FEMALE PARTICIPATION IN ADVANCED LEVEL MATHEMATICS AMONG UNDERGRADUATE SCIENCE EDUCATION STUDENTS IN FEDERAL UNIVERSITY OF TECHNOLOGY MINNA

BY

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DEPARTMENT OF SCIENCE EDUCATION
FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

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A PROJECT SUBMITTED TO THE DEPARTMENT OF SCIENCE EDUCATION, FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA, NIGERIA IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF BACHELOR OF TECHNOLOGY IN SCIENCE EDUCATION (MATHEMATICS OPTION)

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ABSTRACT

The study investigated female participation in advanced level mathematics among undergraduate science education students in Federal University of Technology Minna. The study was guided by three objectives with three corresponding research questions. The objectives of the study are to determine The perception of females in studying advanced level mathematics among undergraduate of science education students in Federal University of Technology Minna, the factors affecting female participation in advanced level mathematics among undergraduate of science education students in Federal University of Technology Minna and the strategies for increasing female participation in advanced level mathematics among undergraduate of science education students in Federal University of Technology Minna. The study adopted a casiest research design design, the target population of the study consist of 110 female students in Science Education and Educational Technology Department. The findings of the study revealed that Females in advance level Mathematics usually experience prejudices and antagonisms from male colleagues and subordinates and females think that their marriage opportunities reduce their advance mathematics careers. The study concluded that female participation in advance level mathematics should be encourage by the teachers and female role models in the society at large. The study recommended that The institutions should provide a conducive environment for adequate female participation in advanced level mathematics. The teachers should make the class more interesting and stimulating for females.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the Study

Mathematics is about the oldest subject in existence. It originated from man's quest for a language or means of counting, measuring and recording his possessions. It is a subject whose knowledge is useful in every aspect of life. This is why it occupies a significant position in the Nigerian school curriculum. It is a compulsory subject at the primary and secondary school levels, and a credit pass in ordinary level mathematics is required for admission to study the majority of the courses at the tertiary level. Today, mathematics has been generally accepted as the bedrock of science and technology, a language which scientists use to express scientific findings (Udogu, 2016).

Mathematics can be seen as a cord of three strings which are interwoven and interdependent. Advances in one field result in/from development in the other. Mathematics have been identified as the bedrock or foundation of wealth and consequently an imperative for national development. It has also been argued that in this era of globalization only persons with appreciable knowledge, skills and abilities in advanced mathematics are required in the labour market. Any country that has not embraced or made significant efforts to advance mathematics education is said to be on the wrong or negative side of the international digital divide (Sheldrake *et al.*, 2015).

Despite the relevance and utilitarian purpose of advanced mathematics, it has been observed that participation of females in the field is low. The corollary is also true, with the danger of reinforcing social inequality for those unable, or perceived as unable, to cope with mathematical ideas. For females, the effects of low levels of numeracy are even

more marked than for males; even for those with competent levels of literacy, low levels of numeracy are associated with higher levels of depression and poor physical health, being out of the labour market and feeling a lack of control of their lives (Roper, 2013).

At the tertiary level, lack of take-up of mathematically-based subjects and careers, in particular by females, remains a persistent issue across many Western cultures, despite reports across the literature that the gender gap in attainment is small and decreasing (McCormack, 2014).

Gender disparity in enrolment into mathematics education as a course of study in the university has also been reported (Eraikhuemen, 2015). This study shows that more males than females enroll into mathematics education. This trend is worrisome. If females are not participating in mathematics, how can they contribute their quota to national development? Non participation in Mathematics will eventually culminate in being a misfit for the job market and consequently in economic disempowerment. All hands must be on deck to develop and implement strategies to improve participation of females in advanced Mathematics. Therefore this study need to investigate the survey of female participation in advanced level mathematics among undergraduate Science Education Students in Federal University of Technology Minna.

