Relevance of Science Education as Perceived by Students Taking General Education Science Courses in Taraba State University, Jalingo, Nigeria

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ABSTRACT

The study investigated the relevance of science education as perceived by university students taking general education science courses in Taraba State University, Jalingo, Nigeria. The research design used for the study was a survey. The data were collected through a 15-item, 4-point Likert scale questionnaire administered to a total sample of 70 students from 400 Level of 2016/2017 session. Out of these, 8 students were interviewed. The data was analyzed using descriptive statistics and t-test at 0.05 level of significant. The result of the findings showed that students have better perception about science education; and also have positive interests towards science education. The findings also revealed that there is no significant difference in terms of gender on their perceptions of relevance of science education. Students considered science education more interesting and important. The results from the interview revealed that students find biology more interesting due to its immediate linkage to everyday life situation unlike chemistry and physics which have few linkages; and that most science and science education lecturers make science education boring and uninteresting to students. The study therefore recommended that Science education lecturers should plan their teaching in ways that will motivate students, make direct use of knowledge about their interests and concerns in science; and the National University commission should develop in–service/refresher programmes/courses for lecturers that emphasize the need to adopt creative and motivating methods of lecturing students. Physics and chemistry classes should also have more and immediate linkages to everyday life.

Keywords: Science education, interests, general education science courses, University students, gender.

INTRODUCTION

Science has been regarded as the bedrock of modern day technological breakthrough. Nowadays, countries all over the world, especially the developing ones like Nigeria are striving hard to develop technologically and scientifically, since the world is turning scientific and all proper functioning of lives depend greatly on science. According to Ogunleye (2002), Science is a dynamic human activity concerned with understanding the workings of the world. The understanding makes man to know more about universe. Without the applications of science, it would have been difficult for man to explore the other planets of the universe.

Science comprises of the basic disciplines such as Physics, Chemistry, Mathematics and biology. Many investigations have shown that secondary school students are exhibiting dwindling interest in Science (Esiobu, 2005). Besides, Physics as one of the science subjects remains one of the difficult subjects in the school curriculum according to the Nigeria Educational Research and Development Council (NERDC) (Isola, 2010). Poor academic achievement in science could be attributed to many factors among which teachers strategy itself was considered as an important factor. This implies that the mastery of science concepts might not be fully achieved without the students having a proper of the relevance of science education. The teaching of science education without positive perception of science education may certainly results in poor academic achievement of students in all level of education. As noted by Avotri, Owusu-Darko, Eghan and Ocansey, (2000), science has become the backbone of development, in this fast advancing and changing technological world.

Despite the growing importance of science and technology in all realms of life in any society, many young people appear to lose their interest for it in schools. This happens mainly in highly developed societies. It seems they have developed ambivalent attitudes to and perceptions of science and technology (Schreiner, 2004). In the quest for solutions to the lack of interest that young people have for science and technology education, most research in science education has focused on the cognitive sides of teaching and learning, but there is growing acceptance of the significance of the affective dimensions of the issue. This is of course also important in developing countries.

As science educators, we believe that a way to successful science teaching goes through knowing something about the views and perceptions of learners. Such views and perceptions may position us better as science educators to think critically and constructively about alternatives and improvements. This has been demonstrated in the developed countries, and more recently in the newly industrializing countries, where science and technology have been responsible for more than half of the increase in productivity. Science education should therefore appeal to all learners, regardless of backgrounds. Students are likely to learn better when they are interested in the subject, hence it becomes important to know the interests of the pupils, and how this may vary with their background. According to Sicinski in Schreiner, (2006), the level of technological development of a country influences people's expectation to the expected benefits of developments in science and technology. Sicinski remarked further, in the same study, that people in developed countries are less confident about future achievements of science than people in less developed countries.

