Attitude Towards Mathematics Among Secondary School Physics Students in Ikwerre Local Government Area, Rivers State, Nigeria

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ABSTRACT

This study investigated on "attitude towards mathematics among secondary school physics students in Ikwerre Local Government Area, Rivers State". Descriptive survey design was adopted. The population of this study covered all S.S.2 physics students offering physics. Simple Random Sampling Technique was employed to get a sample size of 200 students. The instrument used for the research was the "Physics Students' Attitude towards Mathematics and their Mathematics Teachers Questionnaire (PSAMMTQ)" designed by the researcher. A reliability coefficient of 0.80 was adopted. Data were analyzed using mean and standard deviation to answer the research questions while t-test was used to test the hypotheses at 0.05 level of significance. The results showed that attitude of male and female secondary school physics students towards mathematics do not differ significantly. The results also showed that attitude of male and female secondary school physics students towards their mathematics teachers do not differ significantly. It was recommended among others that government should encourage the teaching of mathematics in secondary schools by given incentives to mathematics teachers, teachers of mathematics should have positive attitude towards mathematics since this will in turn develop positive attitude in physics students, educational stakeholders should occasionally carry out mathematics competition among senior secondary students where winners go with enviable prizes, this will cultivate positive attitude for mathematics study.

1. INTRODUCTION

Imagine a world without simple machines - wheel barrow, shovel, inclined plane, caterpillars, bull dozers, matchet, scissors, knives, blades, needles etc. which we know are devices that makes work easy and inventions such as aeroplanes, cars, ship, train, refrigerator, computer, phones among many which have also made life comfortable for man. These mentioned above we all know cannot be easily possible without the knowledge of physics. How frustrating it should have been for man without such things which is a pointer that physics education has made our society very convenient. Ogunleye (2001), as mentioned in Shadrack (2015), said that a nation's technological potential may be better measured by the quality of its physics education. He also said that people cannot establish a strong technical culture without physics. Learning and understanding physics

has become more vital since Malaysia launched her space exploration in 2007, as indicated in the study of Veloo et al. (2015).

Secondary school pupils in Nigeria have persistently performed poorly in physics, despite the fact that this field's knowledge has many practical applications that make human life much easier (Chief Examiner's Report, 2018). Students' and parents' frustration with their children's lacklustre academic performance has far-reaching societal consequences, including a severe scarcity of qualified workers across all economic and political sectors (Aremu & Sokan, 2003 in Salaam & Kareem, 2021).The many researchers have different theories as to why this performance is so bad. According to Ugwuanyi et al. (2017), there are numerous factors that contribute to students' poor performance in physics classes. These include students' lack of interest in the subject, teachers' lack of motivation, instructors' lack of incentives, insufficient instructional materials, a shortage of qualified teachers, teacher-centered instructional strategies, students' inadequate use of materials, and the use of abstract standardised materials. The biggest predictor of success in Physics, according to Nasser and Birembaum (2014), were students' opinions about their academic ability in the subject. Schenkel (2017) agreed with them and said that students' motivation and emotional states, which either help or hurt their academic performance, are directly related to their self-confidence and the expectations they have for themselves in the classroom. A number of additional researches have linked students' negative attitudes towards physics to this pervasive low performance (Mekonnen, 2014; Murunga et al., 2019).

There is a favourable association between the success in physics study results and the learning of mathematics, according to Meltzer (2002) in Izaac (2015). In his research, Oteze (2021) also found that maths and physics work hand in hand. Further supporting the idea that physics and mathematics go hand in hand, Izaac (2015) pointed out that in order to improve students' performance in physics classes, teachers need to know their students' interests in the subject and their level of familiarity with the fundamentals of mathematics in order to design effective lesson plans. This may not be separated from the fact that mathematics is the lingua franca for physics. As a ladder is needed to help someone to get to its desired point, we can as well say that mathematics is the ladder which the physics student need to help him or her achieve his or her aim which is to understand physics.

In a nut shell, one can say that mathematics is the tool of the physicist. Just as the carpenter cannot produce wooden materials like table, wardrobe, bookshelves, seats, doors, cabinet etc. without his tools which are matchet, hammer, nails, chisel, tape etc., the shoe maker in the same vein cannot make and repair shoes without his tools. Thus, the physics student or teacher cannot perform or teach optimally without the knowledge of mathematics which is his or her tool. Agreeing with this idea, Ezeanyi, (2022) noted that mathematics is the foundation for science, technology and engineering (STE). Furthermore, Ezeanyi (2022) stated that the functional role of mathematics in STE is so diverse that no aspect of science technology, engineering and business enterprise escapes its application.

