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Perception Of Interest In Mathematics Among Female Teachers In Teacher Training Colleges In Ghana

Jacob Baffour Awuah

General And Liberal Studies Department, Sunyani Polytechnic, Ghana

Ernest Kwarteng

General And Liberal Studies Department, Sunyani Polytechnic, Ghana

Samuel Yeboah Asuamah

Marketing Department, Sunyani Polytechnic, Ghana

Abstract:

This study deals with how to develop interest in the Learning of Mathematics among female students in Colleges of Education. The study used simple random sampling method to select ten (10) Colleges of Education in Ghana. Five Hundred female students and 500 female teachers were used. The data included in-depth interview and questionnaire, and were analysed by using Descriptive Statistics. In this study, results from the data collected through mixed method shows that female students and female teachers hold significantly different views or perceptions towards females in mathematics. For the Female students to fully participate in mathematics the study recommends that, females' interest in the Teaching and Learning of Mathematics must be developed.

1.Introduction

The level of awareness of girls' education has grown significantly, due partially to advocacy on the part of communities through to international agencies. Over the years, there have been great improvements in some areas like English, Education and so on and, unfortunately, reversals in others.

Many things have been tried, and much is known about what works and what does not in educating girls. We know that all children have the right to acquire a quality basic education, and realistic plans and targets can be put in place for this. During the past decades, stakeholders at all levels (from government policy makers to local school committees, to teachers, to communities, to families, and girls themselves) need to mobilize resources and get all girls in school and make it possible for them to complete a basic education.

According to research report from FEMSA 1994 to 2000, {Female Education in Mathematics and science in Africa} most people are not precise; and so mathematics could be difficult for them as mathematics calls for hard and constant practice of a concept till it becomes part of the person.

They continue to say that most people especially females, do not devote time for this careful and systematic practice. Most females spend their precious time talking about fashion and things that do not matter much. They have belief in our traditions that girls are expected to take up the roles of wives and mothers in adulthood and their socialization at home, in the community and school is geared towards providing them with experiences that will prepare them to carry out these roles effectively.

These expectations determine the division of labour within the household, with girls being assigned the home making household chores like food preparation, cooking, cleaning, fetching firewood and water, washing clothes and, caring for younger siblings.

Fouad (2008) indicates that, for the last 20 years, there has been all this work done on boosting interest of girls. But the research has found evidence that confidence level in Mathematics related tasks is lower for girls than boys.

Many parents and educators shared the view that once a child enters school, it is best to leave education to the professionals; since they are the ones trained to do this job because one of the most valuable experiences a gifted student can have is exposure to a mentor who is willing to share personal value a particular interest, time, talents and skills.

When the experience is properly structured and the mentor is a good match for the student, the relationship can provide both mentor and student with encouragement, inspiration, new insight and other personal rewards (Karl 2000). But according to Awanta and Asiedu-Addo (2005), there are a lot of teachers of mathematics out there who themselves were never good at mathematics but ended up teaching mathematics and therefore pass on the fear of mathematics into their pupils.

Another issue is that teachers are reported in many studies, to look at girls as less confident, incompetent and so on as a group, compared to boys (Lamb, 1997; Tong, 1995). Girls therefore receive less preparation in the subject. They are exposed to a very limited extent to mathematics. Van Donk and Maceba (1999) have also demonstrated that women are usually put in position where they are bound to fail. They are pumped with the propaganda about their inferiority.

Women are taught to self-depreciate, especially in the study of mathematics. This internal state of mind is re-inforced through the processes by which girls are socialized. In Ghana for instance, females who perform extremely better in mathematics are considered by the society as "WITCHES" or "MAN-WOMAN", and because of that parents discourage their sons from marrying women who were science or mathematics graduates as they felt that they would not respect especially those husbands who were

non-scientist or mathematicians. This statement tends to discourage female participation in mathematics (Femsa 2000 and Hari 2000).

In addition to the above statements, Damarin (1991) stated that gender biases of teachers contribute to the high failure rate in the learning of mathematics among girls. Consistent failure engendered from the social context results in girls losing self-concept and their self-esteem being lowered.

Many young students, particularly girls see mathematics as difficult and don't take any more classes than they have to, not realizing that they are cutting themselves off from lucrative opportunities in colleges and careers, Fouad (2008). Cvencek *et al.* (2011) stated that, 'for girls, lack of interest in mathematics may come from culturally-communicated messages about Mathematics being more appropriate for boys than for girls.

Gill and Judith, (1994), indicates that high school girls have positive perception towards school but negative perception towards Mathematics. It focuses on gendering. Despite some authors' belief that separating boys and girls for Mathematics improves girl's perception towards Mathematics, the results indicates that even when girls are taught in all girls' schools, they still have negative perception towards Mathematics.

