

# Attitude towards Chemistry and students' perception as correlate of Academic Achievement of Chemistry students in Senior Secondary School in Ekiti State, Nigeria

<sup>1</sup>Adebisi O. AWODUN (Ph.D) & <sup>2</sup>Amoke M. KENNI

<sup>1,2</sup>Department of Science Education, Bamidele Olumilua University of Education, Science and Technology, Ikere-Ekiti, Ekiti State, Nigeria.

Received: April 03, 2020

Accepted: June 05, 2020

**ABSTRACT:** *This study examined attitude towards chemistry and students' perception as correlate of students' academic achievement of chemistry students in senior secondary school in Ikere 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 Ikere Local government Area of Ekiti State. The sample of the study was two hundred (200) students selected from eight (8) public secondary schools. Simple random sampling technique was used to select twenty-five (25) 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 0.91 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' interest and academic performance of senior secondary school Chemistry students and there was a significant positive correlation between students' perception and academic performance of senior secondary school Chemistry students. Based on these, appropriate recommendations were made.*

**Key Words:** *attitude, chemistry, academic achievement, secondary school student.*

## Introduction

Education involves impartation and acquisition of knowledge through formidable process of teaching and learning, especially at a school or similar institution. Education is aimed at the growth and development of the nation and individuals. Adebowale (2012) opined that education is purposed to nourish, bring up or raise people for a better standard. In a nutshell, education can be said to be a process designed to help every individual to live the fullest life that he is capable of living and also be of immense benefit to the humanity and society. It is expected that education will draw out people from darkness and lead them to a world of enlightenment and empowerment. As education helps every individual to become enlighten is in accordance with one of the objective of science, which is to make enquiry about the hidden and make it known to the world.

Science learning, at the helm of the 21st century, is confronted with the relevance of science and technology to the societal needs and demands. 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). Aptly, 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 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. 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. 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.

Attitude refers to predisposition to classify objects and events, to react to them with evaluative consistency. Orunaboka (2011) asserted that attitude are formed by people as a result of some kinds of learning experience, if the experience is favourable a positive attitude is found and if otherwise it is vice versa. The development of a positive attitude toward Chemistry lessons in school is considered important, as research shows a link between attitudes and academic performance. Once the attitudes are formed, they put the pressure that the individual reacts in a specific or characteristics way to these or related situations, persons or groups (Deeksha, 2016). A positive attitude provides an emotional state that is useful for dealing with problems. Thus, the individual is not only motivated to solve the problem but is also more tolerant to the problem when he or she is unable to find the ideal solution. Kurbanoglu (2013) stated that attitude has been conceptually linked to behaviour, based on the premise that actions tend to be reflective of feelings. Therefore, the development of a positive attitude toward a given subject is essential in predicting the academic performance.

Numerous studies have shown that there is a gradual decreasing attitudes of students towards Chemistry as subject of study (or loss of interest in the subject) and motivation to learn Chemistry as students move from lower secondary school to higher educational institutions (Potvin & Hasni, 2014). Studies affirmed that the decline in attitudes and motivation is accompanied by feelings of dreaded, boredom, rejection, and experiences of failure, which have been a concern of many educators and researchers for decades. Particularly with respect to students, motivation and attitude for academic performance are of great importance to learning and academic performance. And by such, motivation and attitude to learn by students are needed to be stimulated for them to successfully complete an assignment, achieving a goal or a degree of qualification in their future academic professions. Therefore, the issue of students' attitudes towards Chemistry and motivation to learn became an international concern because the decline in attitudes and motivation towards Chemistry learning has a direct influence on the understanding of key concepts associated with the discipline, and consequently on school achievement (MacIntyre & Blackie, 2012).

### Statement of the Problem

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 attitudes of secondary school students towards Chemistry. It is believed that attitude is about disposition and perception 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 Ikere Local Government Area of Ekiti State.

### Research Hypotheses

These hypotheses were tested in this study:

1. There is no significant relationship between students' attitude and academic performance of senior secondary school Chemistry students in Ikere Local Government Area of Ekiti State.
2. There is no significant relationship between students' perception and academic performance of senior secondary school Chemistry students in Ikere Local Government Area of Ekiti State.

### Students' Attitude and Academic Performance

Attitude is the feelings that can be either unfavourable or favourable, positive or negative, and are typically directed towards some specific object. Ayodele & Olatunbosun (2015) defined attitude as

psychological construct which is inferred from responses to a given stimuli. An attitude is an expression of favour or disfavour toward a person, place, thing, or event. Attitude can be formed from a person's past and present. An attitude is an evaluation of an attitude object, ranging from extremely negative to extremely positive. Sofiani, Maulida, Fadhillah & Sihite (2017) divided attitude into six dimensions regarding attitudes: confidence, anxiety, value, enjoyment, motivation and expectations.

