

STUDENTS' ATTITUDE TOWARDS SCIENCE SUBJECTS IN SENIOR SECONDARY SCHOOLS IN ADAMAWA STATE, NIGERIA

SOFEME REUBEN JEBSON¹ & AMOS ZAMNI HENA²

¹Department of Science Education, Federal University, Kashere, Gombe, Nigeria

²National Open University of Nigeria, Yola Study Centre, Yola, Adamawa State, Nigeria

ABSTRACT

The study investigated the attitude of students toward science subjects in senior secondary schools in Adamawa state. Three objectives were raised and to these objectives one research question and two hypotheses were raised. The target population was all the Adamawa state government secondary school students. The study is survey type which used stratified random sampling technique to select a sample of 250 science students. These students responded to valid and reliable instrument known as Science Students' Attitude Questionnaire (SSAQ). The data obtained were subjected to descriptive statistics as well as t-test and chi-square test. The results showed that students in Adamawa state have positive attitude towards science subjects and gender has significant effect ($p < 0.05$) on their attitude. The results indicated that boys have more positive attitude toward science subjects than their girls' counterpart. Age difference among boys and girls in the sampled secondary schools in Adamawa state does not have influence on their attitude toward the study of science subjects. Based on the results of this study recommendations were made on how positive attitude of students can be maintained and improved upon particularly the attitude of girls in Adamawa state.

KEYWORDS: Students Attitude, Science Education, Education

INTRODUCTION

Education in its general sense is a form of learning in which the knowledge, skills, and habits of a group of people are transferred from one generation to the next through teaching, training and research. Any experience that has a formative effect on the way one thinks, feels, or acts may be considered educational. Education from all perspective is viewed or aimed at preparing one for life and since it is supposed to prepare one for a better living, one must be certain on what he/she can achieve through it and from what discipline he/she can attain it. Education must draw some of its principles from psychology. This entails having good grasp of all theories that influence the teaching-learning process. Also, the quality of education that a teacher provides to students is highly dependent upon what teachers do in the classroom. Thus, preparing the students of today to become successful individuals of tomorrow, science teachers need to ensure that their teaching is effective. Understanding of student attitude is very important in supporting their achievement and interest toward a particular discipline. Students attitude toward science have been extensively studied, but research was initially focused greatly on science in general (Dawson, 2000; Osborne, Simon and Collins, 2003) and less attention was addressed to particular disciplines like Biology, Physics and Chemistry (Salta and Tzougraki, 2004). This can partly camouflage students' attitudes because science is not viewed as homogenous subjects Students' attitudes toward science significantly alter their achievement in science. Therefore, identification and influence of attitudes came to be an essential part of educational research. This study has been initiated by the idea that; research in students' attitudes toward science

often involves science in general. Attitudes associated with science appear to affect students' participation in science as a subject and impact performance in science (Linn, 1992). It is generally believed that students' attitude towards a subject determines their success in that subject. In other words, favourable attitude result to good achievement in a subject. A student's constant failure in a school subject can make him/her to believe that he/she can never do well on the subject thus accepting defeat. On the other hand, his/her successful experience can make him/her to develop a positive attitude towards learning the subject. This suggests that student's attitude towards science subjects could be enhanced through effective teaching strategies. It has in fact been confirmed that effective teaching strategies can create positive attitude on the students towards school subjects (Olowojaiye, 2000).

Attitudes are psychological constructs theorized to be composed of emotional, cognitive and behavioural components. Attitudes serve as functions including social expression, value expressive, utilitarian, and defensive functions, for the people who hold them (Newbill, 2005). To change attitudes, new attitudes must serve the same function as the old one. Instructional design can create instructional environments to affect attitude change. In the greater realm of social psychology, attitudes are typically classified with affective domain, and are part of the larger concept of motivation (Greenwald, 1989). Attitudes are connected to social cognitive learning theory as one of the personal factors that affect learning (Newbill, 2005 and Bandura, 1997). Attitude was defined by Eagly and Chaiken, (1993) as "Psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour". Attitudes toward learning chemistry is very important concept that can be described as the students' view of knowledge, assessment, laboratory activities and the roles of instructors and students (Berg, 2005). A learner's attitude relates to all the facets of education. For example, the attitude of a learner towards science will determine the measure of the learner's attractiveness or repulsiveness to science. It follows therefore, that in order to have better students' performance in science subjects there is need to determine students' attitude to science subjects. The investigators consider it necessary to bring into focus the present study with the following objectives of:

- Determining secondary school students' attitudes toward science subjects.
- Investigating the effect of gender on students' attitudes toward science subjects.
- Determining the influence of students' age on attitudes toward science subjects.

Research Question

One research question was raised to guide the study.