1.2 Statement of the Problem

(Ekpo and Ithen, 2016), observed that though there has been considerable progress in facilitating women access in education lately, there is still gender disparity in performance and completion of science, and technology based programmes. It has been speculated that women shy away from mathematics and related courses.

Although there has been a lot of concern expressed by science educators, globally, on the need for more female participation in science there still is a somewhat silent but prevalent

notion that science, especially the physical sciences is male domain. Low participation of females in the sciences cuts across every level of education especially in mathematics. Science education is very vital to any nation's development and no citizen deserves exclusion or limitations in being scientifically literate. Nigeria, like other African nations has a dire need to rise up to ensure equality in participation of its female citizens in science, technology and mathematics (Gye, 2013). Therefore this study need to investigate female participation in advanced level mathematics among undergraduate Science Education Students in Federal University of Technology Minna.

1.3 Aim and Objective of the Study

The aim of the study is to investigate female participation in advanced level mathematics among undergraduate science education students in Federal University of Technology Minna. The specific objectives of the study are to determine;

1. The perception of females in studying advanced level mathematics among undergraduate of science education students in Federal University of Technology Minna
2. The factors affecting female participation in advanced level mathematics among undergraduate of science education students in Federal University of Technology Minna
3. The strategies for increasing female participation in advanced level mathematics among undergraduate of science education students in Federal University of Technology Minna.

1.4 Research Questions

The following research questions is sought to guide the study based on the objectives stated above.

1. What are the perception of females in studying advanced level mathematics among undergraduate science education students in Federal University of Technology Minna?
2. What are the factors affecting female participation in advanced level mathematics among undergraduate science education students in Federal University of Technology Minna?
3. What are the strategies for increasing female participation in advanced level mathematics among undergraduate science education students in Federal University of Technology Minna?

1.5 Scope of the Study

This study will be limited to Science Education students session of Federal University of Technology, Minna Bosso campus. The will focus on the perception, factors affecting and strategies to increase female participation in advanced level mathematics among undergraduate science education students in Federal University of Technology Minna. The study will cover a duration of eight weeks.

1.6 Significance of the Study

This study will give a clear insight on female participation in advanced level mathematics among undergraduate science education students in Federal University of Technology Minna. The study will be beneficial to students, teachers, ministry of education and the parent.

To students, the outcome of the study will motivate them to go into advanced level mathematics and will encourage them to disregard what people will say against their career. It will make them focused and determined.

To the teacher, it will encourage them make their subjects interesting to learn. It will also encourage healthy competition between males and females in advanced level mathematics course.

To the ministry of education, the outcome of this study will help them to use the avenue to provide service, workshops, trainings and seminars for the teachers with the view of improving in their approach of teaching mathematics.

To the parents, it will motivate them and build confident on their children toward learning mathematics.

1.7 Operational Definition of Terms

Female Participation: is the enrolment of female gender into mathematics education as a course of study in FUTMinna.

Undergraduate: students at entry level as a course of study in mathematics education

Advance Level Mathematics: is a discipline in mathematics education as a course in FUTMinna.

Science Education Students: Learners enrolled into mathematics education as a career.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Conceptual Framework

Concept of Mathematics Education

Mathematics Education is an abstract subject, yet significant for scientific and technological development in any society. Tella (2016) remarked, “its usefulness in science, mathematical and technological activities as well as commerce, economics, education and even humanities is almost at par with the importance of education as a whole”. In Nigeria, as in most countries, Mathematics is one of the compulsory core subjects in primary and lower secondary levels of education. This is intended to improve mathematical literacy, and steer the country towards economic growth and development.

At its best, mathematics is a rewarding, compelling and powerful subject. In the words of mathematician Marcus (2017), in an interview reported online, ‘Mathematics has beauty and romance. It's not a boring place to be, the mathematical world. It's an extraordinary place; it's worth spending time there’ (Gold, 2016). Unfortunately this mathematical world is not always recognisable either in portrayals of mathematics in society or the experiences of children in school. The mathematics educationist Alan (2012) believes that students separate school mathematics from the creative, discovery-oriented discipline of abstract mathematics which it is out of their reach to experience in their day-to-day mathematics lessons.

