ASSESSMENT OF SENIOR SECONDARY STUDENTS' PERCEPTIONS AND CAREER INTEREST IN SCIENCE, TECHNOLOGY, ENGINEERING AND MATHEMATICS (STEM) IN IJEBU-ODE LOCAL GOVERNMENT AREA, OGUN STATE

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Abstract
This study assessed senior secondary students' perceptions and career interest in Science, Technology, Engineering and Mathematics (STEM) in the Ijebu-Ode Local Government Area, Ogun State. The study adopted the descriptive survey type of non-experimental design. Simple random sampling technique was used to select 10 schools out of 30 schools, and from each of the 10 schools, 15 students were randomly drawn to gather a sample of one hundred and fifty (150) senior secondary II students. An instrument titled "Perceptions and Career Interest in STEM Questionnaire (PCISQ)" (r = 0.75) was used to collect data. The four research questions raised in the study were answered using descriptive statistics of Mean (2.50), Standard deviation and Independent-Samples T-test. The results showed that students have positive perceptions of STEM subjects (aggregate mean = 2.63); very high interest in STEM careers (aggregate mean = 2.90). The result also showed that based on gender, there is a significant difference (t = 2.12; df = 111; p<0.05), in senior secondary students' perceptions of STEM subjects, but no significant difference (t = 1.01; df = 111; p>0.05) in students' interests in STEM-related careers. It was therefore recommended, among others, that STEM teachers should ensure that students' interest in STEM is not just aroused but sustained enough for them to specialize in STEM-related careers and that this could be achieved through stakeholders, teachers, and students' collaborations.

Keywords: Assessment, Career Interest, Perception, Science, Technology, Engineering & Mathematics (STEM), Senior Secondary School.

Introduction

It is a general belief that no nation can rise above the level of its education. Hence, the more educated the citizens of a nation are, the higher the chances that such a nation will experience unprecedented growth and development. This is because education stands as an instrument of emancipating citizens from the grip of ignorance and also as a tool for developing the citizenry who in turn are expected to assist their nations to experience growth and developmental strides. One area of education that any nation cannot handle menially is Science education.

Science is an organized body of knowledge in form of concepts, theories, laws, and generalizations. It is also the study of natural phenomena leading to the discovery of the principles and laws governing them. The three interrelated aspects of Science are content, process and attitude. Content is divided into Physical, Life and Earth Sciences while Process,

according to the proposal of the American Association for the Advancement of Science (AAAS), involves fifteen inquiring skills including observing, classifying, experimenting, measuring, inferring, organizing data etc. Finally, Attitude is made up of openness and objectivities (Omoifo, 2012). Science education, therefore, is an area of education that is very important to the growth and development of any nation in the world. This is because, aside from making citizens scientifically literate, its objectives also include developing a nation scientifically, technologically and economically. Science Education, according to Garuba, Agweda and Abumere (2012) inculcate in students the basic knowledge, skills and attitudes needed for living and also for working in science and science-related fields. Hence, Science education entails the attempts of man to explore the natural world, interpret it and also manage it to his advantage. It can therefore be concluded that science education aims at transforming the environment to improve the quality of life in general, thereby making the world a better and safer place for all to live in.

The vital roles that science education play in developing, advancing and improving lives and the society, in general, has led to increased clamouring for adequate provisions for Science, Technology, Engineering and Mathematics (STEM) education in Nigerian educational institutions (Ekong, Akpan, Anongo, & Okrikata, 2015). This is concerning the crucial and relevant roles that STEM education plays in the scientific and technological advancement of nations that have implemented STEM fully in their educational systems. STEM education became an area of interest after it was first addressed in the early 1990s in the education of the United States (Quang, Hoang, Chuan, Nam, Anh & Nhung, 2015). STEM's integration was considered a remedy to the educational reforms in the United States when the society was in dire need of providing high quality and qualified workers with relevant skills and knowledge in science, technology and engineering to operate in the high-tech, the knowledge-based economy of the nation (Quang, Hoang, Chuan, Nam, Anh & Nhung, 2015). Tsupros, Kohler, and Hallinen (2009) posited that in STEM education, scientific concepts are taught to students with real-world content which help them in the application of science and technology skills in the contexts which enables connections between the school and the community; work and the global enterprise. Brown, Brown, Reardon & Merrill (2011) noted that STEM education is a standards-based, meta-discipline residing at the school level where teachers employ an integrated approach to teaching and learning. This discipline-specific content is addressed and treated as one lively, fluid study. The STEM Translation Model, as shown in Fig. 1 below, explains this better.

