

Gender Sensitive Pedagogy: The Solution to Girls Negative Attitude towards Mathematics in the South West Region of Cameroon

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Abstract— Mathematics is an important subject in the secondary school curriculum, because its skills are needed for understanding and applying science and technology for development, but it has been noticed in most of the secondary schools in the South West Region of Cameroon that many female students unlike their male counterparts, have negative attitudes towards mathematics, visible in their lack of interest and low participation in its lessons. This attitude affects their ability to engage with Math-related content, leads to poor performance and consequently fewer females pursuing degrees in fields that require a strong mathematics background. This paper seeks to explore the factors that negatively affect female student's attitude towards mathematics and also to show how teachers can use a gender sensitive pedagogy to improve on the attitude, participation and performance of girls in mathematics. Research questions were constructed; feminist theories and other theories of teaching and learning were employed to guide the study. The study was Triangulatory. The study utilized 450 form four students and 72 of their parents, 44 mathematics teachers from 158 public secondary schools in the South West Region of Cameroon. Statistical Package for social science (SPSS) version 12 was used to analyze data collected by research instruments. The results confirmed that some factors that are related to parents and girls perceptions about mathematics and the mathematics teacher's attitude and pedagogical approach are crucial factors that affect the participation and performance of girls in mathematics. To improve on the participation and performance of girls, the Researcher recommends that the pedagogy for secondary school mathematics should be gender sensitive.

Key words: Attitude, Gender Sensitive Pedagogy, Gender Discrimination, Performance

Attitude: It is the original organization of our impressions, feelings towards other things and issues.

Gender discrimination: Denying opportunities and rights or giving preferential treatment to individuals on the basis of their sex.

Gender equality: The elimination of all forms of discrimination based on gender so that girls and boys and have equal opportunities and benefits.

Gender sensitive pedagogy refers to teaching and learning processes that pay attention to the specific learning needs of girls and boys. This pedagogy calls for teachers to take an all-encompassing gender approach in the processes of lesson planning.

Performance: These are scores obtained after assessing students on an achievement task. It is the actual output of a learner after a series of formative and /or summative evaluation.

I. INTRODUCTION

Student's attitude towards a particular subject is an important aspect in the performance of the subject. Attitude can be referred to as complex human state that affects behavior towards people, things and events. Tambo (2003) holds that an attitude is a predisposition to act in a positive or negative way towards persons, ideas or events. Individual attitudes in this study are defined in a more complex way by the emotions, that females associate with mathematics, by individuals beliefs and by how they behave towards mathematics (Britner, S & Pajares 2006).

Emotions and beliefs are very important in learning. Hart, (1989) and Pajeres, (1992) as in Federick and Ecclesiastias (2012) indicated that there is a consensus on the fact that emotion and beliefs deeply interacts as regards to attitude, and that the emotional component is generally explicitly recognized in the construct often together with a cognitive component, which mainly identifies belief, that affects performance.

A negative attitude towards mathematics is considered to be a kind of not positive, undesirable and unfavorable feeling towards the studying of subject. Matthews and Pepper (2005) argued that a negative attitude towards a subject leads to lack of interest and whether the subject can be selected at a senior high school or avoided. In the same vein a positive attitude towards a subject will lead to the student being interested in studying that subject. They also report that the main reason why mathematics is not selected by girls is because it is perceived to be 'hard', 'boring' and 'useless'.

The major objective of this study is to examine how parental influence and girl's perception about mathematics affects the attitude of female students towards mathematics and how a gender sensitive pedagogy can improve on the participation and performance of girls in mathematics.

The two major research questions include:

- 1) Do parental influence and girls' perception about mathematics have an effect on female Students attitude towards mathematics?
- 2) Can the mathematics Teachers' classroom behavior and general pedagogical approach positively influence the attitude of female students' towards mathematics?