Attitude denotes a functional state of readiness which determines the organism to react in a characteristics way to certain stimuli or stimulus situations. Ngogo (2014) defined attitude as the accumulation of information about an object, person, situation or experience which forms an individual's opinion about or predisposition towards that thing. Attitude can also be defined as a mental or neural state of readiness organized through experience influencing dynamically or directly the individuals' response to all objects and situations with which it is related.

A study on the attitudes of the students towards a particular subject like Chemistry has shown that performance in that Chemistry is determined by one's attitude towards the subject (Chemistry) rather than one's attitudes being determined by one's performance in the subject (Chepkorir, 2013). Jain (2014) stated that attitudes are relatively lasting clusters of feelings, beliefs and behavior tendencies, directed towards specific persons, ideas, objects or groups.

Han & Carpenter (2014) stated that attitudes consist of cognitive, affective and behavioral reactions that individuals display towards an object or the surrounding based on their feelings or interest. Han & Carpenter (2014) recapped that affections is person's emotions, feelings and moods towards object, behavioral is person's past and future activities towards object, whereas cognitive is person's thought and beliefs about object. Students' attitudes are intrinsic and it is developed over a period of time, it is as a result of experiences (Abdul-Majeed, Darmawan & Lynch, 2013). The authors added that if the students' experience with a subject like Chemistry is negative and not successful, it is more likely that his/her attitude towards that subject will be negative and vice versa.

Attitude towards Chemistry is essential; it denotes interests or feelings towards studying Chemistry. Attitude and academic achievement are important outcomes of science education in secondary schools. Students' attitude and interest could play substantial role in students' decision to study science (Delmang & Gongden, 2016). Students' attitudes towards learning Chemistry fueled many study projects for a long time; in the late 1980s there was a significant decline in Chemistry education, and towards the turn of the century, the issue of attitudes towards an interest in Chemistry became an international concern; Recent publications presented a gloomy picture regarding students' ignorance in Chemistry, and decline in enrollment in science-based careers (Hofstein & Mamlok-Naaman, 2011).

Small percentage of students (about 4%) expressed the wish to study Chemistry at the university level and over the years few studies that examined students' attitudes towards Chemistry taught in secondary schools (Najdi, 2017). Attitude to learn Chemistry benefits all young students by fostering their chemical perceptive, which is the capability to recognize chemical concepts, define some key-concepts, identify important scientific questions, use their understanding of chemical concepts to explain phenomena, use their knowledge in Chemistry to read a short article, or analyze information provided in commercial ads or internet resources (Najdi, 2017). Attitude is a predisposition to respond in a favorable or unfavorable manner with respect to a given attitude object. Yara (2009) mode of defining attitude in science (Chemistry) however, focuses on scientific approach assumed by an individual for solving problems, assessing ideas and making decisions. It is students' beliefs and attitudes that have the potential to either facilitate or inhibit learning.

Many factors could contribute to student's attitude towards studying Chemistry such as; age, career interest, social view of science and scientists, social implications of Chemistry or cognitive styles of students (Uzum, 2018). Salta & Koulougliotis (2011) identified the factors that could positively influence students' attitude to learn Chemistry; these factors could be organized into three main categories: teaching approaches, educational tools, and non-formal educational material and activities. Science teachers bear on their shoulders a huge responsibility of promoting and developing students' positive attitudes regarding science as a school subject (Delmang & Gongden, 2016). There is a relationship between attitude and methods of instruction, and also between attitude and achievement; and that it is possible to predict achievement from attitude scores reported (Adesoji, 2008). A study guided by Chang (2009) indicated that boys showed higher learning interests in sustainability issues and scientific topics than girls. However, girls recalled more life experiences about science and technology in life than boys (Najdi, 2017).

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.

### **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 & 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' Perception and Academic Performance**

Perception is a process of being aware of one's environment through the senses. How one perceives the world consequently determines how one reacts to it. Perception involves analyzing and interpreting items picked out by the senses in order to assign meaning to them (Kabui & Maalu, 2012). How one analyzes and interprets a sensory reception is determined by many factors which include cultural setting, memories, values, imaginations and past experiences. As such, different people will perceive the same object differently because the content and degree of these influences is different. Consequently perception is not external reality. Perception plays a critical role in attitude towards learning and academic achievement.