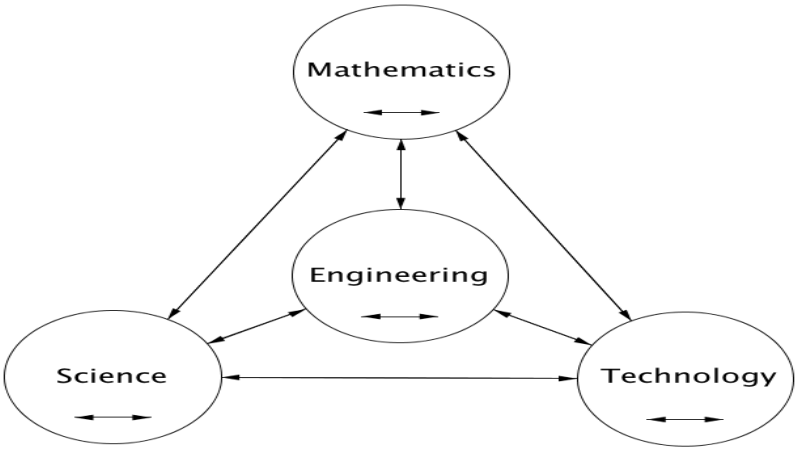

Figure 1: The STEM Translation Model. (Glancy & Moore, 2013)

The STEM Translation Model explains the integrated STEM learning approach. If STEM is considered as integrated learning made up of concepts, skills, and higher-order thinking that

link STEM disciplines together, then the STEM acronym takes on a meaning that is simply beyond STEM being a sum of its parts. Deductive reasoning skills in the field of Mathematics in addition to design thinking in Engineering, coupled with inquiry in the Sciences, and skilled computational thinking in the field of Technology are all distinct and independent approaches to solving problems. Assisting students to cultivate these skills and capabilities should be the sole objective of any STEM education. However, each STEM field has its strengths and weaknesses just as each of them is specifically suited to a specific set of problems. As prevalent globally, real-world problems are complex and integrated and therefore need not just the skill to utilize design thinking or inquiry, for instance, but also the capability to select the best strategy or combination of strategies that centre on the strengths of each way of thinking. Based on this perspective, STEM education does not just stress content, skills, and ways of thinking of each of the disciplines, but also stresses adequate comprehension of the interactions between the disciplines making up STEM in addition to the ways they complement and give support to each other (Glancy & Moore, 2013).

STEM education comes in different approaches – the silo, embedded and integrated approaches. In the silo approach, teachers teach the STEM subjects separately, that is, Science, Technology, Engineering and Mathematics subjects are taught independent of each other (Gerlach, 2015). And because students are taught the core contents of the subjects separately, this allows them to get deep-rooted skills, knowledge and understanding of each subject. However, in the silo approach, students are only able to familiarize themselves with the basic knowledge of the subjects but not experience the subjects by doing (Quang, Hoang, Chuan, Nam, Anh & Nhung, 2015). Contrary to the silo approach is the embedded approach which encourages students to learn through various contexts. It is more efficient than the silo approach because it allows students to reinforce what they already learned in other classes. The integrated approach encourages learning STEM content as one subject (Quang *et al.,* 2015). Hence, students are expected to make use of multidisciplinary STEM concepts in solving societal problems. This approach, therefore, helps to activate concentration, and also increases motivation in STEM content areas, especially with young learners (Laboy-Rush, 2015).

