

EFFECT OF GENDER FACTOR ON TEACHER TRAINEE STUDENTS' ATTITUDES TOWARDS THE STUDY OF SCIENCE IN THE COLLEGES OF EDUCATION-GHANA

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ABSTRACT: *Students' participation and performance in Science depend on the kind of attitude students' show towards science. This kind of attitude exhibit by students' is caused by some factors. This paper therefore seeks to investigate the effect of gender as a factor on teacher trainee students' attitude towards the study of science and make recommendations for college authorities. The instrument used was a structured questionnaire which consisted of a four-point Likert scale items. Data for the study was obtained by administering 140 questionnaires to 140 students' from five (5) public Colleges of Education. The respondents were sampled using stratified random sampling and purposive sampling techniques. Twenty-Eight (28) respondents from each of the colleges were selected to make up the total number of 140 respondents. All the questionnaires were fully answered and returned. The data obtained was analysed using frequency counts and percentages.*

KEYWORDS: Gender, Attitude, Participation, Performance.

INTRODUCTION

The prime responsibility of every teacher is to make sure that the subject matter of every lesson becomes relevant to every student in a class at the end of instructional hour(s). Teachers been aware of this task ahead of them work diligently in terms of preparation before and during instruction. This helps create a conducive classroom environment that brings meaningful learning to all students, in respective of their absorption rates and learning styles. Teacher selects correct instructional materials (that are risk free, learners' friendly and places learner's at the centre of the teaching and learning process), uses appropriate instructional techniques (that are activity-oriented), uses correct sitting arrangement (that fosters group work) and uses classrooms that are well-ventilated during teaching and learning process.

Despite all these factors that are considered to create the enabling environment for learning, attitudes of students towards science lessons are still not the best. What this means is that these factors are not what students expect to see in the classroom in order for them to show positive attitude in science lessons. Many studies have indicated gender-related issues rather, as the determining factors of students' attitudes towards science. For example, Erinosh (2008) said "it is vitally important for a teacher to understand classroom dynamics and psychology of gender relations in order to provide a balanced (or equitable) and friendly learning environment. And according to Erinosh (1997b) a review of science text and curriculum materials that are being used in school shows that they are seriously gender-biased. Almost excluding females in the examples and illustrations, omitting the action of women; using more male generic nouns/pronouns; showing females in restricted roles in relation to scientific activities; and linking males with a wider array of scientific occupations

and equipment than females". On the contrary, Khale (1996); Campbell, Jolly and Perlman (2002) are of the view that girls and boys are found to perform equal roles in scientific activities. This study therefore intends to find out if really gender issues have influence on the kind of attitude students' show during science lessons.

That is, this paper aims to investigate if truly females are denied attention and opportunity in science lessons. Also, the paper seeks to find out if gender discrimination has any significant effect(s) on females' attitudes in participation and performance in science. In addition, this study looks forward to see if equal attention and opportunity is given to both males and females to actively participate in science lessons.

REVIEW OF RELATED LITERATURE

Some measure of attitudes towards school science can be obtained by asking pupils to rank their liking of school subjects Whitfield (1980) and Ormerod (1971). Whitfield's (1980) analysis of data on English students about their preferences for science show that physics and chemistry were two of the least popular subjects and that these were distanced in pupil's mind from biology. Whitfield is of the view that rejection of science by student is as a result of their perception that it is a difficult subject. Perhaps surprisingly, Whitfield's type of study has not been repeated on a large scale. However, a recent study by Lightbody and Durdell (1996a) in one school, using slightly more sophisticated preference ranking system, has shown that boys were far more likely to report liking science than girls-a finding given additional salience by the work of Jovanovic and King (1998), which suggest that one of the major factors in girls' antipathy towards science is their perception that they are better at other subjects. Preference ranking is simple to use and the result of such research are easily presented and interpreted. Its fundamental problem is that it is a relative scale. Hence, it is possible for a student with an extremely positive attitude to all school subjects to still rank science as the least popular, yet still have a much more favourable attitude than another student who has a strong dislike for all subjects and ranks science first. Neither is it suitable for the measurement of attitude change as its blunt nature may not expose changes in attitude as a student's attitude to other subjects may change as well (Osborne, Simon and Collins, 2003).