With dynamism of science (Chemistry), an encouraging attitude through positive perception is necessary in Chemistry, perception regulates the behaviour of the students in their availability, readiness for the subject and their interactive manner during the class (Adebisi & Ajayi, 2015). The same goes for students' involvement in Chemistry class and the academic performance of students in practical. Better perception yield better attitudes and learning. According to Adekunle (2018), students feelings about how difficult Chemistry is, activities and learning will definitely guide his or her response the practical activities and later academic achievement in it. Even before teaching and carrying out of practical activities in laboratory, students' attitude is very germane and must be positive so as to achieve the aim practical set up. However, researchers have suggested that student learning and achievement also depends on academic enablers such as perception (attitudes) and behaviours that allow a student to participate in and ultimately benefit from academic instruction in the classroom (Idika, 2017). In addition, there are other factors such as teacher factor, laboratory inadequacy, non-coverage of syllabus, class-size and environment, the place of attitude (perception) cannot be over-emphasized.

Salta & Tzougraki (2011) surveyed 576 high school students in Greece using an attitude scale with four subscales: the difficulty of Chemistry course; the interest of Chemistry course; the usefulness of Chemistry course for students' future career; and the importance of Chemistry for students' life. They found that female students had positive perception in attitudes regarding usefulness, and importance of Chemistry (practical). On the previous facts, it is evident that Chemistry activity is important for society. However, sometimes students considered Chemistry an unimportant and uninteresting subject (Broman, Ekborg & Johnels, 2011). This could be traced to poor handling of practical class, lack of adequate laboratory facilities and other factors. Also, one of the reasons can be that many of the concepts used in Chemistry are abstract, and are inexplicable without the use of analogies or models. Meanwhile, all that could easily be resolved if Chemistry are seriously handled and carried out in secondary schools. The immediate and long term effects of this will be to change the perception of students towards Chemistry and also stimulate academic achievement in practical.

Magwilang (2016) observed that instructional approaches to Chemistry also contribute to the negative perception of the students to the practical Chemistry. In teaching, especially Chemistry subject, it is not enough to simply give facts, figures, theories, laws and other ideas in verbatim without representations of the image or application in the real –life situation. There is need for feasible and functional practical class to back up all the facts, figures, theories, laws and other ideas.

### 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 Ikere Local government Area of Ekiti State. The sample of the study was two hundred (200) students selected from eight (8) public secondary schools. Simple random sampling technique was used to select twenty-five (25) 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 0.91 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' attitude and academic performance of senior secondary school Chemistry students in Ikere Local Government Area of Ekiti State.

**Table 1: Correlation analysis of students' response**

		Students' interest	Students' performance
Spearman's rho Students' attitude	Correlation Coefficient	1.000	0.710*
	Sig. (2-tailed)		0.031
	N	200	200
Students' performance	Correlation Coefficient	0.710*	1.000
	Sig. (2-tailed)	0.031	
	N	200	200

\* = significant at the 0.05 level.

The result in Table 1 shows the correlation between students' attitude and academic performance of senior secondary school Chemistry students. The table indicates that there was a significant positive correlation between students' attitude and academic performance of senior secondary school Chemistry students ( $r = 0.710$ ,  $N = 200$ ,  $p < 0.05$ ). Hence the null hypothesis was not upheld.



**Hypothesis 2:** There is no significant relationship between students' perception and academic performance of senior secondary school Chemistry students in Ikere Local Government Area of Ekiti State.

**Table 2: Correlation analysis of students' response**

		Students' perception	Students' performance
Spearman's rho	Students' perception	1.000	0.613*
		200	200
	Students' performance	0.613*	1.000
		200	200

\* = significant at the 0.05 level.

The result in Table 2 shows the correlation between students' perception and academic performance of senior secondary school Chemistry students. The table indicates that there was a significant positive correlation between students' perception and academic performance of senior secondary school Chemistry students ( $r = 0.613$ ,  $N = 200$ ,  $p < 0.05$ ). Hence the null hypothesis was not upheld.

### Discussion of Results

The finding indicated that there was a significant positive correlation between students' attitude and academic performance of senior secondary school Chemistry students. The finding was in line with the finding of Tayyaba et al. (2017) that some students' most especially male students' liking for Chemistry (laboratory work) declines when they advance towards higher-grade levels. The implication is that, students are likely to pay attention to learning, remember, imagine and read more readily when their attitude and emotions are positively provoked. Attitude as a human sentiment, goes along with values, attitudes and other forms of human preferences. The finding also buttressed the finding of Bitok et al. (2017) who predicted that a declining attitude in Chemistry could be one of the major problem leading to poor academic achievement in practical Chemistry.