One factor that is very important in the study of Science is interest. Interest, being a psychological factor that is very unique, occurs during interactions between persons and objects of interest (Hidi, 2006). Increased attention, concentration are some of the unique features of interest. According to Krapp and Prenzel (2011), interest is multifaceted and thus can be examined and also measured at diverse intensities of generalizability with regards to diverse contexts, contents, and activities. The aim of 21st-century science education (STEM) is to rebuild students' interest in science and technology careers and this could be achieved by assisting students to take interest in the careers and also by preparing them for such careers (Tayyaba, Ayesha & Hamid, 2017). Interest specifies the quality of personal significance. It has been observed that students come to class with curiosity. However, when the fulfilment of their interest in science is delayed or not fulfilled at all, interest in STEM careers might decline significantly. Many students in secondary school and post-secondary are switching from STEM majors to other fields (Shao-Na, Hui, Shao-Rui, Lu-Chang, & Hua*,* 2019). Recent studies have also shown that one of the factors that affected the decline of students' interest in STEM-related careers is the lack of awareness of the wide range of careers that students can enter with a science background (Ergun, 2019; Peker & Dolan, 2012). Due to the lack of access to real STEM profession opportunities, students are unable to see these disciplines as springboards for their careers. Harackiewicz, Durik, Barron, Linnenbrink-Garcia and Tauer (2008) reported that, as a significant predictor of future choices, interest allows students to be able to assimilate study materials and this, in turn, enhances their memory and also boosts learning. Given this, teachers are strategically positioned to find

every means to ensure that the interest of students in learning is increased and sustained. Students tend to make career choices while they are still in school and this will affect their desire to major in STEM careers. Also, making available relevant information to students about STEM careers assist them to make more informed decisions about courses to study and the subsequent career paths. Kanwar (2010) reported that there is the need to highlight the relevance of guiding and focusing students' attention toward interest in pursuing STEM not just for literacy, but also for the reason of taking up careers in scientific fields.

Williams (2013) states that students give up on science for various reasons. One of such reasons is perceptions. Some students perceive science as being too hard for them to understand while some are afraid of making mistakes and thereby failing. Also, some are not ready to put in the required effort to prepare themselves to attain a career in STEM. Compared to other subjects, science learning involves laboratory work, and it is always considered as the essence of science. Students should perform experiments in the quest for scientific knowledge. However, according to studies such as those of Fadzil and Saat (2017), Abrahams, Reiss, and Sharpe (2013), and Fuccia, Witteck, Markic, and Eilks (2012), experimentation is still limited in many science classrooms due to a lack of resources. Studies also show that students are not interested in science due to the way science is taught, because hands-on activities are lacking, and their science teachers are not competent in teaching science, especially using scientific inquiry and investigation (Alan, Zengin, & Kececi, 2019; Fadzil & Saat, 2013). In general, most schools are also deprived of quality science teachers. Many of these teachers adopt a conventional approach in the teaching of science (Schwichow, Zimmerman, Croker, & Hartig, 2016; Abrahams, Reiss & Sharpe, 2013). Aderemi, Hassan, Siyanbola, and Taiwo (2012) also reported the importance of science and technology, as requirements for the growth, development and improvement of the wellbeing of humans. Therefore, ensuring this readiness, according to Aderemi, Hassan, Siyanbola and Taiwo, means that the potentials of all sectors of the population be fully developed with regards to science and technology. When students have the wrong perceptions of STEM careers or do not have any personal connection with the careers paths, they might be left out of the developmental process.