Schreiner, (2006) also maintains that the level of technological development in a country is a key factor for explaining the expectations people have of further developments. The increasingly complex changes in the nature and amount of knowledge and demands in the field of science and technology necessitate an understanding of how students perceive science and technology classes in terms of their gender. One of the primary reasons students fail in science is because they often have learning styles significantly different from those emphasized by most science courses. As individuals have different preferences in giving meanings and acquiring information, the ways in taking and processing information may vary (Yilmaz-Soylu & Akkoyunlu, 2009). While some prefer to work with concrete information, others are more comfortable with abstractions. Some learn better by visual presentations such as diagrams, flowcharts, and schematics; others learn more from verbal explanations (Felder & Spurlin, 2005). If students' learning styles match the teaching style of the teacher, students will keep information longer and apply it more effectively.

Education may be seen as a process by which individuals acquire knowledge, skills and attitudes, which enables them to develop their faculties in full. According to Fafunwa in Amaele, (2003), education is what each generation gives to younger ones which make them to develop attitudes, abilities, skills and other behaviours ' which are of positive value to the society in which they live. One of the benefits of good education is that it enables individuals to contribute to the development in the quality of life for themselves, their communities and the nation as a whole. When these dimensions of education are achieved, then science learning has become meaningful and fulfilling to the learner. The development of science and technology is also recognized worldwide as vital for a nation's overall economic development. When used effectively science and technology is able to improve productivity and meet the needs of society. This has been demonstrated in the developed countries, and more recently in the newly industrializing countries, where science and technology have been responsible for more than half of the increase in productivity. Science education should therefore appeal to all learners, regardless of backgrounds. Students are likely to learn better when they are interested in the subject, hence it becomes important to know the interests of the students, and how this may vary with their background.

The main purpose of this study is to find out the relevance of science education as perceived by University students. Specifically it is stated below:
 i.   To determine the importance of science education as perceived by University students
 ii. To determine the students' interest in science education
 iii. To determine where there is significant difference between male and female university students perception of the relevance of science education.

Research Questions
To guide this study, the following research questions were raised and answered.
i. What is the importance of science education as perceived by University students?
ii. What is the students' interest in science education?
iii Is there any significance difference between male and female university students perception of the relevance of science education?

Literature Review
Several studies have been conducted on the relevance of science as perceived by both students and pupils in the different level of education. In a study of students' and parents' views of the UK school science curriculum, Osborne and Collins, (2000) stated that while school students in the UK consider science to be an important subject that message is not clearly communicated to all students through school science. A point emphasized further by the Planet Science, Institute of Education and the Science Museum, (2003), an online study reported that even though most respondent students perceive science to be 'useful' almost half (42%) as revealed in findings of the study believe that their GCSE science lessons don't evoke their curiosity and enthusiasm for pursuing greater knowledge about the world. In another study conducted by Osman, Ziya and Ali, (2004) on the dimensions of the university students' perceptions of their science classes and whether or not the students' perceptions differ significantly as regards to the gender and grade level in six main categories which includes: pedagogical strategies, faculty interest in teaching, students interest and perceived competence in science, passive learning, grades as feedback, laboratory experiences. A total of 507 students from two big universities in Turkey, including pre-service middle school science and chemistry teachers, were randomly selected for the study. The study group consisted of 232 males and 275 female students in age ranging between 18 and 23. Questionnaire of Perceptions of Science Classes (QPSC), consisting of a 55-positive and negative Likert scale items, were administered to all the respondents. The statistical results of the QPSC scores indicated that the undergraduates' perceptions of their science classes were significantly difference favoring female students in the grades of third year, and students' perceptions of their science classes showed a significant positive change from first to third years of the universities. Also, there was a significant difference favoring the female students on the factor of students' interest and perceived competence in science in the grades of second and final year. In the grade of third year, female students were significantly better than male students on the factors of faculty interest in teaching, grades as feedback, and laboratory experiences, while male students were better than female students on only the factor of passive learning in the grade of the first year. Similarly; other studies also reported that male students have greater interest and achievement than female students in science and technology (Udo, Ramsey & Mallow, 2005; Ogunjuyigbe, Ojofeitimi & Akinlo, 2006).
Jenkins and Pell, (2006) report findings from the ROSE project from the perspective of students in England. These are largely concurrent with those of other school students from industrialized nations globally. Even though participating students hold positive views of SET and society they are not 'reflected in their opinions about their school science education'. Most boys but, in particular, girls prefer other subjects to science.
Specifically, Boser, Palmer, and Daugherty in Gomleksiz, (2012), reported that female students consistently perceived technology to be less interesting than male students did. In fact, the most striking difference between males and females in science is not in achievement or in opportunities to learn, but in confidence. Even when females have similar exposure to courses and a similar achievement level, they are less confident in their ability, feel less prepared, and lack interest in science and technology. The results of several studies show that the overall trend for male students' perceptions about the utility, necessity, and importance of science and technology is positive (Spall, Barrett, Stanistreet, Dickson & Boyles, 2003). This means that male students have positive perceptions about science and technology classes. However, there are some other studies indicating that female students perceive the biology learning environment more favorably than male students do (Dawson, 2000; Jones, Howe & Rua, 2000; Prokop, Tuncer & Chuda, 2007). Popham in Gomleksiz, (2012), opined that even affective behaviours are