Mathematics is synonymous with quantities and space which gives information via numbers and symbols. The importance of mathematics knowledge to any society cannot be understated. Corroborating that, Esuong and Ibok(2022) stated that mathematics as a human activity is very relevant to everyday activities of man and manifests in all cultures all over the world. They further reported that it provides a powerful, concise, and unambiguous means of communication among people of either the same culture or different cultures. This provided the rationale for the decision by the Federal Republic of Nigeria (FRN, 2014) to include mathematics as a mandatory subject in both elementary and secondary school curricula (Ezeanyi, 2022).

It may surprise you to know that all the laws in physics are mathematical models of real life based on approximation. Mathematical modeling is looking at a real life situation and then turning it to a mathematical language. Similarly, Prasal (2019) asserted that the purpose of mathematics learning in physics education is very vital as it formulates various physics processes in the integrity of mathematics in order to handle analytical, quantitative and predictive based model calculations and solution, which according to him is the reason why physics and mathematics are mutually inclined. Inorthewords, the physics teacher and student should be knowledgeable in mathematics to be able to understand physics concepts.

Having justified reasons why the physics student and teacher should have a good knowledge of mathematics, one can also say that it is very crucial for the physics student and teacher to have positive attitude towards mathematics as this will boost their interest for it. Interest is the key to curiosity. When physics teachers and students have interest for mathematics, there will be great curiosity to study it thereby aiding understanding. Meaning attention will be given to the study of mathematics which will eventually help in simplifying the barriers to understanding physics concepts having earlier mentioned that mathematics is the language of the physicist. In education, according to Orji (2013), all the teacher's efforts to facilitate meaningful learning and comprehension would be for nothing if the students' attention is not engaged and maintained. Making lessons engaging is one of the quickest ways to capture kids' attention. Since students often gripe about physics's impersonal character, it is critical that educators discover methods to pique their students' interest in the subject. Mohammed (2014) revealed in his research that instructors' pedagogical choices significantly affect their students' grasp of and enthusiasm for scientific concepts. A positive attitude on the part of the pupils is sure to result from their enthusiasm for studying physics.

An individual's attitude towards a person, location, item, or event (the "attitude object") may be positive or negative, according to research by Zelley et al. (2005) referenced in Mensah et al. (2013). According to Mensah et al. (2013), the way people feel about a subject affects not just the student but also their instructor, their close social circle, and the educational system as a whole. The authors did note, however, that pupils' attitudes develop in response to the lessons they take in. As stated in Nathanael's (2022) citation of Mohtar et al. (2019), attitude mediates between students' mental potential to succeed and their actual performance in class.

Interest in mathematics, whether positive or negative, determines one's attitude towards the subject. Frequent and recurrent failures or issues while dealing with mathematical activities may lead to unfavourable attitudes, according to Nicoladou & Philipou (2003) in Mata et al. (2012). These attitudes can become relatively permanent. Research by Kiwanuka et al. (2020) and Mullis (2020), both referenced in Sunghwan and Taekwon (2021), suggests that students who have a positive outlook on mathematics are more likely to put an emphasis on the subject because they enjoy it, see its value, and believe in it. Additionally, veloo et al. (2015) cites research by Seth et al. (2007) that indicated a correlation between students' maths attitude and physics performance. The more optimistic they are about mathematics, the better their physics results will be, and vice versa; the more positive their attitude towards mathematics, the better their physics marks will be.

A number of studies have sought to identify the elements that influence students' perspectives on science and mathematics in particular. According to various sources cited in Olusola and Rotimi (2012), these factors include teaching-learning approaches, the types of science courses taken, study methods, intelligence, gender, motivation, attitudes of science teachers and students, students' self-confidence, cognitive style, career interests, socioeconomic status, parental influence, and more. Factors that influence students' attitudes towards science include, among many others, their preferred method of learning, aptitude with numbers, gender, cognitive style, level of parental support, self-concept, parental education, school location, and the kind of school attended.

