styles significantly predict academic performance among secondary school Chemistry students in Ogbaru L.G.A. Based on research findings, it was recommended that Chemistry teacher should be trained on how best to involve students' learning styles by using a variety of instructional styles and paces so as to facilitate students' performance in Chemistry. This could be achieved through seminars and workshops for teachers in secondary school. Also, Teachers should be responsible to their students to enhance students' self-efficacy.

Keywords: Self-efficacy, Learning Style, Academic Performance

Introduction

One of the most crucial methods for fostering socialization and preparing kids to contribute to society responsibly is through education. Many skills are inculcated in children through education, and they include, decision-making, problem-solving, critical and creative thinking, communication, and interpersonal relationship skills, as well as self-awareness, empathy, stress management, and emotional intelligence, among others (World Health Organization [WHO], 2020). Science education is education that studies the inter-

relationship between science as a discipline and the application of educational to its understanding, teaching and learning (Okonkwo & Samuel, 2020).

Science education is the key to socio- economic and technological development/advancement because it can be effectively used to develop skills for productivity, entrepreneurship and employability, values, attitudes and modes of thinking of the people. According to Robertson (2018), remarkable educational improvements in recent time have been linked to the exploration of teaching and learning styles in science education. Science education comprises majorly of four subjects namely Biology, Chemistry, Mathematics and Physics. Over the years, researchers (Okonkwo et al., 2020; Titilayo et al., 2016 and Nwagbo & Okonkwo, 2014), reported there has been low enrolment and poor achievement in these subjects in our institutions, and this has been attributed to a lot of factors among which is, poor teaching and learning methodology in science education (Aina, 2013).

Chemistry is a branch of science that deals with the study of matter, its structure, composition, properties, and the changes it undergoes. Chemistry occupies a fundamental position in science and technology and is needed in every aspect of human endeavor (Abubakar & Eze, 2010; Olayemi, 2009). Chemistry is a fascinating subject which plays a vital role in shaping the world around us. However, the understanding of this concept is reflected on students' performance which has been reported to have been unimpressive over the years. The academic performance of students is one criterion for judging educational programs and outcomes.

Academic performance is the measure of how well a student, teacher, or institution has met its educational objectives. It is determined by marks that are assigned by teachers and refers to the knowledge obtained (Narad & Abdullah, 2016). Academic performance has an impact on students' lives as well as teachers' lives by enhancing their self-confidence and instilling a sense of accomplishment and belief in them based on the premise that they have tutored and mentored such successful individuals (Oredein et al., 2019). Academic success and obtaining good grades are among the main goals in all levels of education; resultantly, the factors influencing the students' academic success has ever remained one of the most important concerns of researchers, teachers and other stake holders in education. Bandura (1997) opined that academic performance of students is greatly influenced by their level of self-efficacy.

Self-efficacy is a belief in one's abilities to accomplish a task, not a measure of those abilities. Pajares (2018) added that self-efficacy affects behavior by regulating an individual's choices, the extent of his or her expended effort, and his or her emotional responses. He showed some features of self-efficacy in the classroom thus; students with higher self-efficacy are more likely to persevere in difficult situation, be engaged, see failure as indication that more effort is needed, choose specific strategies to enhance learning and attribute success to ability. On the other hand, students with lower self-efficacy are less likely to do those things, and more likely to equate failure to bad luck and poor ability and presume that a problem is more complex than it is. Development of self-efficacy beliefs hinges on information derived from four types of resources namely; Mastery(inactive) experiences, Vicarious experiences, Verbal persuasion and