acceptable to undergo far more sudden transformations than cognitive behaviours. A well-designed learning environment aimed at providing effective instruction enriches learning experiences as well. Students should be aware of what they really need and what they should know. Therefore, students should be provided a rich and supportive learning environment. Effective teaching requires a combination of many factors, including aspects of the teacher's background, and ways of interacting with others, as well as specific teaching practices. Effective teachers care about their students and demonstrate this care in such a way that their students are aware of it. This care creates a warm and supportive classroom environment (Stronge, 2002). Teachers have a profound effect on student learning. They can bring the real world to students through technology and can facilitate teaching (Schroeder, Scott, Tolson, Huang & Lee, 2007).

Furthermore, Gomleksiz, (2012) conducted a study on students' perceptions of science and technology classes by gender in a Turkish elementary school context. Data for the study were collected through a 20-item, five-point Likert scale from a total of 1558 sixth-grade students at 20 different elementary schools in Turkey. The independent groups'-test and Mann-Whitney U test were used to analyze the data where statistically significant differences were observed in the gender of the students. The findings of the study revealed that male students considered learning science and technology more necessary and important than female students did. They also found learning environment and teaching strategies more sufficient and effective than females did. Findings revealed that male students were not satisfied with what the teachers practiced in science classrooms.

The educational contexts or curricular programs in which University school students enroll play an important role in their perceptions of relevance of science and technology. With the current study, it is aimed to determine the relevance of science education as perceived by University students', whether there are any differences between their perceptions based on gender.

MATERIALS AND METHODS

The present study was an attempt to explore the relevance of science education as perceived by students taking general education science courses in Taraba State University, Jalingo, Nigeria. The research design used for the study was Survey. Data was generated from a questionnaire in which a four-point Likert scale was used. Students were asked to rate their opinions about their perception of the relevance of science education. The questionnaire administered in the classroom, included 15 items derived from the review of the relevant literatures. In all cases, the same procedures were followed. Students were reminded that their answers would remain anonymous, and they were asked to read the items carefully and answer honestly.

The population of this study comprised of the 400 Level students of 2016/2017 session in science education department, Taraba State University, Jalingo. Simple random sampling procedure was used to select students from each course. The students were purposefully selected on the basis of their courses that is, 7 Physics education students, 19 Chemistry education students, 41 Biology education students, and 3 Mathematics education students making a total of 70 students. The gender composition of the respondents was 42 males (60 %) and 28 females (40%) respectively. Out of these 8 students were interviewed on their perception of the relevance of science education.

Descriptive statistics such as mean and standard deviation was used in analyzing the data collected and t-test was used to test the significant difference between male and female students perception of the relevance science education.

