COUNSELLING FOR GENDER DIFFERENCES IN PERCEPTION OF AND INTEREST IN SCIENCE AND TECHNOLOGY AMONG SECONDARY SCHOOL STUDENTS IN ONDO

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Abstract
The study examined gender differences in perception of and interest in science and technology. A survey research design was used in the study. The population for the study comprised all Junior Secondary three students in Ondo. The sample consisted of 223 students (128 male and 96 female) randomly selected from six secondary schools Questionnaire on Gender Perception and Interest in Science and Technology was used to collect data for the study. The psychometric properties of the instrument were established and the reliability coefficients of 0.74 and 0.71 for perception and interest in science and technology respectively were obtained using the Cronbach's Alpha Statistics. Data collected were analysed using t-test. The results revealed that there is no significant difference in the perception of male and female secondary school students in science and technology while significant difference exists between male and female students in their interest in science and technology. The study therefore recommended that counsellors should organize group counselling on regular by basis to arouse students' interest especially girls in science and technology. Parents-Teachers Association forum should also be used to sensitize parents and teachers to encourage female students to choose careers in science and technology for the development of the country. Counsellors should render liason service to link brilliant female students with governmental and non-governmental organizations that could sponsor their education. Students should be taken on tours to places that would encourage interest in science and technology.

Keywords: Gender, Perception, Interest, Science and Technology.

Introduction

The word science comes from the Latin word for knowledge, "Scientia". It is knowledge about life, the universe, how things work, and how to solve problems. Scientific fields include pure and applied sciences. Pure science observes and explains while applied science uses the findings from pure for practical purposes. Technology is applied science although it also involved industrial art. Technology makes the discoveries and inventions of scientists available in practical form for man. Both science and technology supply the needs of mankind and have brought mankind from a primitive form of life to the space age. These two spheres of knowledge, therefore, combine to form the core of national development. No nation can hope to achieve greatness without recording major breakthrough in technological fields (Olasehinde, 1994).

Every informed person is aware of the amazing accomplishments of science and technology in every sphere of human endeavour. Science and technology have drastically and astronomically increased our knowledge of the universe. From the beginning of time, man has strived to improve his way and quality of life. The totality of the use and application of his knowledge, skills, tools and materials constitute what we today describe as technology. Technology plays a fundamental role in wealth creation, improvement of the quality of life, real economic growth and transformation in any society. Countries that want to develop must invest significantly in science and technology. This is achieved by developing the talent, the human capacity required to compete in a globally competitive world.

The central role played by science and technology in national development has become better appreciated all over the world. As early as the 1940s and immediately after the Second World War, the developed nations of the world (mainly Europe and America) recognized science and technology as the weapon for economic development, reducing poverty and alleviating suffering, hunger and illnesses. These nations invested large proportions of their gross national product (GNP)in science and technology programmes and have continued to take giant strides in that direction. Most developing nations including Nigeria have been beneficiaries of these efforts (Azeke, 1994).

The National Policy on Education (1998) gave premium to the study of science and technology by prescribing admission ratio of 60:40 percent sciences to liberal art into Nigerian universities. The policy did not discriminate between boys and girls in their access to the study of science and technology in schools. In other words, it is the intention of government to provide equal educational opportunities to all citizens of the country. This notwithstanding, more boys than girls enroll for the basic sciences (viz, biology, chemistry, and physics) at the school certificate level. While biology is fairly popular among boys and girls, more boys than girls enroll for chemistry, mathematics, and physics. Furthermore, enrolment is lowest in mathematics and physics although more pronounced among girls than boys.

Indeed, the majority of some third-form students perceived mathematics as a subject more for males than females (Falayajo, 1984). Nigerian girls have been found to under-achieve relative to the boys in the basic sciences and particularly so in mathematics (Ufot and Awuwoloye, 1987).

It has been observed that interest in science and science-related careers among students is failing to keep pace with the expected demand for a scientifically-literate workforce (National Academy for Sciences, 2007). Several explanations have been suggested for the lack of interest in science, among them the development of negative attitudes toward science that originate during the elementary science years (Haladyna & Shaughnessy, 1982) and persist through the secondary and post secondary years (Desy, Peterson & Brockman, 2009, George, 2006, Simpson & Oliver, 1985).

Although, a number of variables may affect students' attitudes toward science, the two most influential appear to be gender and quality of science instruction students experience early in their academic lives (Ebenezer & Zoller, 1993; Osborne, Simon & Collins, 2003; Schibeci & Riley, 1986). Past studies (American Association of University Women (AAUW), 1991; George, 2006; Weinburgh, 1995) have shown that girls tend to exhibit more negative attitudes towards science classes and a career in science than do boys.

In addition, girls' interest in science steadily declines from midle school to the high school years (AAUW, 1991, Hostein & Welch, 1984). The lack of interest in science among female high school students does not appear to be explained by low ability or achievement (Miller, Blessing & Schwartz, 2006; Weinburgh, 1995). In fact, girls are earning high school math and science credits at the same rate as boys and are earning slightly higher grades in these classes (US Department of Education, 2007).

Several researchers (Gogolin & Swartz, 1992, Weinburgh, 1995) have suggested that positive attitudes are essential precursors for students to develop an interest in science. Farenga and Joyce (1998) found that positive feelings and perceptions of science among elementary-aged girls in particular led to their greater interest in science classes.

Today, more women than in the past obtain degrees in science and engineering (Dean & Fleckenstein, 2007; Hill, Corbett & St. Rose, 2010). However, still remain underrepresented in science, technology, engineering and mathematics (STEM) (Hill et. al., 2010). Why, after so many systematic efforts (Liston, Peterson & Ragar, 2008; Lufkin & Reha, 2009), do women continue to be underrepresented in STEM? Valian (2007) suggested that fewer females than males pursue professional careers in science due to low interest. Valian hypothesized that since individuals make their own choices, some individuals, regardless of the encouragement or support they receive, remain uninfluenced and do not explore STEM-related career options. Are females just not interested in STEM? Jolly,

Campbell and Perlman (2004) proposed that certain components must be in place to increase the likelihood of females developing interests in STEM.