The hypotheses of the study:

- 1) Parental influence and girls' perception about mathematics have an effect on female students' attitude towards mathematics?
- 2) Teachers' classroom behavior and general pedagogical approach can positively influence the attitude of female students' towards mathematics?

II. THEORETICAL PERSPECTIVES

A number of theoretical frameworks guided this study and helped the researcher to understand and assess the complexities that girls undergo in the society and classroom which affects their attitude and general participation in secondary school mathematics. Feminists' Theories on education like those of the Liberal, Marxist, Radical and black feminist, all argued that in the mathematics classrooms and school environment, some aspects of female subordination and gender inequality exist. An individual girl's problem may become a generalized problem for girls, with the mathematics teacher sometimes consciously and unconsciously discriminating against the girls during the teaching and learning process. (Frances and Kolma 2005). According to feminist, where the girls are given equal opportunities and a less competitive and aggressive learning environment, they are encouraged to learn mathematics and thus a better performance.

History of mathematics classrooms reveals the negative effects of poor mode of presentation of lessons on student's response or general participation. Bruner's (1947) Theory of Instruction prescribes what secondary school teachers should do to make learning meaningful. According to his principle of teaching, if mathematics teaching is organized following the four principles of readiness, structure, sequence and reinforcement, it will enhance the participation and performance of girls. Mathematics is perceived by the girls as not only difficult and boring but as a male domain. In Maslow's (1970) theory of motivation, the hierarchical classification of needs emphasized that it is only when the lower ranking needs are satisfied; that the upper or higher ranking needs can be satisfied. A female student will satisfy her achievement need when her need of belonging to those who can do well in mathematics has been met. Thus girls need to be motivated through praise and other forms of encouragement to learn mathematics.

Carl Rogers (1947) in himself-concept theory stated that there is a basic human need for positive regard both from others and from oneself and that many of the successes and failures that people experience in many areas of life are closely related to the ways they have learnt to view themselves and their relationships with others. In mathematics education girls have negative interpretations of themselves that shows up in low self-esteem and a general feeling of 'I cannot do it'. According to him, through the learners centered pedagogy the mathematics Teacher can motivate the girls. Bandura (1965, 1986, 1992) in his social cognitive theory of gender development and differentiation explained the determinants and mechanisms through which gender-linked roles and conduct are acquired and how role of models in school and the society activate, channel, and support social behavior. Girls see mathematics as a male domain since most of the mathematicians in the society are males, but according to his theory the actions of female mathematics models in school and the society can serve and channel positive attitude towards mathematics for the girls.

III. FACTORS THAT NEGATIVELY AFFECTS THE ATTITUDE OF GIRLS IN MATHEMATICS

Major concerns here have to do with societal and parental influence on girls, the general beliefs of the girls about

mathematics and the mathematics teachers' attitude and general pedagogic approach.

Parents influence the attitude of girls towards mathematics through their socialization patterns. Where parents have to make a choice for their children, those who uphold the belief that mathematics is a male domain would prefer their boys to do mathematics and the sciences than the girls. Hari (2002) and Torto(2002b), stated that the belief of some parents that girls are academically less capable than boys has a negative effect on girls' participation in mathematics and the sciences in particular. Torto (2004) again stated that extracurricular and out of school factors affects girl's attitude, participation and performance in mathematics. In addition to social comparison with peers, Kyriacou and Goulding (2006) showed that key influences in identity formation in relation to mathematics included views about mathematics held by the student's family and friends, interests/ strengths in related fields, and social expectations and roles. Mendick (2006) also construes choice in terms of socially grounded processes of identity construction.

Most girls have a negative emotional disposition towards mathematics as they perceive mathematics as unpleasurable, difficult and having many rules to make a tiny little operation. According to Halper *et al* (2007) in their study of girl's attitude towards mathematics, they indicated that as girls move out of elementary school they have come to accept and believe in the culture stereotype that mathematics is too tough for them. This result according to them is the most discouraging finding in all, because the victimized person by stereotype ends up accepting as truth the stereotype.