Gender has also been an issue of interest in STEM (Bannikova, Boronina, Kemmet, 2016). Differences in expectations of parents and teachers of boys and girls, gender differences in learning styles, the pressure of social norms remain the subject of active research interest (Bamberger, 2014; Saavedra, Araújo, TaveiraM. *et. al.*, 2014; Legewie & DiPrete, 2014; Archer, Dewitt, Osborne, *et. al.,* 2012; Cecha, Rubineaub, & Silbeyc, *et. al.,* 2011). Workplaces that are STEM-related such as the fields of Engineering, Science, Math, and Technology, are still majorly being held by men (Crawford, 2012). STEM concepts have been shown to support the development of a generation of thinkers, collaborators, and problem solvers. However, research has shown that while STEM is an important aspect of academic and social capital, gender discrepancies have been found. While current research displays a gender gap focused on the concepts of STEM, the overall gender gap has decreased over generations (Reinking & Martin, 2018; Bannikova, Boronina, Kemmet, 2016).

As reported by Wyss, Heulskamp and Siebert (2012), there is a need to adequately guide and assists students in deciding career paths as many of them are undecided in their attitudes toward science as a career preference. This finding further showed that students needed to be supplied with facts about STEM careers as early as possible. This might assist in averting the recurrence of a report by ManpowerGroup (2015) that in 2015, there was a 38% global shortage of talents in the top ten hardest jobs to fill including several STEM-related professions. The report from the UNESCO Institute for Statistics (UIS) has it that only 28% of women are researchers worldwide (UNESCO Institute for Statistics, 2015). Differences in

achievement, attitudes and interest in science across gender have been examined severally to understand the divergence in representation (Wyss, Heulskamp & Siebert, 2012). Whatever the cause behind it, the measured difference across gender may indicate that the methods with the greatest impact on male and female interest in STEM may vary and researchers need to identify appropriate ways to respond to this (Wyss, *et. al*, 2012). The UNESCO (2015) reported that several factors influence women's low representation in STEM careers and some of these factors include but are not limited to wider socio-cultural reasons, labour market preconceptions, and wrong classification of careers as belonging to a different gender, among others. Hoverer, duration has a significant effect, especially concerning gender-sensitive policies and frameworks, teacher training and recruitment, as well as making sure that learning materials are devoid of gender stereotypes.

In this digital revolution where science and technology play a fundamental role in our lives, STEM education is facing a great challenge. Among the possible factors that contribute to this phenomenon is the decline of interest in science that contributed to a decrease in the number of students pursuing STEM, ineffective teaching methodology, ad-hoc changes in policies and a low level of awareness of the demand for specialized talent in STEM (Fadzil, Saat, Awang & Adli, 2019). Consequently, there has been a decrease in the number of students pursuing Science, Technology, Engineering and Mathematics (STEM) related fields in secondary schools (Alan, Zengin, & Kececi, 2019; Ergun, 2019; Jaremus, Gore, Fray, & Prieto-Rodriguez, 2019; Halim & Meerah, 2016).

The Social Cognitive Career Theory (SCCT)

The study adopted the Social Cognitive Career Theory (SCCT) which was propounded by Bandura in 1986. This theory posits that the determination to produce a particular choice can be explained based on interests and self-reference beliefs. The Social Cognitive Career Theory (SCCT) also itemizes the roles of environmental support and barriers in determining student choices. The theory further premised that there are interrelationships among individual, environmental, and behavioural variables which are assumed to control academic and career choices (Lent, Lopez, & Lopez, 2008). The basis of the Social Cognitive Career Theory, among others include interests, self-efficacy beliefs, environmental support, outcome expectations and barriers, as well as choice actions. The theory offers an appropriate theoretical lens to study the issue of STEM choice and has been applied in several studies on STEM-related academic choice intentions (e.g., Hackett, Betz, Casas, & Rocha- Singh, 1992; Lent, Lopez, & Bieschke, 1993; Lent, Lopez, Lopez, & Sheu, 2008). Students' pursuit of STEM as an academic goal responds to contextual support and barriers—social, academic, or financial (Goldrick-Rab, 2007), students transitioning into postsecondary education need to navigate a series of demands, such as the need for financial resources, academic integration into college, and various external demands. The outcomes of this process might present either barriers or support and thus impact the academic choice behaviour of STEM-aspiring students.