What is the attitude of secondary school students toward science subjects in Adamawa state?

Hypotheses

Two hypotheses were formulated and tested which states that:

- There is no significant effect of gender on students' attitude towards science subjects.
- There is no significant influence of age on students' attitude toward science subjects.

Theoretical Framework

The theory used for this research is the theory of reasoned action postulated by Azjen and Fishbein 1975. The components of theory of reasoned action are three general constructs: Behavioural Intention (BI), Attitude (A), and Subjective Norms (SN). Theory of reasoned action suggest that a person's behavioural intention depends on the person's attitude about the behavior and subjective norms ($BI=A+SN$). If a person intends to do a behavior then it is likely that the person will do it. Furthermore, a person's intentions are themselves guided by two things: the person's attitude towards the behavior and the subjective norms. Behavioural intention measures a person's relative strength of intention to perform behavoiur. Attitude consists of beliefs about the consequences of performing the behavior multiplied by his or her valuation of these consequences. Subjective Norm is seen as a combination of perceived expectations from relevant individuals or groups along with intentions to comply with these expectations. In other words, "the person's perception that most people who are important to him or her think he should or should not perform the behavior in question" (Azjen and Fishbein, 1975). The theory of reasoned action of Azjen and Fishbein, (1975) agrees with the current study on the attitudes of secondary school students toward science subjects because it has to do with attitude change.

Attitude towards science denote interest or feeling towards studying science. It is the students' disposition towards 'likes' or 'dislikes' science while attitude in science means scientific approach assumed by an individual for solving problems, assessing ideas and making decisions (Keeves,1992). He further asserted that attitude toward science are known to decrease as students progress through their school years. He further submitted that attributes such as enthusiasm, respect for students and personality traits have been shown to influence students' attitude toward science as well as in other subjects.

From the foregoing, it has been discovered that student' attitudes toward science significantly alter their achievement in science. Therefore, identification of influence of attitudes becomes an essential part of educational research. This study has been initiated by the idea that; research in students' attitude toward science often involves science in general, but particular discipline like Biology, Chemistry or Physics have been overlooked. The study of related literature revealed that gender and age has great influence on the attitude of students toward science subjects. Studies in Nigeria, including that of Alao (1988) examined six attitudinal dimensions and their effects on students' achievement. The dimensions were:

- Social implications of science
- Attitude towards scientific inquiry
- Normality of scientist
- Enjoyment of science and science lessons
- Leisure interest in science and career interests in science.

The result of the study revealed that students have positive attitudes towards sciences, Mathematics inclusive. Odunsi (1988) in assessing the attitude of some science students toward modern orientation in science found that students attitude to science is negative while gender and class level of the students did not significantly influence students' attitude toward science. Obioha (1987) when describing Nigeria situation, opined that school in Nigeria have come a long way from no science in schools to almost compulsory science programmes at all levels and yet younger generation do not

particular want to study science. The reason for this is not farfetched. The social values in the country nowadays have diverted students' attention and interest from learning science to other goodies of life.

Olatoye (2002) found that students attitude towards science has significant direct effect on students achievement in the subject. Adesokan (2000) and Onwu (1981) asserted that in spite of the recognition given to chemistry among the science subjects, it is evident that students still show negative attitude towards science subjects thereby leading to poor performance and low enrolments. In Nigeria, students poor performance in physics have been attributed to poor teaching methods, unqualified and inexperienced Teachers, poor students attitude toward physics, poor learning environment and gender effects. Iwovi (1997). Keeves (1992) and Postlethwaite and Wiley (1991), attitudes toward science are, in general, highly favoured, indicating strong support for science and the learning of science. There is also, consistency across countries and age levels within a country, in the average level of attitude toward science by students. The researchers however concluded that there is marked decline in attitude towards science between the ten-year old and fourteen-year old levels. However, in countries where a high level of technological and industrial development had been achieved, the findings showed that attitude toward science were more neutral, generally, boys held more favourable attitude toward science.

METHODOLOGY

A descriptive survey research design was adopted for the study. The survey covered all the five educational zones of Adamawa state. The population of the study consists of students in senior secondary schools offering science subjects (Chemistry, Biology and Physics). A simple stratified random sampling was employed to select 250 science students across the five educational zones. The schools were randomly sampled for the study and with 50 students from each zone.

The instrument used for the study was the Science Students' Attitude Questionnaire (SSAQ). The SSAQ was developed by the researchers with 20- items on four (4) - point Likert scale designed to gather information to measure to students' attitude. A draft version of the SSAQ was subjected to assessment by experts in educational psychology and educational evaluation to ensure that the instrument is suitable in terms of content, language, format etc. The revised version was trial – tested. The trial – testing provided data for computing the index of construct validity and internal consistency reliability of the SSAQ (Cronbach's coefficient alpha = 0.78). Descriptive statistics of mean and standard-deviation were used to answer the research question while the hypotheses raised were tested using t-test and chi-square statistical analysis. The results were computed by the help of computer software known as Statistical Package for Social Science (SPSS) version 16.