If girls believe that they are incapable of performing well in a math class, they may experience a sense of helplessness in the classroom (Covington and Beery, 1976; Dweck and Repucci, 1973; Kloosterman, 1988) as in Mathew and Pepper, (2005). Also, Hannula (2002), Pietschet al (2003) Kyriacou and Goulding 92006) indicated that low 'self-efficacy' in mathematics, which has been highlighted by other researchers affects participation and performance negatively.

One of the reasons some girls do not participate nor work hard towards good performance in Mathematics is because they do not consider it useful for their future career opportunities. Matthews and Pepper (2005) indicated that boys tend to continue with Mathematics because they consider it useful for their career choices, while girls more often cited reasons that have to do with coping with the subject or whether they enjoy it, and could not see how advanced level Mathematics would be useful in later life (Williamson 2004). Also, Mendick (2006) explained the gender differences in participation as due to mathematics being identified with characteristics of masculinity. The idea of affective assessment, as set out by Williams and Ivey(2001), suggests that once a student adopts a certain stance towards a subject this then becomes the basis for future action, which in turn can reinforce the stance taken, forming either a positive or negative loop. Thus student that decides mathematics does not interest them may disengage from the subject and make less effort, which will lead to lower achievement and satisfaction.

Teacher's classroom discriminatory behavior and pedagogic approach can be seen in the way he manages the mathematics teaching and learning process. FAWE (2005) indicated that the gender inequities pervading society are carried into the mathematics classroom and school environment. This is evident in school processes such as in teaching, teacher-student interaction, school management, and the plan and design of sitting arrangement of a typical classroom that popularized how most schools reinforces traditional socialization that maintains the boy's superiority.

Teachers' attitude may be positive or negative towards the promotion of good teacher-learning situations (Souza and Elia, 1991). Positive attitudes may include warmth, friendly, peaceful etc and negative like harshness, Irregular, quarrelsome, discrimination, sarcastic etc. There is a relationship between students' perception of their Mathematics teachers' attitude and their performance in mathematics. Teacher's negative attitude will discourage participation and his positive attitude will encourage participation.

Still on teachers attitude his mode of assessment and feedback during the teaching and learning process has implications on student's attitude and performance. AAUW(1992) on classroom discrimination published a report in indicating that females receive less attention through feedback from teachers and that the attention receive is often more negative than the attention received by boys (Bailey, 1992) as in FAWE (2005). According to Santrock (2001), teachers often have more positive expectations for high ability students and these expectations are likely to influence their behavior towards them. Nature of feedback is important because as Ngoh and Mbangwana (2001) indicated, it shows the students themselves the extent to which they are successful and strengthens the link between effort and performance. AAUW (1992) Report shows that girls do not only receive less attention than boys, but are less motivated and feel discouraged from pursuing high level mathematics, as they see themselves less apt in the course work of mathematics programmers.

Teachers' Pedagogical Approach is an important factor of girls' attitude towards mathematics. Clearly the socialization of gender roles and the use of a gender-biased teaching material and the hidden curriculum lead to an inequitable mathematics education for boys and girls. Ofsted (2006) stated that Teacher's method and learning materials, for example, may contain gender stereotypes or biases that may affect the meeting of specific learning needs of boys and girls. Nekang (2007) indicated many people blame teachers for using poor and inappropriate teaching methods like lectures, lacking the right teaching strategies for mathematics and therefore causing high failure rate amongst students.