Statement of the Problem

The 21st century is characterized by advancement in science and technology and for Nigeria to realize accelerated development in the 21st century, she needs qualitative science education which could be achieved by adequately preparing its students for relevant careers in STEM. Observations at the primary and secondary school levels, both in rural and urban communities showed that many students are not even provided with the necessary skills and motivation needed to boost their choices of STEM careers. Given this, fewer students enrol in science and technology careers as compared with other courses in the Arts and Humanities, Social and Management courses. This, in turn, has led to a shortage of STEM workers in the country whereas many students keep going into non-STEM careers. These consequences are evident going by the low numbers of students in secondary schools showing interest in STEM-

based courses. While many countries are coming up with modern reforms in their STEM education, Nigeria is yet to take drastic steps in setting up viable STEM education to ensure that its citizens take up careers in science and technology-related careers. 21st-century science education aims to rebuild the interest of students in the field of science and technology careers and this could be done by eliminating such factors including personal challenges of the students, gender bias, type of school, pedagogical challenges, and lack of relevant teaching materials, among others. There is therefore the need to assess senior secondary students' interest in Science, Technology, Engineering and Mathematics (STEM) careers in the Ijebu-Ode Local Government Area of Ogun State. Hence, this study is guided by the following objectives which are to:

(i) determine students' perception of selected STEM subjects in senior secondary schools;
(ii) determine the extent of students' interest in STEM careers after secondary school, and;
(iii) determine the extent of interest in STEM careers based on gender.

Research Questions

The following research questions were answered in this study:

(i) What is the perception of students on selected STEM subjects in senior secondary schools in Ijebu-Ode Local Government Area?
(ii) What is the level of students' interest in STEM careers after secondary school?
(iii) Will there be any significant difference in students' perceptions of STEM subjects in senior secondary schools in Ijebu-Ode Local Government Area based on gender?
(iv) Will there be any significant difference in students' interest in STEM careers in secondary schools in Ijebu-Ode Local Government Area based on gender?

Methods

The study adopted the descriptive survey of the non-experimental design. This is because the design excluded variables manipulation. The population of the study comprised senior secondary school II students in all the senior secondary schools in Ijebu-Ode Local Government Area of Ogun State. The simple random sampling technique was used to select 10 senior secondary schools out of 30 public secondary schools in Ijebu-Ode Local Government Area, Ogun State. From each of the 10 selected schools, 15 students were randomly drawn, making a total of one hundred and fifty (150) students. A researcher-designed and validated instrument titled "Perceptions and Career Interest in STEM Questionnaire (PCISQ)" ($r = 0.75$) was used for data collection in the study. The instrument was divided into four sections with options: Strongly Disagreed (SD), Disagreed (D), Agreed (A) and Strongly Agreed (SA) and To an extent, To a large extent, To a very large extent and Not at all, respectively.

To ensure the face and content validity of the instrument, copies were given to experts in instrument construction for their constructive suggestions. Reliability of the instrument was done using the test-retest method and a Cronbach Alpha reliability coefficient of 0.75 was arrived at. The instrument was administered to the sampled students in their various schools, and the collected data was used to answer the research questions raised, using descriptive statistics of Mean (2.5 benchmarks) and Standard Deviation for research questions 1 and 2, while the Independent Samples T-test was used to answer research questions 3 and 4, respectively. The 2.5 mean benchmarks were calculated by summing together the point of each of the response formats, and diving by 4 since there were four responses provided. The responses were – Strongly Disagreed (1 point), Disagreed (2 points), Agreed (3 points), and Strongly Agreed (4 points). Responses to negative statements were coded Strongly Disagreed (4 points), Disagreed (3 points), Agreed (2 points), and Strongly Agreed (1 point). Also, the

second response format was coded as: Not at all (1), To an extent (2), To a large extent (3), and a very large extent (4), and reversed for negative responses respectively.

Results

Research Question 1: What is the perception of students on selected STEM subjects in senior secondary schools in Ijebu-Ode Local Government Area?