Physiological states. Mastery experiences are derived from what one has experienced; it is said by (Asfaw,2022) to be the most forceful reference of self-efficacy beliefs. To have a resilient sense of self -efficacy requires experience in overcoming obstacles through effort and perseverance. Vicarious experiences are gained by observing a model's performance and comparing it with the observer. Seeing people similar to ourselves succeed by their sustained efforts raises our beliefs that we too possess the capabilities to master the activities and skills needed for success in that area. The third resource, Persuasion, comes from influential people in our lives, such as, parents, teachers, counsellors, managers, and coaches among others, who can strengthen our belief that we have what it takes to succeed, with words like...'I have faith in you'...thereby making us more likely to put in the effort and sustain it when problems arise. The last source of students' self-efficacy is physiological reactions or state, such as stress, anxiety, depression and such other feelings can dampen confidence and capabilities, and, therefore, can be interpreted as signs of vulnerability to poor performance; however, positive emotions can boost confidence in an individual's ability and skills. Self-efficacy in knowledge adoption in sciences, cannot be complete without the students' adherence to a learning style.

Learning styles have been described from different perspectives by researchers. Lorenzo &Lorenzo (2013) viewed Learning styles in terms of how the learner process, absorb and retain information. Perry (1994) cited in Lorenzo et al., (2013) defined it as a pattern that perceive, interact with and respond to knowledge consistently, noting that learning styles are more stable and general than learning strategies. According to Allison and Hayes (1996), cited in Lorenzo et al., (2013), a learning style is a preferential mode, through which a student like to master learning, solve problems, think or simply reach a pedagogical situation. Similarly, Asfaw (2022) defined learning style as the range of instructional strategies through which students typically pursue the act of learning and this study adopted this definition. The preferred learning style of a student refers to their typical method of information acquisition and use as well as how they react to stimuli in a learning situation. These learning styles acknowledge that different people learn in different ways and that students in every course will interpret their lessons in a number of ways (Bailey & Garratt, 2002; Lorenzo & Lorenzo, 2013; Zhang et al.,2017; Ha, 2021). The four types of learning styles are visual learning, auditory learning, read/write learning and kinesthetic learning. According to Felder(1993)as cited in Lorenzo et al., (2013), when students' learning styles and an instructor's teaching style are in harmony (Meshing Hypothesis), achievement could be optimized as it improves retention and understanding as well as post-course attitudes. Dalmolin et al., (2018) stated that a positive correlation exists between the learning styles of students and their academic performance.

Government officials at all levels and curriculum planners should be generally concerned. The degree of subpar performance in the most recent Chemistry external examinations is high profile when compared to other countries. For the sake of enhancing students' academic performance, teachers must thoroughly examine their teaching strategies with a view to addressing the individual differences in the students. Therefore, the purpose of this study is to investigate how students' self-efficacy and learning preferences relate to their academic performance in Chemistry in Anambra state.

Purpose of the study

The purpose of this study was to examine self-efficacy and learning styles as predictors of academic performance in Chemistry among secondary school students in Anambra state.

Specifically, the study determined:

1. The predictive effect of self-efficacy on academic performance among Chemistry students.
2. The predictive effect of learning styles on academic performance among Chemistry students.
3. The joint predictive effect of self-efficacy and learning styles on academic performance among Chemistry students.

Research Questions

1. Will self-efficacy predict academic performance among Chemistry students?
2. Will learning styles predict academic performance among Chemistry students?
3. Will self-efficacy and learning styles jointly predict academic performance among Chemistry students?

Hypothesis

1. Self-efficacy will not significantly predict academic performance among Chemistry students.
2. Learning styles will not significantly predict academic performance among Chemistry students.
3. Self-efficacy and learning styles will not have a significant joint prediction on academic performance among Chemistry students.

Methods

The present study is a cross-sectional survey research, which adopts a predictive design. Multiple regression statistical analysis was used as the appropriate statistics to analyze the data collected. The justification for this design and statistics is based on the fact that the researcher examined self-efficacy and learning style of Chemistry students to understand its predictive role on academic performance. The population of the study comprised of 647 Senior Secondary two (SS2) Chemistry Students from 11 public school selected in Ogburu local government area. The sample of this study consisted of ninety-nine (100) SS2 chemistry students drawn from five (5) schools out of 11 public secondary school in Ogbura L.G.A, using a purposive sampling technique. Purposive sampling involves the selection of a sample that possesses particular characteristic relevant to achieving the purpose of the following: mixed gender schools, schools that have well equipped and functioning chemistry laboratory, schools that are currently presenting candidate for senior secondary school certificate examination (SSCE) and schools that have SS2 Chemistry students' enrolment not less than 20 students. Two research instruments were given out to respondents, they include, the General Self-Efficacy questionnaire (GSE) developed by Schwarzer et al., (1995) and Visual Auditory Read-Write Kinesthetic (VARK)