RESULTS
Research Question 1: *What is the importance of science education as perceived by University students?*
Table 1. Results on importance of science education as perceived by University students

S/N	Statement	Mean	SD	Remark
1.	Science education course is important and relevant	3.75	0.44	Agree
2.	The knowledge I gained in science education is always helpful in real life situation	3.65	0.48	Agree
3.	I need science education to prepare myself for the future.	3.35	0.48	Agree
4.	Science education affects my life very much	3.10	0.77	Agree
5.	The science education course includes important knowledge that I may need in the future	3.35	0.58	Agree
6.	Science education has a lot to do with my life	3.40	0.74	Agree
7.	Science education is the key to sustainable development	3.20	0.75	Agree
8.	Science education has nothing to do with my life	1.95	1.11	Disagree

From Table 1, students agreed on seven items showed agree and disagree on one item. The students agreed that science education course is important (Mean=3.75), the knowledge the gained in science education is always helpful in real life situation (Mean=3.65), they need science education to prepare themselves for the future (Mean=3.35), science education affects their life very much (Mean=3.10), science education includes important concepts they may need in the future (Mean=3.35), science education has a lot to do with their life (Mean=3.40), science education is the key to sustainable development (Mean=3.20).On the other hand, students disagree on one item which says science has nothing to do with their life (Mean=1.95).

Research Question 2: *What are the students' interests in science education?*
Table 2: Result on students' interest in science education

S/N	Statement	Mean	SD	Remark
1.	I feel confident in science education class	3.50	0.50	Agree
2.	I enjoy learning about science education	3.20	0.75	Agree
3.	Science education classes have increased my interest in science	3.45	0.50	Agree
4.	I am excited about learning more of science education	3.10	0.77	Agree
5.	I have interest on basic concepts in science education	3.00	0.84	Agree
6.	I feel uncomfortable in science education classes	2.10	1.14	Disagree
7.	My science education lecturers make science education boring ,difficult and uninteresting	3.35	0.58	Agree

From Table 2, students agreed on six items which includes: their confident in science education (Mean=3.45), they enjoy learning about science education (Mean=3.20), science education has increased their interest in science (Mean=3.45), they are excited about learning more of science education (Mean=3.10), they have interest on basic concepts in science education (Mean=3.00), science education lecturers make science education boring, difficult and uninteresting (Mean= 3.35). Meanwhile, students disagreed on one item that is, that they feel uncomfortable in science education classes (Mean=2.10). This result showed that the university students' have positive interests in science education.

Research question 3: *What is the significance difference between male and female university students perception of the relevance of science education?*

Table 3: t- test difference between male and female university students perception of their relevance of science education

Variable	N	Mean	SD	Df	p-value	Remark
Male	42	3.53	0.88			
				68	0.538	Ho accepted
Female	28	3.38	3.92			

P > 0.05

From Table 3, since the P- value (0.538) is greater than the alpha value (α=0.05), this showed that, there is no significant difference between male and female students perception of the relevance of science education.

Also, from the interview conducted most of the students viewed mathematics and physics as difficult and complex subjects; though very few viewed the two subjects as not difficult. However, they do acknowledge that there are interesting topics within physics. Biology on the other hand is viewed by the students as '*easier 'and* 'more *meaningful'*. Students opined that the application of concepts from biology is transparent and recognizable to them in an everyday life situation. According to the respondents, science subjects is not difficult, it all depends on the way students take the subjects and their determination toward the subjects. The respondents further said that physics and chemistry have few immediate linkages with their everyday lives.

DISCUSSION

This section discusses the findings of the study and explains the data gathered from the field through the questionnaires distributed. It analyses the data with reference to the puzzles which the study set out to unravel that is, the research questions.

The findings related to the importance of science education as perceived by University students as revealed on Table 1 showed that students have better perception about science education. The students agreed that science education course is important, the knowledge they gained in science education is always helpful in real life situation, they need science education to prepare themselves for the future, science education affects their life very much, science education includes important concepts they may need in the future, science education has a lot to do with their life, science education is the key to sustainable development. On the other hand, students disagree on one item which says science has nothing to do with their life. This result also supports findings by Udo et al, (2005); Ogunjuyigbe et al, (2006) and Spall et al, (2003).

The findings related to students interest toward science education as showed in Table 2, revealed that students show confident in science education, they enjoy learning about science education, science education has increased their interest in science, they are excited about learning more of science education, they have interest on basic concepts in science education, and science education lecturers make science education boring and uninteresting. On the other hand, the students disagreed on two items that is, they feel uncomfortable in science education classes, and also disagree that science has nothing to do with their life. This finding showed that in general students' have positive attitude towards science education or science subjects which supported previous studies by Udo et al, (2003); Ogunjuyigbe et al, (2006); Sjoberg, (2004); and Sofeme & Amos, (2015).