According to Mata et al. (2012), which cites research by Mohamed and Waheed (2011) on the topic of student attitudes and the elements that shape them, there are three categories of characteristics that are crucial in shaping students' perspectives: consider factors related to the students themselves, such as their mathematical achievement, anxiety, self-efficacy, motivation, and school experiences; consider factors related to the school, the teacher, and the teaching itself, such as lesson plans, classroom management, instructor knowledge, attitudes towards mathematics, guidance, and beliefs; and lastly, consider factors related to the home environment and society, such as parental expectations and educational background. Similarly, Mensah et al. (2013) found that gender, teaching philosophy, and students' perceptions of mathematics' usefulness, ease, and learning style all influence teachers' attitudes towards and performance in mathematics classes. They went on to say that the way a teacher acts in regard to mathematics is another facet of their approach towards the subject. Mathematical behaviours, such as avoiding or pursuing mathematics, and classroom instructional style, all impact students' attitude and performance, according to their research. Schofield (1981), mentioned in Mensah et al. (2013), agrees with Mensah et al. (2013) that a favourable attitude towards mathematics on the part of teachers is strongly associated with good accomplishment in students.

Science courses, including physics, mathematics, and chemistry, have consistently positive opinions from students and alumni across all educational levels, according to research by Mekonnen (2014). On the other hand, according to Semela (2010) as cited in Mekonnen (2014), the report found that physics had the lowest enrollment rate and that undergraduates whose grades were determined to be in physics had the lowest average scores on the Ethiopian National Higher Education Entrance Examination. Is it possible that these youngsters have no choice but

to major in physics? Since mathematics and physics are inseparable, it follows that students are avoiding physics classes out of fear of mathematics. In addition, might it be that secondary school physics students in Ethiopia have a very pessimistic outlook on science in general and mathematics in particular? Otherwise, why do so few students in the nation choose to major in physics, and why do those students tend to have low GPAs?

Everyone involved in education has to start paying attention to how kids feel about maths and the sciences soon. In Malaysia, it's no surprise that students' perspectives on science in lower secondary school greatly influence their admission to secondary school (Veloo et al., 2015). Educators, parents, and students all agree that mathematics is crucial for making sense of the world, which is why, according to Raed et al. (2016), math education begins in elementary school and continues far into high school. The fact that mathematics is essential for the success in almost every profession (accountants, chemists, engineers, physicians, educators, architects, surveyors, etc.) renders this argument without merit. Whether or not one's perspective on science differs depending on one's gender has been the subject of heated discussion. In addition, a number of studies have looked at the possibility of a correlation between gender and the way physics students feel about mathematics.

Gender is a social, cultural, and psychological aspect of being male or female, according to Umoru (2016). Research by Pell and Meganye (2007) cited in veloo et al. (2015) found no correlation between gender and attitude among students from African countries. Veloo et al. (2015) found that, in contrast to female students, male students generally had a more favourable outlook on science. In their matriculation college, Nur Assyiqin (2004) found no gender difference in attitudes towards mathematics teaching and learning, according to veloo et al. (2015). Additionally, secondary school males in Spain are more likely to have a favourable attitude towards mathematics than girls, according to research by Sainz and Eccles (2011). A common misconception, as pointed out by Nnaka and Ezekannagha (2013), is that males are inherently more capable of excelling in STEM fields than females.

According to Mata et al. (2012), when it comes to maths, many people believe that males tend to have a more positive attitude and a more developed sense of self-worth. Women are underrepresented in STEM fields due to the pervasive stereotype that math is only for men and the belief that "math is for males" (Cvencek et al., 2011 in Peteros et al., 2020). This stereotype holds true across cultures and countries. Nnaka and Ezekannagha (2013) reference research by Okeke (2009) that found that this notion discourages women from pursuing careers or furthering their education in STEM fields. Based on this, it's tempting to assume that male students would outperform female students in physics as well, given that several academics have shown a correlation between the two fields.

However, according to several studies listed in Mata et al. (2012), such as Mohamed & Waheed (2011), Nicolaidou & Philippou (2003), and Ma & Kishor (1997), gender does not influence attitudes towards mathematics. Ibraheem (2001) argued that women had a wealth of expertise in their disciplines that, if used to their full potential, might benefit Nigeria. This finding lends credence to her claims. Dasgupta (2011) in Agommuoh and Ndirika (2017) noted, however, that

many girls and women lose interest and do not pursue STEM advanced courses, majors, or careers, even when they perform at or above male peers on STEM tests. This represents a loss of talent among girls and women who could otherwise become the engineers, scientists, and technologists of tomorrow. The gender gap is glaringly visible to women and has the potential to discourage them from pursuing careers in science, particularly in fields like mathematics and physics. In light of this, Aniodoh and Eze (2014) are urging a broader embrace of feminist thought.