questionnaire to assess learning styles, developed by Flemming (2012). Academic performance was assessed using the chemistry test scores of students, provided by the teachers. The instruments were validated by three experts, two from the Department of Science Education and one from the Department of Education Foundation, Nnamdi Azikiwe University Awka. Internal consistency was established using Cronbach's alpha, where an alpha value of .82 and .70 was obtained respectively for both research instruments. On collection of data from respondent, the researchers experience a mortality of 1, making the total number of respondents ninety nine (99)

RESULTS

Table 1: Summary table of the mean and standard deviation: A descriptive Statistics.

VARIABLES	Mean	SD	N
Academic performance	55.29	9.312	99
Self-Efficacy	29.83	5.200	99
Visual	7.92	2.538	99
Auditory	7.04	2.222	99
Read/write	7.85	3.072	99
Kinaesthetic	7.71	2.327	99

Table 2: Standardised Multiple Regression Analysis, showing the independent prediction of Self-efficacy and learning styles on academic performance among secondary school chemistry students.

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta (β)		
(Constant)	29.963	10.054		2.980	.004
Self-Efficacy	.412	.175	.230	2.353	.021
Visual	.679	.402	.185	1.690	.094
Auditory	-.318	.471	-.076	-.675	.501
Read/write	.438	.304	.145	1.441	.153
Kinaesthetic	.838	.411	.209	2.038	.044

Dependent Variable: Academic Performance.

Research Question 1: Will Self-efficacy significantly predict Academic performance among secondary school chemistry students?

In Table 2, research findings indicate that self-efficacy significantly predicts academic performance among secondary school chemistry students with an observed beta value of $\beta = .230$ and point of significance below .05 (sig = .021).

Research Question 2: Will Learning styles significantly predict Academic performance among secondary school chemistry students?

In Table 2 above, findings show that visual learning style did not significantly predict academic performance among secondary school chemistry students with an observed beta value of $\beta = .185$ and point of significance above .05 (sig. = .094).

Similarly, findings indicate that Auditory learning style did not significantly predict academic performance among secondary school chemistry students with an observed beta value of $\beta = -.076$ and point of significance above .05 (sig. = .501).

Findings indicate that Read/Write learning style also did not significantly predict academic performance among secondary school chemistry students with an observed beta value of $\beta = .145$ and point of significance above .05 (sig. = .153).

However, findings show that Kinesthetic learning style significantly predicts academic performance among secondary school chemistry students with an observed beta value of $\beta = .209$ and point of significance below .05 (sig. = .044).

Finding from table 2 above indicate that kinesthetic learning style significantly predicted academic performance, while visual, auditory and read/write learning style did not significantly predict academic performance among secondary school chemistry students.

Research question 3: Will Self-efficacy and Learning styles jointly and significantly predict Academic performance among Secondary school chemistry students?

Table 3: (Model summary); Standardized Multiple Regression Analysis, showing the joint prediction of Self-efficacy and learning styles on academic performance among secondary school Chemistry students.

Model	R	R Square	Adjusted R ²	Std. Error of the Estimate	F	Sig
	.406 ^a	.165	.120	8.734	3.697	.004

Predictors: (constant), Self-Efficacy, Visual, Auditory, Read/write and Kinesthetic

From the findings in Table 3, using a standardized multiple regression analysis (Enter Method), results indicate that Self-efficacy and learning styles jointly and significantly predicted Academic performance with an Adjusted $R^2 = .120$; $F = 3.697$; point of significance at below .05 level (sig = .004) as it can account for 12% of the variance observed in Academic performance in chemistry.