Research studies have identified a number of factors influencing attitudes towards science in general. These can be broadly defined as gender, personality, structural variables and curriculum variables. Of these the most significance is gender according to Osborne, Simon and Collins (2003). Gardner (1975) said, "Sex is probably the most significant variable related towards pupils' attitude to science". This view is supported by Schibeci's (1984) extensive review of the literature, and more recent meta-analyses of a range research studies by Becker (1989) and Weinburgh (1995) covering the literature between 1970 and 1991. Both the latter two papers summarise numerous research studies to show that boys have a consistently more positive attitude to school science than girls, although this effect is stronger in physics than in biology. Interestingly, this effect is highest in "general science" and Edinburgh's work raises question of whether the introduction of "balance science" or integrated science courses during the past decade has had a similar effect in increasing the separation between boys' and girls' attitude to science. And according to Breakwell and Beardshell (1992); Harding (1983); Harvey and Edwards (1980); Johnson (1987); Jovanovic and King (1998); Kahle and Lakes (1983); Robertson (1987) and Smail and Kelly (1984),

what is clear from an extensive literature on the subject, mainly as a result of a serious consideration and investigation of the problem in the 1980s, is that girls' attitudes to science are significantly less positive than boys.

Notwithstanding, there is now some evidence beginning to appear that girls no longer hold such a stereotypical aversion to career in science and are confident of their ability undertake science courses (Colley et al 1994; Lightbody and Durndell 1996b and Whitehead 1996). For example, Archer (1992) found out that girls between ages of 10 and 15 reported liking most strongly the three subjects labeled stereotypically 'masculine'; mathematics, science and games. Again, Whitehead's (1996) work has found out that, although there are significant gender distinctions within pupils' perceptions of subject, these have no significant influence on subject choice. In her study, girls offering mainly feminine subjects described themselves as high on stereotypical masculine trait and were highly intrinsically motivated. On the other hand, boys offering mainly masculine subjects said they were extrinsically motivated for status recognition and highly paid job.

This has raised concern to give every student in the classroom an equal opportunity and unrestricted access to knowledge. Thus, a teacher must recognise the individual difference of learners and adopt effective strategies that can make all the students to reach their optimal level of attainment (Erinosho, 2008). The underlying principles of equity or fairness in science is that, all students, regardless of gender, cultural or ethnic background, physical or learning disabilities should have the opportunity to attain high level of scientific literacy (NRC, 1996). According to Erinosho, (2008) gender equity should be guided by the desire to give an equal opportunity to boys and girls to actively participate and learn science in an enabling environment without any impediment.

She continued to say that, gender equity is about encouraging boys and girls to study science in school with the aim of increasing their literacy level and or their charting career in science related fields. She stressed that, it is important to build up the capacity of females and males in science so as to:

- Bring the perspective, skills and ideas of both sexes into decisions having to do with technological advances.
- Equip them with skills that will increase access to the vistas of opportunities in science and also to function effectively in the labour market.
- Address the short fall in human resources that are needed for scientific progress and
- Empower all with the appropriate knowledge in science that is relevant for coping with everyday problem in health and nutrition, agriculture, environment and energy among others.

“Broaden your horizons”, “girls can do anything”, “switch on to science”, “an electrifying career”, “don't get filtered out” and “science can take you beyond the experimental stage”, are but some of the puns and slogans which educators have developed in order to capture, in a memorable way, the issues associated with girls' problematic relationship with science as a school-subject and an associated vocational choice (Gough & Kenway, 1998). Over the last three decades, there has been improvement in educational achievement and attainment in science education with regard or reference to girls and women participation. Despite the improvement recorded over the years and educators' puns and slogans to capture girls'

problems with science as a school-subject, they still trail behind their male counterparts in their participation. This could be due to the traditional argument that females are incapable of acquiring the skills to learn science or are deficient in the analytical and visual spatial skills that are needed for abstract reasoning.

