

Motivation to Learn as Correlate of Students' Academic Achievement in Chemistry in senior Secondary Schools in Ekiti State, Nigeria

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Abstract

This study examined the motivation to learn as correlate of students' academic achievement in chemistry in senior secondary schools in Ado Local Government Area of Ekiti State, Ekiti State, Nigeria. The research design that was used for the study was survey design of the descriptive type. The population of the study comprised of chemistry students from public senior secondary schools in Ado Local government Area of Ekiti State. The sample of the study was two hundred and forty (240) students selected from eight (8) public secondary schools. Simple random sampling technique was used to select thirty (30) respondents from each of the selected secondary schools. The instrument for data collection for the study was a questionnaire. The instrument was subjected to validity and reliability mechanism. A coefficient of reliability of 0.88 was obtained. The formulated hypotheses were tested using inferential statistics of Pearson Correlation statistical analysis. The findings of the study revealed that there was a significant positive correlation between students' reinforcement and academic performance of senior secondary school students in Chemistry and there was a significant positive correlation between provision of learning materials and academic performance of senior secondary school Chemistry students Based on these, appropriate recommendations were made.

Keywords: motivation, chemistry, academic achievement, secondary school student.

Introduction

Science learning, at the helm of the 21st century, is confronted with the relevance of science and technology to the societal needs and demands (Awodun & Kenni, 2020). In its concordance to relevance, science learning is paramount to reshape the mental cognition of

students towards academic performance and the acquisition of the desired competencies, e.g., subject specific skills and general and transferable scientific skills (Bautista, 2012). Aply, science learning is to engage and expose students in a meaningful learning condition that constantly make them wander in a sustained culture of practice.

Currently, Chemistry as a course is developing rapidly and strongly affects human everyday lives. For this reason, Chemistry is considered to be an important part of education for the current and future population (Awodun & Kenni, 2020). There is also expert consensus that science education (including Chemistry) should be a compulsory part of the education of all children. Chemistry enables students to provide explanations for almost all natural phenomena they encounter in their daily life or school laboratories (Woldeamanuel & Selassie, 2019). It's also a requirement to study pharmacy, medicine, pharmacy, environmental science, chemical engineering, geology, biology, agriculture and others so on (Eridemir & Bakirci, 2009). Generally, Chemistry affects all aspects of human life and help people in making decisions in areas such as health, environmental conservation (environmental care and love), dietary intake (starch, carbohydrates, fats, vitamins) and food choices which are directly related to their daily life and affect the quality of their lives. However, studies have shown that the majority of students at secondary school perceived Chemistry as a difficult subject and this perception become more evasive when they reach university.

Chemistry deals with the scientific study of matter, its structure, composition, properties and the changes (chemical and physical changes) it undergoes. Chemistry is made up of five branches which include; organic Chemistry, inorganic Chemistry, physical Chemistry, analytical Chemistry and biochemistry (Awodun & Kenni, 2020). Apart from its major branches, Chemistry is found in other field of studies such as agriculture, geography, chemical physics, medicine, geochemistry, engineering, molecular physics, food and nutrition and so on. Ekpen (2019) stated that Chemistry and indeed chemists are linked to everything on earth as aptly captured in a slogan; what on earth is not Chemistry? Chemistry plays a pivotal role at engineering sustainable economic development and growth in any nation. Put succinctly, there is no aspect if human endeavored on natural phenomenon that Chemistry does not feature. It features prominently in the area of oil, gas, agriculture, health, environment, solid minerals, textiles, cosmetics, water supply and sanitations, crime detection, pulp and paper, waste management just name it.