Students bring curiosity with them when they take their secondary school science (Chemistry) practical activities. The delay or absence of fulfilment of curiosity may lead to decline in attitude.

Finally, the finding revealed that there was a significant positive correlation between students' perception and academic performance of senior secondary school Chemistry students. The finding agreed with the assertion of Adebisi and Ajayi (2015) that with dynamism of science (Chemistry), an encouraging attitude through positive perception is necessary in Chemistry, perception regulates the behaviour of the students in their availability, readiness for the subject and their interactive manner during the class. Perception plays a critical role in attitude towards learning and academic achievement. Also, the finding was in line with the assertion of Adekunle (2018) that students' feelings about how difficult Chemistry is, activities and learning will definitely guide his or her response in the practical activities and later academic achievement in it. Even before teaching and carrying out of practical activities in laboratory, students' attitude is very germane and must be positive so as to achieve the aim of practical set up.

### 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. Chemistry students' should have a change in their perception and feeling about Chemistry topics and methodology and rather see Chemistry as subject that improve their learning skills.
2. Chemistry teachers should show more interest in Chemistry class through practical activities in order to improve and boost Chemistry students' attitude towards the subject.
3. Stakeholders in the Chemistry education should organize seminars and programmes for secondary school students in other to make them uphold a positive and good perception about Chemistry learning and methodology which invariably will tell on their attitude toward Chemistry.