Under representation of girls/women in science is well documented (Yoloye, 1998; Erinosh, 2005). This claim is supported by Nigerian data indicating that girls formed 32% of arts students, 28% of social science students and a mere 17% of natural sciences in the Senior Secondary Certificate Examination (SSCE) in 1999 – 2004. Prime emphasis in gender research in science education has been on documenting and reporting differences between girls' and boys' participation, achievement and attitudes and /or their types of engagement with particular learning strategies in science education. (Gough & Kenway, 1998). They added that the under-representation and participation of girls in science courses and careers has long been a central preoccupation. Girls and boys are found to perform equally well if the instructional context is fair and conducive (Kahle, 1996a; Campbell, Jolly & Perlman, 2002).

The need to move beyond this tendency has recently been well argued by several writers (see, for example, the edited collections and reviews by Fraser & Tobin, 1998; Kahle & Meece, 1994; Parker, Rennie & Hardings, 1995; and the editorial by Krockover & Shephardson, 1995). Gough & Kenway, (1998) are of the view that, such writers suggest that the emphasis on gender differences in participation rates could perhaps make way for more pressing concerns. Gough & Kenway, (1998) however, did not support the idea that gender differences in participation rate could make way for pressing concerns. They cited participation (Baker & Leary, 1995; Greenfield, 1995; Solomon, 1997), attitudes (Chambers & Andre, 1997; Greenfield, 1996; Parsons, 1997; Weinburgh, 1995), achievement (Catsambis, 1995) and learning strategies (Alexopoulou & Driver, 1997; Hazel, Logan & Gallagher, 1997; Lagoke, Jegede & Oyebanji, 1997; Meece & Jones, 1996; Roychoudhury, Tippins & Nichols, 1995) of student as factors which cannot be overlooked when it comes to issues of science education.

Additionally, the gender differences in participation and pursuit of science by members of both sexes are being linked to social-psychological factors at the level of individual, the home and school that contribute to different interests and attitudes (Oakes, 1991; Kahle, 1996b; Campbell et. al, 2002; Erinosh, 1997b, 1999). Some of the individual factors that are critical predictors of science choice and /or achievement among females include: attitudes towards science (Oakes, 1991; Erinosh, 1999), Social background (Erinosh, 1997b), and mathematics anxiety (Fennema 1990; Campbell et. al, 2002). According to Krockover & Shephardson, (1995, P.223) in terms of issues of difference, there has been an emerging trend in some of this recent literature to acknowledge differences among girls and women, to recognize that gender equity research ought to transcend the boundaries of race, ethnicity, class and socio-economic identities'. Thus, for example, there are now articles which still address colour (Parsons, 1997) ethnicity (Greenfield, 1996) and homelessness with respect to gender and science education.

METHODOLOGY

This study followed a qualitative survey research method. In this a structured questionnaire was used. This questionnaire consisted of a four-point Likert scale items rated Strongly Agree

(SA), Agree (A), Disagree (DA) and Strongly Disagree (SD). Data for the study was obtained by administering 140 questionnaires to 140 students. These sampled students were taken from five Colleges of Education in the Central and Western Regions of Ghana. Twenty-eight (28) students were selected from each of the five colleges. Stratified random sampling was used to select students (respondents) from two categories of students: non-elective (Integrated Science students) and elective (pure-science students). For fair representation of voices of male and female students in the study, purposive sampling was used to select Twenty-eight (28) students from each college to include equal number of males and females. In totality, seventy (70) males and seventy (70) females were used. The data obtained was analysed using frequency counts and percentage.

RESULTS AND DISCUSSIONS

Table1: Response of teacher trainee students' about gender factor and their attitude towards the study of science.