According to Swetman (1995), girls' positive perception towards Mathematics decline as they grow older. Initially girls have more positive perception towards Mathematics than boys do, but as they continue in school, girl's perception become more negative. In order to improve girls' performance in Mathematics, teachers need to facilitate interest in girls towards Mathematics, Swetman (1995).

Females start learning mathematics at home. They learn addition, subtraction and measurement in cooking. These have great effect on some females more than males but because females do not see the link between the home mathematics and the school mathematics, find the school mathematics difficult.

A research by Beilock (2010) indicates that Teachers who are stereotype undermine girls mathematics performance. They stated that Elementary school women Teachers who are anxious about Mathematics pass on to female students the stereotype that boys not girls are good at mathematics. Girls who endorse this belief then do worse at mathematics.

In considering the literature, Gutbezahl (1995) Stated that, parents and teachers expectation for girls in Mathematics have an enormous impact on girls performance in Mathematics. Girls internalize their teachers and parents negative expectations, which become self fulfilling prophecies, because girls believe that they cannot achieve in Mathematics. Their poor performance reinforces parents and teachers negative expectations and feeds the cycle of negative expectations and lack of achievement. In view of Gutbezahl's statement, teachers and parent's expectation for girls performance in Mathematics must be raised if girls are to have the opportunity to achieve in Mathematics.

In addition to Gutbezahl's statement, Odikoya (1996) stated that, "poor performance is attributed to poor teaching, students' laziness, over loading of syllabus, absence of real practical work in teaching, communication and unaffordable textbooks. Motivational and psychological factors constitute yet another category that tends to mystify the learning of mathematics. Rogers and Kaiser (1995) stated, that if educators and social context can instill the love of mathematics among girls, it is possible to see their performance increasing significantly. This love for the discipline seems also to be related to their educators' perceptions and expectations

Robinson (2011), indicated that, Teachers are still unawares of growing gender gaps in classroom. A gap in Mathematics scores still exist in lower grades with boys continuing to outpace girls in mathematics and girls ahead of boys in reading.

Awanta and Asiedu-Addo (2005) stated that the performance of girls in mathematics can also be influenced by teachers' expectations. Consciously or unconsciously some teachers, assuming that girls are not good at mathematics write them off too quickly and focus their attention and energy on the boys and help them more. Pupils become aware of this situation and so perform according to the teacher's expectation; That is the perception that teachers have towards the study and even the way they present mathematics in the classroom tend to affect their learners greatly.

They continued to say that teachers used to create huge gaps between themselves and learners of mathematics by actually not involving the learners. They concluded their statement by saying that, there is a whole lot of teachers of mathematics out there who they themselves were never good at mathematics and ended up teaching mathematics and whatever they do is, to pass on the fear they have in mathematics to their pupils.

The effect of teacher sex on mathematics education has barely been addressed in the literature. In her review of the literature pertaining to teachers' gender-related beliefs in mathematics, however, Li (1999) explained that the few studies that have explored this connection can be broken into two groups: those that focus on the effects of teacher sex on mathematics education outcomes and those that look at the effects of teacher sex on students' beliefs and behaviours.

Li (1999) found that the results of studies exploring a connection between teacher sex and mathematics outcomes have generally showed that teacher sex does impact student outcomes. She mentioned several international studies that were conducted to look for a connection between teacher sex and student outcomes (Mwamwenda and Mwamwenda 1989; Warwick and Jatoi 1994). She gave an example of an analysis of less developed countries using Information Education Assessment (IEA) data concluded that having a male teacher positively impacted student mathematics outcomes and having a female teacher negatively impacted these outcomes (Saha 1983).

However, one study in the US of male and female mathematics teachers found that female mathematics teachers tended to interact more frequently with male students than with female students, while male mathematics teachers did not tend to interact more frequently with either of the sexes. As a result, male mathematics students with female mathematics teachers are given greater learning opportunities in these classrooms (Duffy *et al* 2001)

2.Statement Of The Problem

Mathematics is a core subject in the Colleges of Education, Senior High Schools and the Basic schools. Therefore our Teacher Trainees especially females must be well equipped in Mathematics so that they can impart well the knowledge received to the

younger generations. But females in the Colleges of Education interest towards Mathematics are diminishing. President Clinton in 1998 stated that if we are serious about having the finest mathematicians, scientist and engineers in the world then we cannot leave anybody behind e.g. women and disables. Now the question is what can be done to develop females' interest in mathematics in Colleges of Education.