## References

1. Abdul-Majeed, A., Darmawan, G. N., & Lynch, P. (2013). A compulsory factor analysis of attitude towards mathematics inventory (ATMI). *The Mathematics Educator*, 15(1), 121-135.
2. Adebisi, T. A., & Ajayi, P. O. (2015). Correlation of students' attitude and gender differences on understanding of concept in Physics. *Advanced Social Science Research Journal*, 2(4), 215-219.
3. Adebowale, T. A. (2012). Is Youth unemployment a solvable problem? *African Journal of historical science in education*, 8(1), 44-53.
4. Adekunle, D. F. (2018). Attitude towards chemistry and students perception of chemistry as school subject, *Notes on Chemistry Teaching and Learning Process*.
5. Adesoji, F. A. (2008). Managing Students' Attitude towards Science through Problem – Solving Instructional Strategy. *Anthropologist*, 10(1), 21-24.
6. Ayodele, M. O., & Olatunbosun, S. M. (2015) Gender Differences in Students' Attitude towards Basic Science in Junior Secondary School, *International Journal of Contemporary Applied Science*, 2, 114–120.
7. Bautista, R. G. (2012). The convergence of mastery learning approach and self-regulated learning; learning strategy in teaching biology. *Journal of Education and Practice*, 3(10), 25-32.
8. Bhat, M. A. (2013). Academic Achievement of Secondary School Students in Relation to Self-Concept and Parental Encouragement, *International Journal of Recent Scientific Research*, 4(6), 738-741.
9. Broman, K., Ekborg, M., & Johnels, D. (2011). Chemistry in crisis? Perspectives on teaching and learning chemistry in Swedish upper secondary schools. *NorDiNa: Nordic Studies in Science Education*, 7(1), 43–53.
10. Chang, S. (2009). Ninth Graders' Learning Interests, Life Experiences and Attitudes towards Science & Technology, *Science Education and Technology*, 18, 447–457.
11. Chepkorir, S. (2013). The Impact of Students' Attitudes on the Teaching and Learning of Chemistry in Secondary Schools in Bureti District, Kenya. *Journal of Emerging Trends in Educational Research and Policy Studies (JETERAPS)*, 4(4), 618-626.
12. Deeksha, P. B. (2016). The imperative and the process for rethinking childhood, In P. B. Pufall & R. P. Unsworth (Eds.), *Rethinking childhood*, New Brunswick, Canada: Rutgers University Press, 1-21.
13. Delmang, T. K., & Gongden, E. J. (2016). Ameliorating Student's Performance and Attitude towards Chemistry through Chemistry Problem-Solving Techniques (CPST), *International Journal of Scientific Research in Education*, 9(2), 41-47.
14. Ekpen, M. (2019). Influence of Scientific Attitudes on Student's Academic Performance in Chemistry in Bekwarra Local Government Area of Cross River State. *Social Science Research Network*, 1-21.
15. Elias, S. M., Smith, W. L., & Barney, C. E. (2012): Age as a moderator of attitude towards technology in the workplace: work motivation and overall job satisfaction, *Behaviour & Information Technology*, 31(5), 453 – 467.
16. Eridemir, N., & Bakirci, H. (2009). The Change and the Development of Attitudes of Science Teacher Candidates towards branches, *Kastamonu Education Journal*, 161-170.
17. Han, S. Y., & Carpenter, D. (2014). Construct validation of student attitude toward science, technology, engineering and mathematics project-based learning: The case of Korean middle grade students. *Middle Grades Research Journal*, 9(3), 27–41.
18. Hofstein, A., & Mamlok-Naaman, R. (2011). High-school students' attitudes toward and interest in learning chemistry, *Education Quím*, 22 (2), 90-102.
19. Irika, M. A. (2017). A comparative study of urban and rural students' attitude to chemistry at introductory level in Ibadan, Oyo State, Nigeria, *Journal of Scientific Research and Studies*, 4(7), 165-170.
20. Jain, V. (2014). Attitude: Triode approach. Retrieved from [www.garph.co.uk/march 2014.pdf](http://www.garph.co.uk/march 2014.pdf) on 23/05/2018.
21. Kabui, E. W., & Maalu, J. K. (2012). Perception of entrepreneurship as a career by students from selected public secondary schools in Nairobi. *DBA African Management Review*, 2(3), 101-120.
22. Kathryn, D. (2010). Academic performance achievement. Retrieved June 14, from <http://www.nichgy.org>.
23. Kurbanoğlu, N. I. (2013). The Effects of Organic Chemistry Anxiety on Undergraduate Students in Relation to Chemistry Attitude and Organic Chemistry Achievement, *Journal of Baltic Science Education*, 12(2), 130-138.
24. MacIntyre, P. D., & Blackie, R. A. (2012). Action control, motivated strategies, and integrative motivation as predictors of language learning affect and the intention to continue learning French. *System: An International Journal of Educational Technology and Applied Linguistics*, 40(4), 533-543.
25. Magwilang, E. B. (2016). Teaching chemistry in context: Its effects on students' motivation, attitudes and achievement in chemistry. *International Journal of Learning, Teaching and Educational Research*, 15(4).
26. Najdi, S. (2017). Students Attitude toward Learning Chemistry, *Journal of Chemical Education*, 83-92.
27. Ngogo, J. L. (2014). Assessment of Attitudes of Secondary School Students Towards Vocational Education and Training in Tanzania: Case Study of Mpwapwa District, A Dissertation Submitted in Partial Fulfillment of the Requirements for The Degree of Master of Science in Agricultural Education and Extension of Sokoine University of Agriculture. Morogoro, Tanzania.
28. Okorie, E. U. (2014). Introduction to Special Methods chemistry. Lagos: Springs field Books. Okutan, M. (2012). Classroom management. 11th Edn., Ankara: Pegem Academy.
29. Orunaboka, T. T. (2011). Attitude of Nigeria Secondary School Students towards Physical Education as a Predictor of Achievement in the Subject, *Journal of Education and Practice*, 2(6), 71-77.

29. Potvin, P., & Hasni, A. (2014). Interest, motivation and attitude towards science and technology at K-12 levels: a systematic review of 12 years of educational research. *Studies in Science Education*, 50(1), 85-129.
30. Salta, K., & Koulougliotis, D. (2011). Students' Motivation to Learn Chemistry: The Greek Case. *Technological Educational Institute(TEI) of Ionian Islands(Greece)*.
31. Sofiani, D., Maulida, A. S., Fadhilah, N., & Sihite, D. Y. (2017). Gender Differences in Students' Attitude towards Science, *Journal of Physics: Conference Series*, 895, 1-8.
32. Uzum, B. (2018). Students' attitudes toward native and non-native English speaking teachers, *TESOL Encyclopedia of English Language Teaching*, 1-6.
33. Ward, A., Stoker, H. W., & Murray-Ward, M. (2019). Achievement and Ability Tests - Definition of the Domain, *Educational Measurement, University Press of America*, 2, 2-5.
34. Woldeamanuel, M. M., & Selassie, G. G. (2019). Motivation and Attitude towards Learning Chemistry, *AmalJyothi College of Engineering*, 9(2), 70-88.
35. Yara, P. O. (2009). Students' attitude towards mathematics and academic achievement in some selected Secondary Schools in Southwestern Nigeria. *European Junior of Scientific Study*, 36(3), 336-341.