(a) Response of male students

Item/Statement	Response and Percentage		
	SA	A	DA
SD			
1. Science is for men not women 48(68.65%)	1(1.4%)	2(2.9%)	19(27.1%)
2. Equal attention is given to men and women during science lessons	57(81.4%)	11(15.7%)	2(2.9%)
3. Science is difficult to learn 12(17.1%)	25(35.7%)	19(27.1%)	14(20.0%)
4. Females who do science are Stigmatised as witches 27(38.6%)	5(7.1%)	18(25.7%)	20(28.6%)

(b) Response of female students

Item/Statement	Response and Percentage		
	SA	A	DA
SD			
1. Science is for men not women 1(1.4%)	51(72.9%)	12(17.1%)	6(8.6%)
2. Equal attention is given to men and women during science lessons 2(2.9%)	49(70.0%)	17(24.3%)	2(2.9%)
3. Science is difficult to learn -	55(78.6%)	15(21.4%)	-
4. Females who do science are Stigmatised as witches	52(74.3%)	17(24.3%)	1(1.4%)

Source: Field survey (April, 2018)

Total number of respondents	=	140
Number of male respondents	=	70
Number of female respondents	=	70

Assessing gender factor on teacher trainee students' attitude towards science, a Likert type items rated Strongly Agree (SA), Agree (A), Disagree (DA) and Strongly Disagree (SD). The results from Table 1(a) indicate that 48 male respondents representing 68.65% Strongly Disagree that science is for men and not women. This experiences opposite view from the female counterpart as only 1 female respondent representing 1.4% Strongly Disagree to the item 1 as in the table 1(b). And as the rest of the male students' indicate 1(1.4%), 2(2.9%) and 19(27.1%) for Strongly Agree, Agree and Disagree respectively, the females on the other hand, show 51(72.9%), 12(17.1%) and 6(8.6%) respectively for the same item 1.

It is also very clear that none of the male students respond to Strongly Disagree for the item 2 whilst only 2 female respondents who constitute 2.9% of the females Strongly Disagree. Majority of the total respondent rather show their support for this item number 2 since 57(81.4%) and 11(15.7%) of the males Strongly Agree and Agree while 49(70.0%) and 17(24.2%) represent the positions of the females for Strongly Agree and Agree respectively. 2(2.9%) each is the response recorded for males and females to indicate that they Disagree to the item number 2.

As 12(17.1%) of the male students' choose Strongly Disagree for the statement "Science is difficult to learn," none of the opposite sex show such opinion. The females rather express Strongly Agree to this statement with 55(78.6%) while 25(35.7%) of the males Strongly Agree. Ones again, the females believe that they are stigmatised as witches when they pursue science as they Strongly Agree with 52(74.3) for item 4. The male counterparts however, express a contrary view to that of the females with only 5 respondents which correspond to 7.1%. In response to this same item 4, 18(25.7%) males and 17(24.3%) females Agree when 20(28.6%) of males against one (1) female who represents 1.4% Disagree. When none of the females Strongly Disagree to Item 4, as many as 27(38.6%) Strongly Disagree.

CONCLUSION

The outcome of the study shows that gender factor cannot be the sole cause of college students' negative attitude towards the study of science. This is because the results indicate mixed opinions from the respondents. The female respondents strongly support that science is for men and not women and equal attention is given to men and women during science lessons. They also express opinions to show that science is difficult and they are stigmatized when they do science. The males rather express opposite views to that of the females as they strongly disagreed to the items. Taken exception, the males supported the females that equal attention is given to both males and females during science lessons

This outcome therefore implies that science teachers must not consider gender factor as focal point for addressing student attitude towards the study of science. This is because gender difference has no significant effects on students' attitude in terms of their participation and performance in science lessons. Moreover, the outcome has implications for the classroom practices of teachers, particularly regarding their instructional techniques, handling of

students' responses to questions, verbal and non-verbal gestures and use of examples and generalizations such that would enable them send the right signals about science to both girls and boys (Erinosho, 2008)

RECOMMENDATIONS

Based on the result of the study, I recommend that other factors apart from gender issue must be looked into to see if they are the causes of the kind of attitude students' show towards the study of science in the colleges of education in Ghana.

Further studies on students' attitude by interested researcher(s) must try to find out if teachers' instructional techniques and their interpersonal relationships with students could have influence on attitude of students towards Science.

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