Aniodoh and Eze (2014) quote Wikipedia (2014), which explains that feminist pedagogy is based on feminist theory and encompasses a variety of behaviours in the classroom, including pedagogical assumptions, tactics for teaching, approaches to material, and the connection between teachers and students. They consider the idea of gender and women's rights to be the foundation of feminist thought. According to Aniodoh and Eze (2014), feminist pedagogy seeks to decentralise power in the classroom so that students may express their ideas, opinions, needs, and experiences by blaming conventional classrooms for power imbalances and constraints. Which, if completely executed, is thought to reduce gender gaps in academic performance, particularly in mathematics. In light of the above, the purpose of this research is to examine the mathematical attitudes of physics students in Rivers State's secondary schools in the Ikwerre Local Government Area.

Research Questions

The study was guided by the following questions:

1. What is the attitude of secondary school male physics students towards mathematics?
2. What is the attitude of secondary school female physics students towards mathematics?
3. What is the attitude of secondary school male physics student towards their mathematics teachers?
4. What is the attitude of secondary school female physics students towards their mathematics teachers?

1.2 Hypotheses

Ho_1: The attitude of male and female secondary school physics students towards mathematics do not differ significantly.

Ho_2: The attitude of male and female secondary school physics students towards their mathematics teachers do not differ significantly.

2. Methodology

This study investigated attitude towards mathematics among secondary school physics students in Ikwerre local government area of Rivers state Nigeria. The study employed a descriptive survey design. The population of the study consists of all SS2 physics students from the local government area. Simple Random Sampling Technique was employed to get a sample size of 200 students. The instrument used for the research was the Physics Students' Attitude towards Mathematics and their Mathematics Teachers Questionnaire (PSAMMTQ) designed by the researcher and validated

by one other expert in science education. A reliability coefficient of 0.80 was adopted. For (PSAMMTQ). The rating ranged from Agreed (1), Stongly agreed (2), Disagreed 3), Strongly Disagreed (4) for the 4 points likert scale.

3. Results

Research Question one: What is the attitude of secondary school male physics students towards mathematics?

Table 1: Mean response of male physics students' attitude towards mathematics.

SN	Item statement	Mean	SD	Decision
1	I enjoy mathematics classes	3.10	1.07	Agreed
2	Am interested in mathematics	3.35	.943	Agreed
3	I hate mathematics subject	2.99	1.06	Disagreed
4	I dislike studying mathematics	2.63	1.09	Disagreed
5	Am excited during mathematics classes	3.24	.817	Strongly disagreed
6	Mathematics is a difficult subject	2.48	.966	Disagreed
7	Mathematics is an easy subject	2.53	1.01	Agreed
8	I am addicted to studying mathematics	2.35	1.25	Disagreed
9	Mathematics knowledge makes it easy for me to learn physics	2.74	1.14	Strongly agreed
10	I like studying mathematics	3.12	.097	Disagreed
	Total	25.72	6.33	

Criterion Mean = 2.50

From analysis of data in table 1, the mean score of 25.72 is above the criterion cutoff point of 2.50 i.e. it shows that the attitude of male physics students towards mathematics is positive.

Research Question Two: What is the attitude of secondary school female physics students towards mathematics?

Table 2: Mean response of female physics students' attitude towards mathematics.

SN	Item statement	Mean	SD	Decision
1	I enjoy mathematics classes	3.14	.971	Agreed
2	Am interested in mathematics	3.33	1.005	Agreed
3	I hate mathematics subject	3.16	.939	Disagreed
4	I dislike studying mathematics	2.72	1.151	Disagreed
5	Am excited during mathematics classes	3.09	.892	Strongly disagreed
6	Mathematics is a difficult subject	2.48	1.009	Disagreed
7	Mathematics is an easy subject	2.58	.968	Agreed
8	I am addicted to studying mathematics	2.63	1.220	Disagreed
9	Mathematics knowledge makes it easy for me to learn physics	2.96	1.093	Strongly agreed
10	I like studying mathematics	3.01	1.009	Disagreed

	Total	26.39	5.997

Criterion Mean = 2.50

From analysis of data in table 4.2, the mean score of 26.39 is above the criterion cutoff point of 2.50 i.e. it shows that the attitude of female physics students towards mathematics is positive.