Motivation affects students' learning and engagement in formal, semi-formal, and informal activities. Motivation has an important role in learning. Student's achievement is related to the way of thinking, feeling and behavior of students (Mokhtar, 2013). Students who have problems at school, they show the level of motivation is low. Teachers need to seek an increase in student's achievement motivation by providing support in the form of awards/reinforcement for his achievements, paying attention to awareness, giving feedback and making students felt the ability (Mushawwir, Arsad & Rezky, 2012). Motivation can be described as the most crucial and paramount factor determining the students' success or failure in learning process and academic performance. Motivation as a concept is very important for both teachers and students in identifying and perceiving the root of academic success or failure (Uyulgan & Akkuzu, 2014). Individual student believes that he/she has the capacity and ability to achieve the learning expectation through teaching activities and goals to be realized with a certain effort and difficulty. Student perception can have negative effect on the student's motivation in academic programme such as whether it is easy or very difficult. The student perceives learning activity as valuable and makes efforts to achieve success in it if he or she considers the learning activity to be one that will provide a benefit for him or her (Okutan, 2012).

Many students of Chemistry believe Chemistry is difficult because of people perception and motivation students derived from their environment. The researcher observed that many of the students do not just have the feelings that Chemistry is difficult but all these happened due to some factors such as notion of their senior about Chemistry, students' perception, teacher methodology, availability of learning materials, not having access to textbook written locally that relates Chemistry to immediate environment of learners and rewards, among others. All these influence the motivation to learn and attitudes of secondary school students towards Chemistry. It is believed that motivation to learn and attitude is about rewards, availability of learning materials, disposition and perception of Chemistry. If a student is well motivated for learning in Chemistry, then he or she will be able to develop affection for Chemistry, he or she will always be eager to learn, engage in discussion about Chemistry and develop curiosity that prompt deep understanding of Chemistry. Thus, this study intended to find out the relationship of motivation to learn and attitude towards Chemistry on the academic achievement of secondary school student in Ado Local Government Area of Ekiti State.

Research Hypotheses

These hypotheses were tested in this study:

1. There is no significant relationship between students' reinforcement and academic performance of senior secondary school Chemistry students in Ado Local Government Area of Ekiti State.
2. There is no significant relationship between provision of learning materials and academic performance of senior secondary school Chemistry students in Ado Local Government Area of Ekiti State.

Concept of Motivation

The concept of motivation is considered as a crucial factor that affects human behavior and performance (Turan, 2015). Especially educational researchers and practitioners express that motivation is one of the most important factors in student achievement and in ensuring continuous achievement (Alkış, 2015). Lin (2012) describes motivation as intrinsic desires which are already present in the individual or which are reflected in the individual while acquiring new information and learning. There are, however, in the literature other definitions of motivation; the latter word was derived from the word "movere" that means moving in Latin (Seiler et al., 2012). Küçüközkan (2015) defined motivation as the sum of the efforts made for mobilizing the individual towards one or more particular goals and for ensuring the continuity of this movement. Therefore, motivation has a multi-dimensional structure instead of a simple and basic one.

Motivation is a theoretical construct used to explain the initiations, direction, intensity, persistence and quantity of behavior (Ekici, 2010). Motivation is an affective factor which makes human organisms behave, determine the decisiveness and energy of that behaviour and keep the behaviours going by directing them. Dinah (2012) stated that motivation is a process that begins with a physiological deficiency or need that activates behaviour or a drive that is aimed at a goal or incentive. Motivation therefore consisted of needs (deficiencies) which set up drives (motives) which help in acquiring the incentives (goals). Drives or motives are action-oriented while incentives/goals are those things which alienate a need. Marques (2010) opined that motivation is what people need to perform better and can only work if the right person with the right skills has been placed in charge of the task at hand.

Motivation is a critical component of learning and plays a very important role in helping students become involved in academic activities. Motivation is defined as a situation that gives energy to behavior, directs and sustains it. This includes goals and activity requiring that the objectives provide motivation to move and action. Action requires effort and insistence to operate for a long period of time. Motivation involves a set of beliefs, perceptions, values, information and actions that are totally related to each other. Motivation can lead to many behaviors and it is important to understand the importance of motivation in an educational setting (Suhag, Larik, Tagar & Solangi, 2016). Learning motivation is a vital precursor to profound and effective learning.