Table 1: Mean and standard deviation indicating the perceptions of students on selected STEM subjects in senior secondary schools in Ijebu-Ode Local Government Area

S/N	Items	X	SD	Decision
1.	Computer Studies is a very hard subject to learn.	2.38	.967	Negative perception
2.	Computer Studies is a very interesting subject to learn	2.72	.796	Positive perception
3.	The study of Computer Studies will prepare me for my future career.	2.49	1.070	Negative perception
4.	Because I like Computer Studies, I will take a Computer related degree at the University.	2.61	1.030	Positive perception
5.	Mathematics is a very hard subject to learn.	3.04	.817	Positive perception
6.	Mathematics is a very interesting subject to learn	2.97	.871	Positive perception
7.	The study of Mathematics will prepare me for my future career.	2.04	.967	Negative perception
8.	I would like to take Mathematics related degree at the University.	2.85	.889	Positive perception
9.	Biology is a very hard subject to learn.	2.00	.991	Negative perception
10.	Biology is a very interesting subject to learn	3.24	.909	Positive perception
11.	The study of Biology will prepare me for my future career.	3.19	.701	Positive perception
12.	I would like to take Biology related degree at the University.	2.86	.895	Positive perception
13.	It is hard to learn Chemistry.	2.75	.912	Positive perception
14.	Chemistry is a very interesting subject to learn.	2.02	.935	Negative perception
15.	The study of Chemistry will prepare me for my future career.	2.76	.993	Positive perception
16.	I would like to take Chemistry related degree at the University.	2.81	.978	Positive perception
17.	Physics is a very hard subject to learn than Chemistry.	2.56	1.101	Positive perception
18.	It is very interesting to learn Physics as a subject.	2.91	.978	Positive perception
19.	Studying Physics will prepare me for my future career.	2.50	.983	Positive perception
20.	I would like to take Physics related degree at the University.	2.88	.908	Positive perception

Aggregate Mean = 2.63

The results in table 1 indicated that the students have positive perceptions of STEM subjects. With a mean of 2.38, the students indicated that Computer Studies is not a hard subject to learn; mean of 3.04 indicated that Mathematics is not a hard subject to learn; mean of 2.00 indicated that Biology is not a hard subject to learn; mean of 2.75 indicated that Chemistry is not a hard subject to learn while a mean of 2.91 indicated that Physics is an interesting subject to learn. Other results in the table indicated positive perceptions of STEM subjects by the students. It was therefore concluded that students have positive perceptions of STEM subjects in the study area.

Research Question 2: What is the level of students' interest in STEM careers after secondary school?

Table 2: Mean and standard deviation indicating the level of students' interest in STEM careers after secondary school in Ijebu-Ode Local Government Area

S/N	Items	X	SD	Decision
1.	I have aim to take up a career in the sciences or engineering since childhood.	3.20	.792	Very high interest
2.	I will like take up a profession based in science, technology, engineering or mathematics.	3.05	.864	Very high interest
3.	I plan to become a scientist or engineer in the future.	2.94	.859	High interest
4.	I often discuss about the advantages of taking up a career in STEM with my friends in school.	3.00	9.54	Very high interest
5.	I enjoy doing subjects based on in science, technology, engineering or mathematics.	2.55	1.026	High interest
6.	The more I learn science subjects, the more I wish to take up a career in science related field.	3.04	.828	Very high interest
7.	I try to make efforts to learn my science subjects very well because I plan to take up career in science, technology, engineering or mathematics.	3.18	.722	Very high interest
8.	I like all science, technology, engineering and mathematics related subjects.	2.84	.941	High interest
9.	I wish to be one of the scientist or engineers in my society.	3.10	1.009	Very high interest
10.	Even if I will go into the teaching career, I will like to teach STEM related subjects.	3.18	.601	Very high interest
11.	It's my personal decision to become a scientist or engineer in the future.	2.83	.885	High interest

Aggregate Mean = 2.90

The result in table 2 shows the majority of the respondents have a very high interest in STEM careers. The students indicated that they will like to have a profession based in science, technology, engineering or mathematics (x = 3.05 – very high interest). Also, the students indicated that they enjoy doing subjects based on science, technology, engineering or mathematics (x = 2.55 – high interest) activities. In addition, the students indicated that it's their personal decision to become scientists or engineers in the future (x = 2.83 – high interest). They also indicated that they like all science, technology, engineering and mathematics-related subjects (x = 2.84 – high interest) just as they indicated high and very high interest in other items in the table. This showed that the students, to a very high extent, are interested in STEM careers.