4.3 Research Question Three: What is the attitude of secondary school male physics students towards their Mathematics teachers?

Table 4.3: Response of male physics students' attitude towards their mathematics teachers.

SN	Item statement	Mean	SD	Decision
1	I love my mathematics teacher	3.36	.967	Agreed
2	I feel sickly whenever my mathematics teacher is teaching	3.12	.888	Agreed
3	Am uncomfortable in the presence of my mathematics teacher	2.97	1.063	Disagreed
4	Am scared of my mathematics teacher	3.37	.794	Disagreed
5	My mathematics teacher presence puts me off	3.05	1.093	Strongly disagreed
6	I feel dull whenever my mathematics teacher is teaching	3.15	.949	Disagreed
7	Mathematics teachers are not friendly	2.92	1.082	Agreed
8	Mathematics teachers makes mathematics learning difficult	3.22	.949	Disagreed
9	My mathematics teacher teach in ways I understand	3.11	1.000	Strongly agreed
10	My mathematics teacher is boring	3.22	.823	Disagreed
	Total	28.59	6.377	

Criterion Mean = 2.50

From analysis of data in table 4.3, the mean score of 28.59 is above the criterion cutoff point of 2.50 i.e. it shows that the attitude of male physics students towards their mathematics teachers is positive.**4.4 Research Question four:** What is the attitude of secondary school female physics students towards their mathematics teachers?

Table 4.4: Response of female Physics students' attitude towards their mathematics teachers.

SN	Item statement	Mean	SD	Decision
1	I love my mathematics teacher	3.25	.968	Agreed
2	I feel sickly whenever my mathematics teacher is teaching	3.16	.909	Agreed
3	Am uncomfortable in the presence of my mathematics teacher	3.10	.947	Disagreed

4	Am scared of my mathematics teacher	3.28	.830	Disagreed
5	My mathematics teacher presence puts me off	3.21	.958	Strongly disagreed
6	I feel dull whenever my mathematics teacher is teaching	3.09	1.037	Disagreed
7	Mathematics teachers are not friendly	2.92	1.112	Agreed
8	My mathematics teacher makes mathematics learning difficult	3.22	.890	Disagreed
9	My mathematics teacher teach in ways I understand	3.13	.996	Strongly agreed
10	My mathematics teacher is boring	3.26	.941	Disagreed
	Total	28.69	6.783	

Criterion Mean = 2.50

From analysis of data in table 4.3, the mean score of 28.69 is above the criterion cutoff point of 2.50 i.e. it shows that the attitude of female physics students towards their mathematics teachers is positive.

Hypothesis 1: The attitude of male and female secondary school physics students towards mathematics do not differ significantly.

Table 5: t-test analysis of male and female secondary school physics students attitude towards mathematics

Group	N	X	SD	t-cal	Df	Sig	Decision
Male	92	28.52	6.332	.675	198	.615	Not significant
Female	108	29.11	5.997				

Ns = Not significant, p(.615)>0.05 level of significance.

Table 5 above showed that the calculated t-value (.675) was not significant at 0.05 level of significance. Thus, the null hypothesis was accepted which implies that the attitude of male and female secondary school physics students towards mathematics do not differ significantly.

Hypothesis 2: The attitude of male and female secondary school physics students towards their mathematics teachers do not differ significantly.

Table 6: t-test analysis of male and female secondary school physics students attitude towards their mathematics teachers

Group	N	X	SD	t-cal	Df	Sig	Decision
Male	92	31.49	6.377	.140	198	.889	Not significant
Female	108	31.62	6.783				

Ns = Not significant, p (.889)>0.05 level of significance.

Table 6 above showed that the calculated t-value (.140) was not significant at 0.05 level of significance. Thus, the null hypothesis was accepted which implies that the attitude of male and female secondary school physics students towards their mathematics teachers do not differ significantly.

4. Discussion of findings

If you look at table 5, it shows that there was no statistically significant difference in how male and female high school physics students felt about mathematics in the first hypothesis test. Consistent with the results of Ma and Kishor (1997) cited, Mata et al. (2012) and Prasal (2017) both determined that gender had no influence on attitudes towards mathematics. Veloo et al. (2015) said otherwise, and this goes against what Guzel (2007) discovered, which was that female students viewed mathematics more favourably than male students. In addition, it challenges the findings of Aysun (2017), who discovered a statistically significant difference in the perception of mathematics by men and women.