IV. METHODOLOGY

The research design is triangularly. It combined more than one approach, like the qualitative and quantitative methods, to investigate the research questions in order to enhance confidence in the ensuing findings. The quantitative approach was concerned with the systematic empirical investigation of observable phenomena via statistical, mathematical or computational techniques and the qualitative had to do with the examination, analysis and

interpretation of observations for the purpose of discovering underlying meanings and patterns of relationships in the study. Both direct and indirect sources of information were used to gather data. The Target population was secondary schools in the South West Region of Cameroon. Through the stratified and the simple random sampling technique, 450 form four students, 44 mathematic teachers and 72 parents were selected as sample. Students and teachers' questionnaire and observation formed the major source of data. The validity and reliability of the instruments were all checked through the pilot study of a small proportion of the target population. Response of the pilot study was about 96% consistent, which was an indication of a high degree of validity and reliability of the instrument.

Both descriptive and inferential statistics and Windows Statistical Package for Social Sciences (SPSS) was used to analyze the data. For descriptive statistics, frequencies, percentages, bar-charts and pie-charts, means and standard deviations were used. For inferential statistics, the student t-test for comparison between groups, the Pearson chi-square test of independence $X^2 = \sum (O-E)^2$ where X^2 = chi-square calculated value and the Pearson Correlation Product Moment were used to verify the hypotheses.

V. THE FINDING

Computation of Means and Standard Deviations in Relation to Responses to Research Question 1: Do parental influence and girls' perception about mathematics have an effect on female Students attitude towards mathematics?

An overall mean of 3.012 suggested that parental influence and girls' perception about mathematics affects girls' attitudes towards mathematics since 3.026 lies within 2.75 and 4.00 ($2.75 \leq 3.012 \leq 4.0$). The factors that affect their attitude and participation negatively are parental belief that mathematics is a male domain and consequent failure to encourage their daughters to study mathematics; girls' belief that mathematics is difficult and boring; girls' lack of interest to study mathematics and their failure to see its importance in their future career. The above factors contribute to girls streaming out of mathematics lessons; failure to do mathematics assignments, general disbelief in their ability to do mathematics, and a manifestation of helplessness that leads to less participation and consequent poor performance. This agrees with Matthews and Pepper (2005) findings from their study of gender difference in mathematics which according to them a negative attitude towards a subject leads to lack of interest and the question of whether the subject can be selected in senior high school. In the same vein they stated that a positive attitude towards a subject will lead to the student being interested in studying that subject and choosing it in senior classes. This finding also agrees with what Nekang (2007) stated that some of the factors responsible for girls poor attitude towards mathematics include lack of interest, curiosity, no commitment to study and inadequate support and encouragement from parents.

The way the subject mathematics is taught is an important aspect for the students especially for the female who most of the time already show an inferiority complex towards the learning of the subject. Responses on Teachers' Classroom behavior and pedagogical approach revealed some level of discrimination between boys and girls by the

Teacher, in that most of the questions during mathematics lessons are directed to the boys with less Teachers interaction, feedback and general motivation to girls. This agrees with what Premier (1969-1976, 1982-1986 and 1993) indicated that classroom observations in Kenya, Malawi and Rwanda and others, showed that teachers paid more attention to boys than girls, or completely ignored girls. Also Kilo (1994) stated that in Cameroon, Teachers acknowledged that they preferred to teach boys, especially in the sciences, and that they focused more on boys than on girls in the classroom.

Also responses by Teachers and students on what could be done by the mathematics Teachers to increase girls participation and performance in mathematics indicated that girls would appreciate the kind of pedagogy that meets their immediate needs or solve their major problems in the mathematics classroom like: Formation of mixed cooperative learning groups headed by both boys and girls that are free from competition; the use of motivation and positive reinforcement on both boys and girls; Encouragement of the girls to answer questions in class and appreciation of girls who do well through praise. This agrees with Rogers (1990), who in a study of high-ability students, found that significant success in attracting females to higher level mathematics courses was achieved by teachers, either male or female, who created a classroom environment open and supportive of all students, the one in which the teacher's style was conducive to the nature of mathematical inquiry.