RESULTS

The study answered one research question which states that: What is the attitude of secondary school students toward science subjects in Adamawa state?

Mean response of students

N	Minimum	Maximum	Mean	Std. Deviation
250	35	79	56.14	8.701

In determining the attitude of Adamawa state secondary school students toward studying of science subjects, the mean and standard deviation was employed. The table above indicated a minimum mean of 35 and a maximum mean of 79.

The study used a Likert scale of four (4) points with twenty (20) items. This implies that the average score is forty (40) points while the highest score obtainable is eighty (80). By implication, below forty (40) is considered negative while above forty (40) is considered positive. The mean obtained in this study is 56.14 which show that it is very much above the average. This indicates that the attitude of secondary school students in Adamawa State toward science subjects is positive.

Hypotheses Testing

The study presents two hypotheses and these hypotheses were tested using two different statistical analysis. The first hypothesis was tested using the t-test analysis while the second hypothesis was tested using the chi-square analysis.

The table below shows the analysis of the first hypothesis which states that; **there is no significant effect of gender on students' attitude towards science subjects.**

Variables	N	Mean	SD	Df	t-Cal	t-Critical	Remark
Boys	125	56.90	8.101	248	145.595	1.645	Significant
Girls	125	55.39	9.233				

Significant at 0.05 level of significance

The table above revealed that the calculated t (t-cal) 145.595 is greater than the critical t (t-critical) 1.645 under $df=248$ at 0.05 level of significance. This indicates that gender has significant effect on students' attitude toward science subjects. Therefore, the hypothesis which says that there is no significant effect of gender on students' attitude towards science subjects is rejected.

The second hypothesis states that; there is no significant influence of age on students' attitude towards science subjects. This is being explained by the table below:

Variables	Response		Total	Df	Chi-square Cal	Chi-square Critical	Remark
	Negative	Positive					
Age				3	5.454	7.815	Significant
11-14yrs	3 3.41	9 8.59	12				
15-18yrs	30 31.24	80 78.76	110				
19-22yrs	29 31.52	82 78.48	111				
23yrs & above	9 4.83	8 12.17	17				
Total	71	179	250				

The above revealed that the calculated chi-square (5.454) is less than the critical chi-square (7.815) under $df =$ at 0.05 level of significance. This therefore indicates that there is no significant influence of age on students' attitude towards science subjects. Therefore, the hypothesis which states that there is no significant influence of age on students' attitude towards science subjects is accepted.

DISCUSSIONS

Based on the findings obtained from the study conducted and in answering the research question, it is evident that Adamawa state secondary school students exhibit positive attitude toward science subjects. This was clearly seen from the mean response in the first table.

The result of this study shows clearly that there is significant effect of gender on students' attitude towards science subjects. The results indicated that boys have more positive attitude towards science subjects than girls 'counterpart. From the result, it reveals that sex (gender) is the most significant variable which relates to students' attitude towards science subjects.

The t-test summary of the effect of gender on students' attitude towards science subjects indicates that boys tends to have more positive attitude towards science subjects such as Chemistry, Physics and Biology. This is in consonance with several studies that have suggested that boys demonstrated more positive attitude towards science subjects than girls'. Boys rated science as a subject more exciting and interested than girls.

The second hypothesis states that there is no significant influence of age on students' attitude towards science subjects. The results obtained clearly indicates that the hypothesis is accepted which means that there is no significant influence of age on students' attitude towards science subjects. This clearly shows that age difference among school students does not have any influence on their attitude towards science subjects.

Based on the result of these findings, it is clear that boy's in secondary school in Adamawa state have more positive attitude towards science subjects than girls. The reasons for girls developing negative attitude toward science subjects could be attributed to the following factors: social norms, cultural barriers, lack of role model, parental influence, and personal influence.

The result of the study agrees with the theory used for this study which state that a person's behavioral intention depends on the person's attitude about the behaviour and subjective norms. If a person intends to do a behavior then it is likely that the person will do it. Furthermore, a person's intentions are themselves guided by two things: the person's attitude toward the behavior and the subjective norms. The theory of reasoned action of Azjen and Fishbein, (1975) therefore agrees with this study conducted in Adamawa state.

CONCLUSIONS

This study has examined the effect of gender and the influence of age on the attitudes of students towards the study of science subjects at the secondary level of education in Adamawa state. The result of the study reveals that gender has effect on the attitude of students toward science subjects. As part of developing the sector of our education scientifically, there is the need of students to acquire positive attitude towards science subjects because science is different from most of the other discipline where the task is simple. Developing students' attitude positively increases and motivates students' interest in the study of science which in turn brings positive development to both the nation and the individual.