Research Question Three: Will there be any significant difference in students' perceptions of STEM subjects in senior secondary schools in Ijebu-Ode Local Government Area based on gender?

Table 3: Independent sample t-test result showing significant difference in male and female secondary school students' perceptions of STEM subjects

Variables		N	Mean	Std. Deviation	t	df	Sig.	Remark
Perceptions	Male	52	53.9231	6.19882	2.121	111	.036	Sig.
	Female	61	51.4262	6.26753				

The result in Table 3 shows that there is a significant difference in the perceptions of male and female secondary school students on STEM subjects in the Ijebu-Ode Local Government Area of Ogun State. This is evident in the result ($t = 2.12$; $df = 111$; $p<0.05$) which indicates significant difference. Also, the Mean for perception for male students (53.9231) tends to be statistically higher than that of the female students (51.4262), signifying differences in opinions on STEM subjects.

Research Question Four: Will there be any significant difference in students' interest in STEM careers in secondary schools in Ijebu-Ode Local Government Area based on gender?

Table 4: Independent Samples T-test result showing no significant difference in male and female secondary school students' interest in STEM careers

Variables		N	Mean	Std. Deviation	t	df	Sig.	Remark
Interest	Male	52	32.3654	4.53323	1.015	111	.312	Sig.
	Female	61	31.5246	4.26461				

The result in Table 4 reveals that there is no significant difference between male and female secondary school students' interest in STEM careers. The result ($t = 1.01$; $df = 111$; $p>0.05$) indicates no significance difference. Also, the Means of both male and female students did not statistically differ. This implies that male and female senior secondary students in Ijebu-Ode Local Government Area both have the same level of interest in STEM careers.

Discussion

The results of the study showed that students have positive perceptions of STEM subjects (Computer, Mathematics, Biology, Chemistry and Physics). This corroborates Wyss *et. al.* (2012), who reported the importance of providing students with facts about STEM careers as early as possible. According to a survey conducted in 2015, there was a 38% global shortage of talents in the top ten hardest jobs to fill including several STEM-related professions. (ManpowerGroup, 2015). This makes it very imperative to ensure that students have positive perceptions of STEM to avert a global shortage of manpower in scientific fields. The finding of this study also showed that the majority of the students investigated in the study have a very high interest in STEM careers.

Also, the finding showed that the students investigated in the study would like to take up a profession based in science, technology, engineering or mathematics. According to Harackiewicz, Durik, Barron, Linnenbrink-Garcia and Tauer (2008), interest is a significant predictor of future choices, interest allows students to be determined to assimilate study materials, and this, in turn, enhances their memory and also boosts learning. Also, the aim of

21st-century science education (STEM) is to rebuild students' interest in science and technology careers and this could be achieved by assisting students to take interest in the careers and also by preparing them for such careers (Tayyaba, Ayesha & Hamid, 2017). Given this, teachers are strategically positioned to find every means to ensure that the interest of students in learning is increased and sustained. According to Shao-Na, Hui, Shao-Rui, Lu-Chang, and Hua (2019), interest specifies the quality of personal significance, just as it has been observed that students come to class with curiosity. However, when the fulfilment of their interest in science is delayed or not fulfilled at all, interest in STEM careers might decline significantly. Hence, to avert recent trends in research studies who have it that the lack of awareness of the wide range of careers that students can enter with science background is causing a decline in student's interest in STEM-related careers (Ergun, 2019; Peker & Dolan, 2012, in Fadzil, Saat, Awang & Adli, 2021), there is the need to increase students' interest in STEM careers.