Suhag et al. (2016) stated that motivation has several effects on the learning and behavior of students: Firstly, motivation leads behavior to specific goals. Motivation sets specific goals that people strive for and, thus, influences the choices of students. Motivation also increases the effort and energy to determine whether a student will pursue a task that is difficult with enthusiasm or lifeless attitude. Motivation will be an important factor affecting the learning and success of the students by affecting the initiation and continuity of the activities, increasing the time of the students' duties. Motivation affects how information is processed and how it is processed as it increases the cognitive processing process and, thus, motivated students get more inclined to understand and examine material than to observe learning movements just superficially (Yilmaz, Şahin & Turgut, 2017).

Concept of Academic Achievement

Academic achievement is the educational outcome that indicates the extent to which the specific goal of education has been accomplished in an instructional environment. This is normally shown in terms of students' scores and grades in test examinations or assignments. Academic achievement is commonly measured by examination or continuous assessment but maintains that there is no general agreement on how academic achievement is best tested (Ward, Stoker and Murray-Ward, 2019).

Academic achievement is the extent to which a learner is profiting from instructions in the given area of learning i.e. achievement is reflected by the level to which skill and knowledge has been imparted to him. Bhat (2013) opined that academic achievement indicates the knowledge attained and skill developed in the school subject, generally designated by test scores. Achievement is influenced by the personality, opportunities, motivation, training and education (curriculum reform).

Academic performance can be described as the overall measure of indices of learning outcomes of a learner. This indices include the knowledge, skills, retention level, and ideas, acquired and gathered in the course of exposure to particular instruction within and outside the classroom environment (Okorie, 2014). Academic performance refers to a person's performance in a given academic area (e.g. reading or language arts, mathematics, science and other areas of human learning. Academic performance relates to academic subjects a learner studies in school and the skills the learner is expected to master in each (Kathryn, 2010).

Academically successful students have higher self-esteem, lower level of depression. Individuals who are better organized, better prepared and have a plan or a planner did better in school and will continue to be like that in their career. Academic achievement is important for the successful development of young people in society. Students who do well in school are better able to make the transition into adulthood and to achieve educational, occupational and economic success (McInerney, Cheng, Mok & Lam, 2012). Academic achievement also allows students to enter competitive fields.

Students Reinforcement and Academic Performance

The downward trend in the performance of students is blamed on the teachers' in appropriate teaching methods and their inability to use reinforcement to encourage their students' performance. Reinforcement may be positive or negative, whichever way, it elicits change in behaviour. According to Amuma & Ibodi (2013) reinforcement has produced an enormous body of reproducible experiment results. Reinforcement is the central concept and procedure in the experimental analysis of behaviour and much of quantitative analysis of behaviour. Reinforcement may be positive reinforcement when there is increase in the future frequency of behaviour due to the addition of a stimulus (reinforcer) following a response. While negative reinforcement increases the future frequency of a behaviour

Positive reinforcement is one of the teacher's most valuable behaviour management tools. Positive reinforcement is an interesting technique that helps teachers to improve the overall behaviour of students. Positive reinforcement can be explained simply as "timely encouragement" which is gentle and effective at the same time. The words, actions and inactions of a teacher can make or mar the academic performance of a student. Students need positive reinforcement to improve their performances. Most teachers are interested in just using the conventional methods of teaching without considering how positive reinforcement can impact positively on students' academic achievement. Akinade (2012) defined positive reinforcement as reinforcement that involves the application of pleasant or desirable stimuli in the treatment of behaviour. In other words, positive reinforcement is the encouragement that follows good behaviour. For instance, a student submits an assignment on time and includes some extra information that she or he gathered about the topic. The teacher wanting to appreciate the student's efforts asks the other students to clap for her. The teacher's action acts as an impetus for the student to repeat the same effort again. Positive reinforcement as the name implies is a hassle-free technique to bring about a sense of responsibility and discipline in a class (Eremie & Doueyi-Fiderikumo, 2019).