Results from testing the second hypothesis (table 6) showed that there was no statistically significant difference in how male and female secondary school physics students felt about their maths teachers. Both the male and female physics students were quite complimentary of their maths teachers. This could be as a result of their awareness that mathematics is a compulsory subject to have at least a credit in the senior secondary certificate examination to be able to gain admission in any institution of higher learning. Another reason for this could be because of their awareness that as science students they can't afford to distant themselves from nor develop negative attitude towards their mathematics teachers knowing the negative implication it will have on their study of mathematics.

5. Conclusion

The following conclusions were drawn from the findings of the study. Attitude towards mathematics and their mathematics teachers does matter to secondary school physics students. Physics students have to be knowledgeable in mathematics to understand physics. There is therefore the need to make mathematics learning interesting to physics students. It is imperative that educational stakeholders find ways of cushioning the factors that contributes to negative attitude towards mathematics as to boost students' interest for it thereby improving performance in physics. This is because mathematics is like the ladder to be climbed to perform optimally in

physics. When there are good physics students, technology which is the bedrock of every nation will be achieved.

6. Recommendations

From the findings of this study, it was recommended that:

a. Educational authorities should regularly organize mini workshops for all mathematics teachers so as to sensitize them on the importance of their teaching subject as the bedrock for science courses especially physics. This will cause them to have a positive attitude towards mathematics teaching.

b. Government should encourage the study of mathematics in our secondary schools by giving enviable awards to best mathematics students in the classrooms.

c. Educational stakeholders should always organize mathematics competitions among secondary school students where winners will go with enviable prizes. This will encourage seriousness for mathematics study among students.

d. Secondary school teachers should use innovative methods of teaching that will make mathematics interesting to students thereby developing positive attitude towards the subject.

e. Teachers of mathematics should have positive attitude towards mathematics teaching, this will in turn develop positive attitude in physics students.

References

Agommuoh, P. C., & Ndirika, C. M. (2017).Strategies for promoting gender equality in stem education towards sustainable development. 60th Science Teachers Association of Nigeria (STAN) annual conference proceedings, 298 – 303.

Aniodoh, H.C.O., & Eze,G.L. (2014).Enhancing girls' participation in science through feminist pedagogical techniques: A panacea for gender-gap in science and technology classrooms. STAN proceedings, 304 – 311.

Aysun, N.E. (2017). Students' attitude towards mathematics and the impacts of mathematics teachers' approaches on it. Acta Didactica Napocensia, 10(2), 99 – 106.

Esuong, U.U. &, Ibok, O.E (2022). Expository narrative of the ethno-mathematics concepts that exists in the Efik cultural heritage: Implication for teaching and learning mathematics. 62nd Science Teachers Association of Nigeria (STAN) annual conference proceedings, 152 – 158.

Ezeanyi, C.B. (2022). Remediation of common process errors in geometry among senior secondary school students in Awka education zone, Anambra state, Nigeria. 62nd Annual Conference of Science Teachers Association of Nigeria(STAN) Proceedings,141 – 151.

Ibraheem, I. (2001). Winning More Girls and Women for Science and Technology: A Challenge for Women, In O Busari (Ed): Women in Science, Technology and Mathematics Education in Nigeria. 43rd Annual Conference Proceedings, STAN. Nigeria, Rivers State University of Science and Technology, August, 2002: 18-23.

Izaak, H. W. (2015). The correlation study of interest at physics and knowledge of mathematics basic concepts towards the ability to solve physics problems of 7th grade students at junior high school in Ambon Maluku Province, Indonesia. Education Research International, 1 – 6.

Mata, L. M., Monteiro, V., & Peixoto, F.(2012).Attitudes towards mathematics: Effects of individual, motivational and social support factors. Child Development Research, 1 – 10.

Mekonnen, S. (2014).Problems Challenging the Academic Performance of Physics Students in Higher Governmental Institutions in the case of Arbaminch ,Wolaiyta Sodo, Hawassa and Dilla Universities .Natural Science,6 (5),362 – 375. http://dx.doi.org/10.4236/ns.2014.65037.

Mensah, J. K., Okyere, M., & Kuranchie, A.(2013).Student attitude towards mathematics and performance: Does the teacher attitude matter? Journal of Education and Practice, 4(3),132 – 139.

Mohammed, I. (2014). Effect of inquiry-based teaching method on students' achievement and retention of concepts in integrated science in senior high school, Texila. International Journal of Academic research, 7(2), 1 - 11.