Nigeria is still developing nation-mainly subsisting on the technology of the advanced countries. There is need for the country to modernize her economy, to automate her production, and to promote the standard of living of her citizens. One means of achieving all of these is through scientific and technological breakthroughs. Ironically, only about half (men only) of Nigeria's human potentials is being tapped. The other half (mainly women) is generally neglected even though women in Nigeria constitute the majority. Women are grossly underrepresented especially in science and technology fields (Olasehinde, 1994).

Hence, this study aims at investing gender differences between male and female secondary school students in perception of and interest in science and technology in a bid to use counselling as a tool to encourage female students to choose careers in science and technology for the development of the country.

Objectives of the Study

The objectives of this study are to:

1. find out if there is any difference in the perception of male and female students in science and technology.
2. determine if there is any difference in the interest of male and female students in science and technology.

From the objectives stated the following research hypotheses were formulated.

Hypothesis One: There is no significant difference in the perception of male and female students in science and technology.

Hypothesis Two: There is no significant difference in the interest of male and female students in science and technology.

Methods

A survey research design was used in this study. The population for the study comprised all Junior Secondary three students in Ondo. The sample consisted of 224 students (128 male and 96 female) randomly selected from six secondary schools which are four public schools (two mixed and two single-sex) and two private schools. Questionnaire on Gender Perception and Interest in Science and Technology was used to collect data for the study. The questionnaire was divided into three sections. Section A consists of personal data of the respondents, Section B consists of items on students perception of science and technology while Section C consists of items on students interest in science and technology. The psychometric properties of the instrument were established and the reliability

coefficients of 0.74 and 0.71 for perception and interest in science and technology respectively were obtained using the Cronbach's Alpha Statistics. Data collected were analysed using t-test.

Results

Research Hypothesis One: There is no significant difference in the perception of male and female students in science and technology.

Table 1: Gender Difference in Students' Perception in Science and Technology

MALE	N	Mean	Std. Deviation	Df	t	P
Male	128	21.4141	4.61686	222	-0.243	0.808
Female	96	21.5833	5.79049			

From Table 1, the male subjects have a mean of 21.4141 and a standard deviation of 4.61686 while female subjects have a mean of 21.5833 and standard deviation of 5.79049. A t-test analysis of these values yielded a t-value of -0.243 which is not significant at 0.05 level. This implies that there is no significant difference in the perception of male and female students in science and technology.

Hypothesis Two: There is no significant difference in the interest of male and female students in science and technology. The result is presented in table 2.

Table 2: Gender Difference in Students' Interest in Science and Technology

MALE	N	Mean	Std. Deviation	Df	t	P
Male	128	15.8281	3.08440	222	3.083	0.002
Female	96	14.5208	3.21503			

Table 2 shows that male subjects have a mean of 15.8281 and a standard deviation of 3.08440 while female subjects have a mean of 14.5208 and standard deviation of 3.21503. Using the t-test statistical analysis, a t-value of 3.083 was obtained. This value is significant at 0.05 level. This implies that there is significant difference in the interest of male and female students in science and technology.

Discussion

The results revealed that there is no significant difference in the perception of male and female students in science and technology. This is contrary to the view of Eccles (1984); Ehindero (1986); Rosenfield & Stephens (1978) that females have low self-concept about their abilities in science and mathematics. The change in perception may be due to the effort focused on women as a distinct socially

disadvantaged sub-group in science and technology and developing strategies for encouraging their greater participation.

The results also showed that there is significant difference in the interest of male and female students in science and technology. This is supported by the American Association of University Women (AAUW, 1991); George (2006) and Weinburgh (1995) who have shown that girls tend to exhibit more negative attitudes towards science classes and a career in science than do boys. In addition, girls' interest in science steadily declines from middle school to the high school years (AAUW, 1991, Hotstein & Welch, 1984). Valiant (2007) also suggested that fewer females than males pursue professional careers in science due to low interest. This implies that something urgent needs to be done by curriculum planners and the government to encourage more participation of girls in science and technology.

Conclusion and Recommendations

There is no significant gender difference in the perception of science and technology but female interest is still low compared with that of male. Based on the findings of the study, the following recommendations are made:

- Counsellors should encourage and motivate JSS 3 girls to go for science in SSS classes.
- Programmes and seminars should be organized by counsellors to develop the interest of girls in science and technology.
- Successful female scientists and engineers should be invited as resource persons to sensitize the students.
- Counsellors should identify students that need help for encouragement in science and technology.
- Attention should be paid to the needs of female and male students especially those in non-traditional areas.
- Intervention and remedial strategies should be used on a sustainable basis to change sex-stereotyped attitude.
- The low level of achievement of girls in Science, Technology and Mathematics should be improved through attitude modification, compensatory classes, challenging the girls to the highest peaks of their potentials and achievements.
- Girls should be encouraged to remain in STM by providing assistance to indigent girls and awarding scholarships to promising ones as is being done by Nigerian Association of Women in Science, Technology and Mathematics.
- Wherever possible, conversion programmes should be provided for girls with good arts subjects at O'level or Senior Secondary Certificate Examination to switch to STM subjects at the beginning of their tertiary studies.

- There should be no pressure from peers, parents and even teachers on females to pursue conventional paths in their academic and professional pursuits.
- The media should be used to publicize the "problem" of equal opportunities and the need for remedial action to compensate for girls' under-achievement.

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