3.Purpose Of The Study

This study will then consider developing female interest in mathematics on a higher level or scale and provide specific techniques that can help to avoid and alleviate females' negative perception towards mathematics. Other areas of concern are, to consider teachers perception towards females in Mathematics. It stands to reason that for a teacher to be able to develop females' interest in Mathematics, the teacher must have positive attitude to the subject.

4.Research Questions

In the study the researchers seek to explore three main questions:

- What are some of the behaviours that affect female student's interest in Mathematics?
- To what extent do the perceptions of Basic school teachers in mathematics contribute to the achievement of female students' interest in mathematics in teacher training colleges?
- How could teachers help to develop and sustain females' interest in Mathematics?

5.Significant Of The Study/Motivation

The study will help outline the negative perceptions of females towards mathematics and suggest ways of remedy. Thus, females' interest in mathematics will rise and their performance will improve. The findings will serve as reference material for researcher doing similar work. In the very knowledge of the researchers few empirical works on the study are exist in the literature. The findings fill in the literature gap.

6.Limitations And Scope

The paper is limited to self-reported responses of respondents. Any biases in the responses might not be known to the researchers. The study is descriptive and not causal in nature. It is also cross-sectional and not longitudinal.

7.Methodology

The research is based on mixed method of quantitative and qualitative, descriptive cross-sectional survey. Survey was used to obtain quantitative and qualitative information about female students and teachers gender- related beliefs and how females' interest in mathematics could be sustained.

Primary data was obtained using self-designed questionnaire, administered during class hours. The researcher after receiving the responses from the questionnaires coded the data from the questionnaires and entered it into SPSS to determine frequencies and percentages. The results were presented in Tables.

8.Results And Discussions

Using the data provided in the first part of the survey, the researchers determined the frequency and percentage of each response to background questions about their performance in General Certificate of Education Ordinary level (O' Level) or Senior High School (SHS) mathematics as shown in Table 1.

	Frequency	Percent	Valid Percent	Cumulative Percent
Valid yes	190	38.0	38.0	38.0
no	310	62.0	62.0	100.0
Total	500	100.0	100.0	

Table 1

From Table 1, 62 percent responded 'NO' to the question "Did you resit to improve your grade in O'Level/SSS Mathematics" This means that their performance in Mathematics in the basic level is quite good and 38 percent said yes.

- Descriptive statistics on female students' perception towards mathematics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	94	18.8	18.8	18.8
	Disagree	108	21.6	21.6	40.4
	cannot decide	13	2.6	2.6	43.0
	Agree	64	12.8	12.8	55.8
	strongly agree	221	44.2	44.2	100.0
	Total	500	100.0	100.0	

Table 2(a)

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	56	11.2	11.2	11.2
	Disagree	50	10.0	10.0	21.2
	cannot decide	12	2.4	2.4	23.6
	Agree	114	22.8	22.8	46.4
	strongly agree	268	53.6	53.6	100.0
	Total	500	100.0	100.0	

Table 2(b)

It can be seen from table 2a that, 57 percent agreed (44.2% strongly agreed and 12.8% agreed) to the statement, 40.4 percent (18.8% strongly disagreed and 21.6% disagreed) disagreed and 2.6 percent said they cannot decide.

Again, from Table 2b, 76.4 percent agreed (53.6% strongly agreed and 22.8% agreed) that males have natural ability in Mathematics than females. While 21.2 percent disagreed (11.2% strongly disagreed and 10.0% disagreed), 2.4 % said they cannot decide.

As majority of female students and the female teachers agreed to this statement, it shows how important it is to them. This finding could be considered surprising if one recalls that several past studies have shown female Mathematics students to be less confident in their mathematical abilities than their male counterparts.

However, this result could be interpreted that women who are highly skilled in Mathematics are choosing teaching Mathematics as a profession whereas equally skilled men may choose other careers. Male teachers are likely to take their mathematical abilities for granted than females teachers. If this were the case then this finding would indicate agreement with those past studies that females have less confident in Mathematics or less natural ability to do Mathematics than males;

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	strongly disagree	93	18.6	18.6	18.6
	Disagree	81	16.2	16.2	34.8
	cannot decide	15	3.0	3.0	37.8
	Agree	64	12.8	12.8	50.6
	strongly agree	247	49.4	49.4	100.0
	Total	500	100.0	100.0	

Table 3

Behaviour depicted by the female students show that, 62.2% supported the statement while 34.8% disagreed that they do not have interest in Mathematics. Female students' lack of interest is not only difficult for students to deal with, but it is students who not only may have otherwise chosen careers that would deal with Mathematics directly but indirectly also.