Positive reinforcement effects our everyday life and personality while on the other hand negative reinforcement effects the development of avoidance tendencies. Both reward and punishment are means of motivation and have significant effects on behavior (Khattak & Ahmad , 2018). Positive reinforcement does not involve any kind of force that would pressurize a student into behaving well. Positive reinforcement can be in the form of verbal remarks like praises, commendations, compliments, approval, encouragement and affirmation e.g. good job, well done, nice work etc. or tangible rewards like cash gift, pen, cake, sweets, erasers etc. or none-verbal rewards like being clapped, a pat on the back, being smiled at etc to encourage the repetition of such behaviour. The researcher conceives positive reinforcement as any activity that motivates a learner to do more of his activities to achieve a better result (Eremie & Doueyi-Fiderikumo, 2019).

Provision of Learning Materials and Academic Performance

Parental involvement is the participation of parents in regular, two way and meaningful communication involving student academic learning and other school activities, including ensuring that parents play an integral role in assisting their child's learning; that parents are encouraged to be actively involved in their child's education and are included as appropriate, in decision –making and on advisory committees to assist in the education of their child (Oyedare, Ogunjinmi & Durojaiye, 2016).

Parental involvement may be different from culture to culture and society to society. Parental involvement may have different types, which might have differential influence on academic performance of their children. Parental expectations have a greater impact on student's educational outcomes. Parental involvement may include activities like helping children in reading,

encouraging them to do their homework independently, monitoring their activities inside the house and outside the four walls of their house, and providing coaching services for improving their learning in different subjects (Hafiz, Tehsin, Malik, Muhammad & Muhammad, 2013). Oyedare, Ogunjinmi & Durojaiye (2016) revealed that parental involvement clearly and consistently has significant effects on pupils performance and adjustment which for outweighs other forms of involvement. The question is, why is parental involvement so significant and how does it promote performance and adjustment. The broad answer to these questions seems to be that it depends on the age of the child. For younger pupils, parenting provides the child with a context in which to acquire school related skills and to develop psychological qualities of motivation and self-worth. For older children, the specific skills component seems to be less salient and the motivational component assumes increasing importance. Comer (2019) stated that parents' interest in, and support of their children's school help reinforce students' sense of belonging to school and their identification with teachers and other school personnel. Clark (2019) pointed out that parent-initiated contacts with their children's school help strengthen students' identification with teachers. In examining the interaction among parental involvement, teacher's support and students' sense of belonging to school, students whose parents are involved in their school activities are better able to take advantage if the benefits of supportive teachers or school environments for their academic performance.

Varghese & Jasmine (2019) stated that child needs their parents' true love and skilful guidance in the process of overall development -body, mind and spirit. Parents must understand child's strong and weak areas, his needs, interests, feelings, difficulties in growing up in the process of realizing his best potentialities. Parents more than anybody else influence the development of each child in different way. The main role of the parents is involved in creating a conducive home environment where child develops his attitude towards himself, parents, teachers, others, things, incidents and institutions. Many studies emphasize the role of parents and family as of great importance in the development of child, both physically and psychologically. Parent involvement have not only a strong impact on relationships within the family but also affect the attitudes and behaviour of the children. Studies on successful and unsuccessful children in the academic achievement have shown that most of those who became successful in academic achievement had come from homes where parent involvement towards them were favourable and where a wholesome relationship existed between them and their parents (Varghese & Jasmine, 2019).

Nnodum, Agbaenyi & Ugwuegbulam (2014), in another study investigated the efficacy of positive reinforcement (PR) and self-control (SC) in the management of aggression among pupils. 30 pupils were randomly selected through a purposive sampling procedure in Owerri North Local Government Area of Imo State using a quasi-experimental design with three experimental groups comprising, two treatment groups and one control group. The results revealed that positive reinforcement was more effective than self-control (SC) both at post-test and follow-up periods in reducing aggression among the pupils.

Amadi & Onyeike (2015) conducted an experimental study among 120 JS1 students in Abia State on the effectiveness of token economy and verbal rewards on students' academic achievement in Igbo language in Aba North Local Government Area of Abia State. The results of the study revealed that token economy which is a form of tangible positive reinforcement significantly enhanced students' academic performance over verbal rewards which are intangible forms of positive reinforcement although the verbal rewards significantly improved academic performance over the control group.