Murunga, J.J., Kepher,S., Awinja, S., Enos, E., kisaka, R.,Watiti, B., Malesi, B., Daniel, W., Phanus, N., Wekesa, L., Nyamanga, K., Mwalo, M.,& Magut, M. (2019). Attitude of students towards Physics: It's influence to their academic performance in West Pokot County, Kenya. International Journal of Advanced Research (IJAR), 7(12),152 – 165.

Nasser,A., & Birenbaum (2014). Examining disparities in physics education: Achievement gap or education gap. High School Journal, 91(1), 24 – 42.

Nathaniel A. O. (2022).Cognitive and non-cognitive predictors of students' achievement in stoichiometry. 62nd STAN Proceedings, 62 – 71.

Nnaka,C.V.,& Ezekannagha, G.N.(2013). Society's current attitude towards women in science and technology based artisan jobs as a factor in mainstreaming girls into STM education. STAN Proceedings, 303 -309.

Olusola, O. O., & Rotimi, C.O. (2012). Attitudes of students towards the study of physics in college of education Ikere Ekiti, Ekiti State, Nigeria. American International Journal of Contemporary Research, 2(12), 86 – 89.

Onanuga, A.P., & Ifamuyiwa, S.A.(2022). Effect of instructional strategy, gender and parents' education level on secondary school students' attitude to learning agricultural science. 62nd STAN Proceedings, 101 – 112.

Orji, E. I. (2013).Relative effect of cognitive conflict instruction and conceptual change pedagogy in students conceptual change and attention in temperature and heat. Unpublished M.Ed project, department of science education, university of Nigeria, Nsukka.

Oteze, I. K. (2021). Ethics in STEM teacher education and practices: Implications for mathematics teaching and learning in Nigerian Schools. 61stSTAN Proceedings, 73 – 80.

Peteros, E., Gamboa, A., Etcuban,J.O., Dinauanao,A., Sitoy, R.,& Arcadio, R.(2020).Factors affecting mathematics performance of junior high school students.International Electronic Journal of Mathematics Education,15(1),1 – 13. https://doi.org/10.29333/iejme/5938.

Prasal, C.O. (2019). Attitude of students towards the study of physics in college of Education Ikere Ekiti, Ekiti State, Nigeria. Journal Contemporary Research, 2 (12), 86 – 89.

Ra'ed, A., Reem,A.,& Sabir, A. S.(2016).Undergraduate students attitude towards mathematics after peer teaching experience. Global Journal of Pure and Applied Mathematics, 12(2), 1501 – 1517.

Sainz, M., & Eccles, J. (2011). Self–concept of computer and maths ability. Gender implications across time and within ict studies. Journal of Vocational Behaviour (JVBE), 25(75), 1-14. Retrieved October 02, 2011, from <www. elsevier, com/ Locate/Jvb.

Salaam, I. O., & Kareem,S.A. (2021).Three psycho-social variables as predictors of students' academic performance in biology in Lagos State. 61st STAN Proceedings, 170 – 179.

Schenkel, S. (2019).The learning environment,teachers' factor, and students' attitude towards Physics amongst engineering technology students. International Journal of Academic Research, 2 (2), 16- 21.

Shadrack, T. (2015). Effect of video-taped instruction on senior secondary students' performance in physics practical in Port Harcourt metrropolis, Rivers State. Unpublished M.Ed work, Rivers State University of Science & Technology (RSUST).

Sunghwan, H., & Taekwon, S. (2021). Students' Attitude toward Mathematics and its Relationship with Mathematics Achievement. Journal of Education and e-Learning Research, 8(3): 272-280.

Ugwuanyi, S.C., Eze, E.J., Magbo, R.C., & Ugwoke, E.(2017). Assessment of the efficacy of students' improvised instructional materials on their academic achievement in Physics concepts. 60th Annual conference of STAN Proceedings, 356 -363.

Umoru, S.E. (2016). Effect of brain-based learning approach on senior secondary school students" achievement in genetics, in Markurdi metropolis. Journal of Science Education, 1(1), 65-72.

Veloo,,A.,Nor, R.,& Khalid,R.(2015). Attitude towards physics and additional mathematics achievement towards physics achievement. International Education Studies, 8(3), 35 – 43.

West Africa Examination Council (WAEC) (2018). Chief examiners' report. Lagos: WAEC.