From (Bursal & Paznokas, 2006) indicate that, lack of understanding of basic Mathematical principles can result in an inability to solve other scientific problems. They continue to state that lack of understanding prevents students from acquiring logic and reasoning skills that can be used in a variety of areas, even outside the realm of Mathematics.

It is the teachers' responsibility to find new ideas in their teaching and step outside their own comfort zone from time to time. There has been a big push to move towards more students -centered classroom, but Bowers-Khourey (2005) found that many

classrooms still rely on traditional approaches such as presenting vast concept and students' interest and experience. While it is understandable that female students' interest in Mathematics can be developed for Mathematics achievement, what is comfortable for the teacher, thus those methods used may not always be the best practice of what is comfortable for the student. "It is the obligation of the teacher to see that their students value and feel confident their Mathematics abilities between ultimately decisions of career choice may be determined based on a student disposition towards Mathematics (Fumer & Duffy, 2002). Perhaps the most obvious factor on lack of interest in Mathematics is a lack of confidence which often leads to decreased motivation. Female students without interest in Mathematics often perceive their Mathematics skills as less than those in other subjects and will not enjoy Mathematics or have the desire to teach it (Owens, 1993).

Table 4. males need mathematics in life more than females					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Strongly disagree	306	61.2	61.2	61.2
	Disagree	105	21.0	21.0	82.2
	cannot decide	14	2.8	2.8	85.0
	Agree	41	8.2	8.2	93.2
	Strongly agree	34	6.8	6.8	100.0
	Total	500	100.0	100.0	

Table 4

Table 4 shows that 411 students (82.2%) disagreed to this statement, 75 students (15%) agreed. Fourteen students (2.8%) could not decide. Responses from both female student-trainees and the female teachers revealed that, females also need Mathematics in life..

This is an interesting finding because they believe that females are not born to do hard jobs as stated by Frimpong (1998) He claims that, most of the females answer to the questions why they don't like Mathematics, one female openly expressed that "Females in general were created to be cared for and not to explore much". Females therefore cannot face difficult challenges in life like the study of Mathematics; therefore Mathematics is for males, like a man taking difficult task to kill a snake. Reading of Mathematics is like one of these difficult jobs and males must be responsible for it.

Table 5. Do you think mathematics in TTC is more difficult for females					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	315	63.0	63.0	63.0
	No	185	37.0	37.0	100.0
	Total	500	100.0	100.0	

Table 5

From the views of female teachers on Colleges of Education Mathematics, 63% of the female teachers indicated that mathematics in Colleges of Education is more difficult for females while 37 percent said it is not difficult. If the female teachers themselves are saying Mathematics in Colleges of Education is difficult, then where is our stand as a nation because the females take 51 percent of Ghana's population.

9. Conclusion And Policy Implications

Based on the existing literature, the researcher had anticipated that there are differences on female perception towards Mathematics. The analysis on the data however, revealed that female students responded in different ways. There were no differences in female students' perception regarding female students' interest in Mathematics. Success or failure in Mathematics and future intention to develop females' interest in the learning of Mathematics in Colleges of Education must be seen to. These data seem to confirm my expectations that females own negative perceptions towards Mathematics causes their poor performance in the subject - Mathematics. The researcher believed that the current movement towards teacher accountability and standardization of curriculum, students' outcome is influencing a form of teacher professionalism. Individual teachers are restricted in their ability to customize lessons around their personal beliefs and interest. Although female teachers did not answer as a group, they did not indicate that they believed that males and females are equal in all respects. Thus the teachers tend to hold similar perceptions regarding pedagogic practice.. In this study the researcher proposed that female teachers enter the classroom with different behaviours and interest that were formed based on their experiences as Mathematics teachers.

However the responses pattern to the questions could indicate that female teachers hold different perceptions towards female students' interest in mathematics. Again, they have several beliefs regarding the effective teaching of Mathematics because female students' and male students' actions may be different in a classroom with a male teacher or a female teacher. This would suggest a stronger feedback loop between students' actions and teachers' perceptions than between teachers' experiences and their perceptions.

To enable female students have positive perception towards the learning of mathematics, the following are recommended:

- Female teachers need to constantly reflect about their teaching since what happens in the classroom affect the female student's interest in the study of mathematics.
- Female student who is interested in the study of mathematics pair with a female mentor.
- Female teachers share their experiences with others and incorporate each other's idea and practice in their own teaching levels of mathematics.
- Female teachers need to encourage and motive female students in the study of mathematics.

Since the current study is descriptive future study should use longitudinal research to examine causal issues. Larger sample size should also be used in future study to ensure more external validity. The study should be replicated in other educational institutions.

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