Arbabisarjou et al. (2016) found that there was a significant relationship between academic achievement motivation and academic performance among medical students. A longitudinal study by Liu and Hou (2017) has shown that intrinsic motivation considerably promotes academic performance.

Korantwi-Barimah et al. (2017) study amongst university students demonstrated positive significant correlations between academic self-concept, motivation and academic performance. The study indicated that motivational factors played vital roles in academic performance. In short, from previous studies, there were evident that students' motivation was imperative in science teaching and learning.

Febriana (2017) investigated the analysis of student's achievement motivation in learning Chemistry. The aim of the study is to determine the effect of student's achievement motivation toward learning Chemistry. The research was conducted at SMK Kesehatan Rahani Husada. The descriptive method was used in the research. The data was collected using test for student's cognitive achievement and questionnaire for achievement motivation. Data was analyzed using descriptive analysis techniques. The results showed that achievement motivation on XI grade of SMK KesehatanRahaniHusada students was in the category of achievement motivation "high" at 47,54%.

Woldeamanuel & Selassie (2019) in a research work titled "relationship between attitudes and motivations of first year Biology and Chemistry students to learn Chemistry". The study adopted co relational research design. A total of 155 first year biology and Chemistry students (95 first year Biology and 60 Chemistry students) taking Chemistry in the second semester of 2017/2018 at Dire University, Ethiopia, were involved in the study. Data for the study were collected using Attitude Inventory Test and the Achievement Motivation Scale. Data were analyzed using Statistical Package for Social Science (SPSS) version 21. The results showed that there is no statistically significant difference between biology and Chemistry students in their attitudes and motivation towards learning Chemistry. Furthermore, there is no statistically significant relationship between attitudes and motivation of these students towards learning Chemistry (i.e. there is negligible degree of relationship between attitude and motivation to learn Chemistry). On the basis of the results of this study, it was concluded that there is no statistically significant relationship between attitude towards Chemistry and the motivation to learn Chemistry. The results did not support the expectation that there is a statistically significant relationship between attitude towards a given domain of science and the motivation to learn it.

Yilmaz, Şahin & Turgut, (2017) in their study on variables Affecting Student Motivation Based on Academic Publications. The variables having impact on the student motivation have been analyzed based on the articles, conference papers, master's theses and doctoral dissertations published in the years 2000-2017. A total of 165 research papers were selected for the research material and the data were collected through qualitative research techniques through document review and content analysis. According to the research results, the most important factors affecting student motivation are the fields of teacher, teachers' classroom management skills and their teaching methods. In addition, factors having less influence on the student motivation are parental communication, student characteristics and study fields.

Methodology

The research design that was used for the study was survey design of the descriptive type. The population of the study comprised of chemistry students from public senior

secondary schools in Ado Local government Area of Ekiti State. The sample of the study was two hundred and forty (240) students selected from eight (8) public secondary schools. Simple random sampling technique was used to select thirty (30) respondents from each of the selected secondary schools. The instrument for data collection for the study was a questionnaire. The instrument was subjected to validity and reliability mechanism. A coefficient of reliability of 0.88 was obtained. The formulated hypotheses were tested using inferential statistics of Pearson Correlation statistical analysis.

The data collected from these respondents was subjected to inferential statistics of Pearson’s Product Moment Correlation (PPMC) to determine the value of reliability coefficient (r) at 0.05 level of significance.

The researchers personally administered the questionnaire to the selected students with the help of two (2) self-trained research assistant. The questionnaires were retrieved immediately from them as soon as they completed their responses.

In analyzing the data for this study, the researcher used descriptive statistical tools of frequency counts and percentage to analyse the demographic data of respondents, percentage was used to answer the research questions while inferential statistics of t-test was used to test the hypotheses at 0.05 alpha level of significance. The analysis was done through computerized package of SPSS software version 20.

Results and Discussion

Test of Hypotheses

Hypothesis 1: There is no significant relationship between students’ reinforcement and academic performance of senior secondary school Chemistry students in Ado local government area of Ekiti State.