The result of the hypothesis in Table 3 showed that there is no significant difference between male and female students perception of the relevance of science education. Osman et al, (2004) the statistical result scores indicated that the undergraduates' perceptions of their science classes were significantly difference favoring female students in the grades of third year, and students' perceptions of their science classes showed a significant positive change from first to third years of the universities. Also, there was a significant difference favoring the female students on the factor of students' interest and perceived competence in science in the grades of second and final year. In the grade of third year, female students

were significantly better than male students on the factors of faculty interest in teaching, grades as feedback, and laboratory experiences, while male students were better than female students on only the factor of passive learning in the grade of the first year. Similarly; the studies by Udo et al, (2005) and Ogunjuyigbe et al, (2006), reported that male students have greater interest and achievement than female students in science and technology. This also supports the findings by Jenkins and Pell, (2006) who revealed that most boys prefer science; but, in particular, girls prefer other subjects to science. Also Gomleksiz, (2012) findings of the study revealed that male students considered learning science and technology more necessary and important than female students did. Sofeme and Amos, (2015) also noted that boys have more positive attitude toward science subjects than their girls' counterpart.

Specifically, Boser et al in Gomleksiz, (2012) reported that female students consistently perceived technology to be less interesting than male students did and also lack interest in science and technology. The results of several studies show that the overall trend for male students' perceptions about the utility, necessity, and importance of science and technology is positive (2003). This also agreed with the findings by Sofeme and Amos, (2015) whose results indicated that boys have more positive attitude toward science subjects than their girls' counterpart and that of Edu, Okorn, Koko and Bessong, (2013) whose result indicated that male students showed more positive attitudes towards the teaching of science than their female counterparts. This means that male students have positive perceptions about science and technology classes. However, there are some other studies indicating that female students perceive science subjects such as biology and biology learning environment more favorably than male students do (Dawson, 2000; Jones et al, 2000; Prokop, et al, 2007).

However, responses from the interview indicated that most of the students view physics and mathematics as difficult and complex subjects. However, they do acknowledge that there are interesting topics within physics though some students were of the opinion no subject is difficult; to them it all depends on the way students take the subjects and their determination toward the subjects. School-based educational experiences have a strong influence on students' decision making about their further study and career choices. Therefore, if students perceived physics as *'too hard'* and not relevant to them it is unlikely they will consider further study and career options related to this subject. Biology, on the other hand, is viewed as *'easier'* and *'more meaningful'*. The students perceived that the application of concepts from biology is transparent and recognizable to them in an everyday situation thereby of more relevance to them in everyday life; than physics and chemistry which have few immediate linkages with their everyday lives. This finding also supports that of Gomleksiz, (2012), who opined that effective use of teaching strategies encourages students in a positive and supportive manner and helps them participate actively in the teaching-learning environment.

CONCLUSIONS
Based on the result of the study, the following conclusions can be drawn

The result of the findings showed that students have better perceptions about science education; and also have positive interests towards science education. There is no significant difference between male and female university students in their perception of the relevance of Science Education (ROSE).

The result of the findings from the interview also showed that most science and science education lecturers make science education boring and uninteresting; most students have interest toward science education especially in biology that they perceive as not difficult and not boring; most of the students viewed Mathematics and Physics as difficult; and that Physics and chemistry have few immediate linkages to their everyday lives.

Based on the conclusions drawn from the findings of this study, the following recommendations were made:

1. Science education lecturers should plan their teaching in ways that motivate students, make direct use of knowledge about their interests and concerns in science.
2. The National University commission should develop in–service programmes and refresher courses for lecturers that emphasize the relevance of science education and the need to adopt

creative and motivating methods of lecturing and the importance of being available to the students.

3. Admissions into chemistry and physics education programme should be given to students based on their interest and relevance of both science subjects.

4. Physics and chemistry classes should have more and immediate linkages to everyday life; so as to sustain students' interest and emphasize relevance of science.

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