The finding also showed that there is a significant difference in the perceptions of male and female secondary school students on STEM subjects. This implies that male and female secondary school students differ in their perceptions of STEM subjects. According to Williams (2013), students have various perspectives on STEM subjects for various reasons. One of such reasons is perceptions. Williams reported further that some students perceive science as being too hard for them to understand while some are afraid of making mistakes and thereby failing. Also, some are not ready to put in the required effort to prepare themselves to attain a career in STEM. Studies have also shown that students might have varied perceptions of STEM due to the way science is taught because hands-on activities are lacking, and their science teachers are not competent in teaching science, especially using scientific inquiry and investigation (Alan, Zengin, & Kececi, 2019; Fadzil & Saat, 2013). In general, most schools are also deprived of quality science teachers. Many of these teachers adopt a conventional approach in the teaching of science (Schwichow, Zimmerman, Croker, & Hartig, 2016; Abrahams, Reiss & Sharpe, 2013). All of these might give rise to students having varied perceptions of STENM subjects.

Finally, the study has shown that there is no significant difference between male and female secondary school students' interest in STEM careers. This implies that male and female senior secondary students both show the same level of interest in STEM careers, although their perceptions of STEM subjects differ. According to Aderemi, Hassan, Siyanbola, and Taiwo (2012), the importance of science and technology as requirements for the growth, development and improvement of the well-being of humans. Therefore, ensuring this readiness, according to Aderemi, Hassan, Siyanbola and Taiwo, means that the potentials of all sectors of the population be fully developed with regards to science and technology. When students do not have any personal connection with STEM career paths, they might be left out of the developmental process. Indirectly related to this finding is the report of Wyss, Heulskamp and Siebert (2012), that differences in students' interest in science across gender are frequently studied to understand the divergence in representation. Whatever the cause behind it, the measured difference across gender may indicate that the methods with the greatest impact on male and female interest in STEM may vary and researchers need to identify appropriate ways to respond to this. As reported by Wyss, *et. al.,* (2012), there is a need to adequately guide and assists students in deciding career paths as many of them are undecided in their attitudes toward science as a career preference. This finding further showed that students needed to be supplied with facts about STEM careers as early as possible. This might assist in averting the recurrence of a report by ManpowerGroup (2015) that in 2015, there was a 38% global shortage of talents in the top ten hardest jobs to fill including several STEM-related professions. The report from the UNESCO Institute for Statistics (UIS) has it that only 28% of women are researchers worldwide (UNESCO Institute for Statistics, 2015).

Conclusion

Given the findings of the study, it was concluded that while senior secondary students have differences in perceptions toward STEM subjects, they both have the same level of interest in STEM careers. Differences in their perceptions of STEM subjects might be due to various reasons including but not limited to the way STEM subjects are taught in senior secondary schools, lack of hands-on activities, inappropriate use of teaching methods, among others.

Recommendations

Based on the findings of the study, the researchers recommended that:

(i) All stakeholders in education should make it an urgent priority to provide schools and STEM teachers with all the equipment and incentives needed to teach STEM subjects in ways that would be appealing and simple for students to understand. It is believed that this might help in reducing the misconceptions that senior secondary students might have concerning STEM subjects, especially that science subjects are difficult to study.

(ii) Also, STEM teachers should ensure that students' interest in STEM is not just aroused but sustained till they eventually pick up careers in STEM. This could be done through stakeholders, teachers, and students' collaborations. This will ensure that students with an interest in STEM are monitored till they major in STEM careers.

(iii) The government and other stakeholders in Education should ensure that schools are supplied with every necessary equipment and tool needed to make the learning of STEM encouraging, motivating and enjoyable for students, and easier to teach by teachers as well. It is believed that this will further engender greater interest in STEM careers by students.

(iv) Finally, teachers and other stakeholders in education should ensure that there is no form of discrimination between male and female students concerning the study of STEM and taking up STEM careers by senior secondary students. Both sexes should be evenly encouraged to take up careers in STEM-related fields.

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