Table 1: Correlation analysis of students’ response

		Students’ reinforcement	Students’ performance
Spearman’s rho	Students’ reinforcement	1.000	0.472*
	Correlation Coefficient		0.031
	Sig. (2-tailed)		
	N	240	240
	Students’ Performance	0.472*	1.000
	Correlation Coefficient	0.031	
	Sig. (2-tailed)		
	N	240	240

* = significant at the 0.05 level.

The result in Table 1 shows the correlation between students’ reinforcement and academic performance of senior secondary school students in Chemistry. The table indicates that there was a significant positive correlation between students’ reinforcement and academic performance of senior secondary school students in Chemistry (r = 0.472, N = 240, p < 0.05). Hence the null hypothesis was not upheld.

Hypothesis 2: There is no significant relationship between provision of learning materials and academic performance of senior secondary school Chemistry students in Ado Local Government Area of EkitiState.

Table 2: Correlation analysis of students’ response

		Learning materials	Students' performance
Spearman's rho	Learning materials	Correlation Coefficient Sig. (2-tailed) N	1.000 0.399* 0.015 240
	Students' Performance	Correlation Coefficient Sig. (2-tailed) N	0.399* 1.000 0.015 240

* = significant at the 0.05 level.

The result in Table 2 shows the correlation between provision of learning materials and academic performance of senior secondary school Chemistry students. The table indicates that there was a significant positive correlation between provision of learning materials and academic performance of senior secondary school Chemistry students ($r = 0.015$, $N = 240$, $p < 0.05$). Hence the null hypothesis was not upheld.

Discussion of Results

The finding revealed that there was a significant positive correlation between students' reinforcement and academic performance of senior secondary school students in Chemistry. The finding was in line with the assertion of Eremie and Doueyi-Fiderikumo (2019) that positive reinforcement as any activity that motivates a learner to do more of his activities to achieve a better result. Positive reinforcement is one of the teacher's most valuable behaviour management tools. Positive reinforcement is an interesting technique that helps teachers to improve the overall behaviour of students. The finding also agreed with the assertion of Khattak et al. (2018) that positive reinforcement effects our everyday life and personality while on the other hand negative reinforcement have effects on the development of avoidance tendencies. Both reward and punishment are means of motivation and have significant effects on behavior. This is to say that both type of reinforcement such as positive and negative have role to play in enhancing students' academic performance in Chemistry.

The finding of also revealed that there was a significant positive correlation between provision of learning materials and academic performance of senior secondary school Chemistry students. The finding agreed with the findings of Varghese & Jasmine (2019) that findings have shown that most of those who became successful in academic achievement had come from homes where parent involvement towards them were favourable in terms of provision of learning materials and support. The finding further agreed with the assertion of Hafiz et al. (2013) that parental involvement may include activities like helping children in reading, encouraging them to do their homework independently, monitoring their activities inside the house and outside the four walls of their house, and providing coaching services for improving their learning in different subjects.

Conclusion

Based on the findings, the following recommendations were made:

Students' reinforcement influence the academic performance of senior secondary school students in Chemistry. Consistent provision of learning materials on Chemistry influence academic performance of senior secondary school Chemistry students. Students' interest influence their passion, commitment and readiness to learn in Chemistry class and have effects on their academic performance in senior secondary schools. Students' positive perceptions pre-determined the academic performance of senior secondary school Chemistry students.

Recommendations

Based on the findings, these recommendations were made:

1. Teachers at all levels should learn the use of positive reinforcement to help improve academic achievement of students.
2. State and federal government ministries should train teachers on how best to apply positive reinforcement for the maximum benefit of students.
3. Teaching without any form of reinforcement should be discouraged in the teaching and learning of Chemistry in senior secondary schools.
4. Parents should provide varieties of Chemistry textbooks for students so that they can have access to more information on perceived Chemistry concepts and improved their performance.
5. Teachers should ensure that students have needed and recommended textbooks on Chemistry and must be used in Chemistry class.
6. Chemistry teachers should continue to encourage students to develop positive interest towards Chemistry in order to make them maintain their interest toward active learning and improved academic performance.

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