VI. DISCUSSION & CONCLUSION

According to this study, reviewed literature, general classroom observation and responses from questionnaires suggest that Teacher's attitudes, behavior and teaching approach have perhaps one of the most significant implications for female attitude, persistence and academic achievement in mathematics. There are a number of postulated reasons for the poor performance of females in secondary school mathematics and their failure to continue with mathematics in high school and university that have to do with the impression created by societal perception that girls are not good at mathematics with the males remaining superior. This is also sometimes seen in the hidden curriculum that is in the conscious and unconscious discriminatory attitude of the teacher. This is in line with what Harbok (2001) stated that gender issues in mathematics have been a source of aversion. Mathematics has been male-stereotyped, especially as mathematics is regarded as abstract by girls. Boys are good at risk bearing and handling of difficult situations and some teachers feel more comfortable making a boy than a girl understands mathematics.

Some females often exhibit a pattern of learned helplessness, do not believe themselves to have control over their own learning outcomes and as a result perceive failure as inevitable in attempting to solve mathematics problems. This helplessness of female students as earlier indicated by Covington and Beery, (1976), Dweck and Repucci, (1973), Kloosterman, (1988) as in Mathew and Pepper, (2005) was also noticed during the Researchers field visits.

The problem at hand as Maccoby and Jackline (1974): Ritzer (2007) and significant number of others indicated is how the teacher can dismantle the myths of

female inferiority, and encourage teaching, learning and other socialization patterns in school that will provide females with an equitable chance of success in a broad range. This confirms what the Liberal feminist stated that there is no equality within the present educational system and women need to seek out their own forms of knowledge and styles of learning. It was in this line that Dale (1982) cited by Measor and Sikes (1992), stated that to improve on the attitude of girls there is the need for gender equality in the mathematics classroom.

The Mathematics teacher has much to do so far as improving girl's attitude towards mathematics is concern. As Noddings (1990) and Confrey (1990) stated, the mathematics teacher's main function is to establish mathematical learning environments that encourage both male and female students to explore and raise questions in their studying. The teacher's pedagogical content knowledge and teaching approach which include questions asked, activities designed, teaching aids should be able to improve on the performance of all the students. Mbilinyi and Mbughuni (1991) argued learning will not be conducive particularly for the girls, where there is competition and negative discrimination.

Teachers need to design activities that are fun, relaxed, and include hands-on work and problem solving. Constant practice will improve understanding of the subject and hence improve performance. They will need to use some teaching techniques that pay attention to the specific needs of boys and girls. This will help increase performance and participation, for students learn best when they are active than passive learners. Boaler (1997b, 2002) found that particular teaching approaches have different effects on the attitudes and performance of girls and boys. He indicated to be gender-sensitive, as Carl Rogers (1947) stated, a more student-centered classroom is driven by the interests and needs of both male and female learners. In a mixed school boys and girls should sit together and teachers should stimulate healthy competition among the sexes because classrooms that encourage cooperation between boys and girls result in higher achievement for girls. Eder and Forgasz (2000) stated that the learning environment should encourage students to develop their own voice and construct their own knowledge.

According to Sternberg (1994) as in Santrock (2002) and Tchombe (2004) flexibility of teaching and assessment styles that meet up with the individual differences and different learning styles of the students will result to immediate powerful increase in performance. Mathematics Teachers should avoid the use of language, teaching material or method that limits one gender or the other from participating in classroom interaction by always using what is gender neutral and relevant to both boys and girls during their lessons.

VII. CONCLUSION

Substantial research as those above provides clear and compelling evidence that societal perceptions and gender issues in the mathematics classroom has negative effects on girls attitude towards mathematics, and that girls like boys flourish in mathematics when they are given a supportive environment especially by the Teacher who is the major facilitator of learning. Because the findings from this study

have great implications for classroom practice and school administration, there is need for a heightened awareness of gender issues in terms of professional development, gender-balanced curriculum, instruction and assessment and school culture for a gender sensitive pedagogy that will improve on girls participation and performance in mathematics.

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