Hypothesis 1: Self Efficacy will not significantly predict Academic Performance among Chemistry students. Based on research finding, the hypothesis is rejected

Hypothesis 2: Learning styles will not significantly predict Academic Performance among Chemistry students. Although Visual learning style, Auditory learning style and Reading/Writing did not significantly predict academic performance among secondary school students, Kinesthetic learning style significantly predicts academic performance

among secondary school students with an observed beta value of $\beta = .209$ and point of significance below .05 (sig. = .044). based on findings, this hypothesis is rejected.

Hypothesis 3: Self efficacy and Learning Styles will not have a significant joint prediction on Academic Performance among Chemistry students. Based on research finding, the hypothesis is rejected.

Discussion

The general purpose of the study was to investigate the predicting role of self-efficacy and learning styles on the academic performance of secondary school Chemistry students in Ogbaru L.G.A. Based on research findings, Self-efficacy significantly predicted academic performance of secondary school Chemistry students in Ogbaru L.G.A. This discovery supported the work of Bandura (1997) and Domenech et al., (2017) who stated that students possessing moderate or higher self-efficacy will be more successful in academic performance, whereas those who lack the belief and abilities for success become inefficient and may avoid higher academic performance altogether. Similarly, Kiran and Sungur (2011) also reported that students with high self-efficacy also produced a corresponding high level of academic performance in Chemistry. Relative to this finding, it is imperative that students be encourage to have a more positive self-efficacy towards curricular activities in school.

Findings also reveal that learning styles significantly predicts academic performance among secondary school Chemistry students in Ogbaru L.G.A. Kinesthetic style of learning was shown to have a significant role on academic performance; however, visual, auditory and read/writing learning styles did not significantly predict academic performance among secondary school Chemistry students. It is important to note that this finding does not in anyway place Kinesthetic learning style above other learning styles. It simply implies that among secondary school chemistry students in Ogbaru LGA, kinesthetic learning, also known as hands-on learning appears to have a more significant impact on their academic performance. This finding is in tandem with the works of Dalmolin et al., (2018) who found a positive correlation between learning styles and academic performance of students.

Additionally, self-efficacy and learning styles jointly predicts academic performance among secondary school Chemistry students in Ogbaru L.G.A. This study corroborated the assertion of Ha (2021), that learning may not take place if the teaching as a counseling guide is not structured to facilitate learning even when the teaching mode is appropriate. Learning factors (principles) that will affect the learning of students and the success of teaching efforts are setting the stage to provide clear instructions and modeling appropriate behavior when emphasizing particularly skills or competencies, increasing learning during teaching, providing active participation, increasing self-efficacy, matching teaching techniques to students' self-efficacy, ensuring specific, timely, diagnostic, and practical feedback, providing opportunities for students to practice new behaviors and maintaining basic knowledge in particular areas- developing learning points to assist in knowledge retention, setting specific goals, identifying appropriate reinforcement, teaching students

how to reinforce their learning and teaching students how to take responsibility of their own learning. Hence the challenge to the counselor is the attempt to bridge this gap in academic performance.

Conclusion

In conclusion, self-efficacy, and learning styles are crucial aspects of teaching and learning to foster an overall academic performance. It is imperative that students should have a high self-efficacy and teachers should be able to structure their curriculum in a way that helps them to deliver effective teaching using a combination of different learning styles to enable students excel academically.

Recommendations

Based on the finding of the study, the following recommendations were made:

1. Chemistry teacher should be trained on how best to involve students learning style so as to facilitate students' achievement and attitude in the lesson. This could be achieved through seminars and workshops for teachers in secondary school.
2. Curriculum planners should integrate learning style approach in chemistry curriculum, as it will promote an overall academic performance.
3. Teachers should be responsible to their students to enhance students' self-efficacy.
4. Such factors like provision of adequate laboratory materials, recruitment of qualified teachers, provision of conducive classroom environment etc. should be taken much more seriously so that these can be complemented with the high self-efficacy of the students to produce a better performance of students in chemistry.

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