Students' attitude in science determines their success in a particular field of endeavour. Favourable attitude result to good achievement, students' interest in the study of science subjects should be developed by both boys and girls. This is because girls showed low interest or negative attitude towards science subjects, their interest or attitude should increase perhaps through encouragement from both parents and teachers. Also, having peer role models in science will motivate and increase girls' interest or change their attitude positively.

RECOMMENDATIONS

Based on the study conducted, the researchers came up with the following recommendations:

- Students in secondary schools should be exposed by the science teacher continually to challenging life situations about the benefits of science. This will help to shape their attitude positively toward science subjects.
- Parent and school authorities should make clear to our boys and girls in schools how also in natural science fundamental questions of human life are raised and answered. Parents should make their children know that science subjects are made for both boys and girls so as to take away all forms of discrimination amongst them in the learning of science.
- Students should be taught how science comes to statements on fundamental questions of our human and social existence.

REFERENCES

- I. Adesokan, C. O. (2000). Students Attitude and Gender as determinants of performance In JSS Integrated Science. Unpublished B.Ed. project, University of Ado – Ekiti, Nigeria.
- II. Alao, E. O. (1988). Attitudes of Secondary school students to the basic sciences in selected Local Government Areas of Oyo State. Doctorate Dissertation. University of Ife. Ile – Ife
- III. Bandura, A. (1997). Self-efficacy: The exercise of control. New York: W. H. Freeman and Company.
- IV. Berg, C. & Anders, R. (2005). Factors related to observed attitude change toward learning chemistry among university students, chemistry education research and practice 69(1), 1-18
- V. Dawson, C. (2000). Upper primary boys' and girls' interest in science have they changed since 1980? International Journal of Science Education Education, 22(26), 557-570.
- VI. Eagly, A. H. & Chaiken, S. (1993). The psychology of Attitude. Fort Worth, TX: Harcourt Brace Jovanovich college Publishers.
- VII. Fishbein, M. & Azjezen, I. Believe, Attitude, Intention and Behaviour Reading, MA: Addison – Wesley, 1975.
- VIII. Greenwald, A.G. (1989). Why attitudes are important: Defining attitude and attitude theory 20 years later in A. R Pratkanis, S. J. Breckler & A. G Greenwald (Eds), Attitude structure and Function (Pp.429-440). Hillsdale, NJ: Lawrence Erlbaum Associates.
- IX. Ivowi, U. M. O. (1997). Redesigning School Curricula in Nigeria. WCCI Region 2 seminar, NERDC Conference Centre, Lagos. 2-21.
- X. Keeves, J. P. (1992). Learning Science in the changing world. Gross National Studies of Science Achievement. 1970-1984 I. E. A. International Headquarters, Australia.
- XI. Linn, M. C. (1992). Science education reform: Building the research base. Journal of Research in Science Teaching, 29, 821-840.

- XII. Newbill, P. L. (2005). Instructional strategies to improve women's attitudes towards science. Dissertation submitted to the faculty Virginia polytechnic Institute and State University in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Curriculum and Instruction.
- XIII. Obioha, N. E. (1987). Decline in students' choice of Science and Technology. Annual conference Proceedings of Science Teachers' Association of Nigeria. 28, 16-23.
- XIV. Odunsi, T. O. (1988). A study of the attitudes of some Nigerian Teachers' towards science and science teaching. *Journal of Research in Curriculum* (692) 205-211.
- XV. Olatoye, R. A. (2002). A casual model of school factors as determinants of science achievement in Lagos State Secondary Schools. Unpublished Ph.D Thesis, University of Ibadan, Ibadan.
- XVI. Olowojaiye, F. B. (2000). A comparative Analysis of students interest in and perception of Teaching/Learning of mathematics at Senior Secondary Schools levels. A paper presented at MAN conference "EKO2000".
- XVII. Onwu, G. O. M. (1999). Learning difficulties in Chemistry: Capacity limitation or strategy deficit. *African Journal of Educational Research* 4(1&2) 125.
- XVIII. Osborne, J. F., Simon, S. and Collins, S. (2003). Attitudes toward science: A review of the literature and its implications. *International Journal of Science Education*, 25(9), 1049-1079.
- XIX. Postlethwaite, T. N. & Wiley, D. E. (1991). *The I. E. A. study of science II. Science achievement in twenty-three centauries*, Oxford, Pregamon press.
- XX. Salta, K. & Tzougraki, C. (2004). Attitude toward Chemistry among 11th grades students in high schools in Greece. *Science Education*, 88(4), 535-547.