Mathematics Education is a dynamic, evolving entity with which children can form a relationship and therefore identify rather than as a static body of knowledge is a key starting point for this thesis. Stemhagen (2011) conceptualises mathematical philosophy as falling roughly into two categories: absolutism and constructivism. The first of these

focuses on mathematics as certain, permanent, and independent of human activity' (Stemhagen, 2011) the second being more interested in how humans create their own mathematical understanding. Differing views of the nature of mathematics position the subject varyingly as beautiful, pure and reliable or cold, hard and inhuman (Ernest, 2014) with the latter tied for most people to an absolutist, separated model of mathematics.

Factor affecting Female Participation Mathematics Education

There is an extensive body of research investigating the reasons for girls' alienation from secondary mathematics courses. According to Zohar (2015) these reasons include:

Different gender-dependent socialization patterns

Boys are "socialized into mathematics" and girls are "socialized out of mathematics". This socialization is related to the lack of women role-models, inequality in educational opportunities, biased school guidance (girls are often discouraged from taking technically challenging subjects), reduced parental and teachers' expectations of girls' success, and lastly, family-unfriendly and unappealing prospects of mathematics-related careers.

Different gender-dependent attitudes, interest levels and self-efficacy about Mathematics: Girls often exhibit more negative attitudes about mathematics than boys. This is also reflected in their lower mathematics self-efficacy (one's belief in one's ability to complete specific tasks or achieve certain goals) as compared to boys, which results in girls' lower achievements. Girls' low self-efficacy in mathematics education learning is expressed as their lack of confidence in their ability to succeed at understanding mathematics education and excelling in it. It has been documented that even when boys and girls perform at the same academic achievement level, the girls have a lower confidence in their ability to do mathematics than the boys. This also applies to undergraduate students. As a result, girls become more frustrated and less persistent in

their studies, consequently having lower academic achievement and failing to fulfill their potential.

Different effects of the classroom culture on boys and girls: Girls are more likely to experience aversion to the highly competitive and non-collaborative culture found in many mathematics classrooms. Since girls represent a minority in most mathematics classrooms, and many of them feel uncomfortable and silenced in competitive male-dominated groups, girls often feel alienated and excluded. While contemporary mathematicians rarely work alone, collaborative pedagogies, such as Peer Instruction and Peer wise are still uncommon in secondary schools.

Strategies for Increasing Female Participation in Advanced Level Mathematics

According Halpern *et al.* (2017), outline some possible ways to increase female participation in Advanced level mathematics;

Exposing girls to female role models who have succeeded in mathematics and science

Strong female role models are critical to helping young women discover their passion for mathematics and boosting their confidence in their academic abilities. Mathematics teachers as wells secondary schools are encouraged to invite prominent women who have excelled in mathematics-related careers and professions to share their thoughts and experiences regarding reasons they entered the field, obstacles they overcame in relation to their career path, the type of work they do on a daily basis, practical information (e.g., about pay and benefits), and positive and negative aspects of their jobs. Studies by Halpern *et al.* (2017) have shown that exposure to positive role models have a positive impact on young women's mathematics performance and can help dispel negative stereotypes. Halpern *et al.* (2017) further suggest the use of biographical readings about women scientists, mathematicians, and engineers to help

students find positive role models. Watt (2006) has also noted the role of mathematics-related female role models in countering the stereotypes that promote men in mathematics- related domains.

Fostering a conducive classroom climate that enhance interest and curiosity in mathematics

The majority of the girls highlighted the need for teachers improve on their ways of teaching so that the girl child gains confidence and feels comfortable during mathematics lessons. This will help to kindle increase and sustain interest in math. The majority of the girls who were interviewed suggested that teachers should provide equal opportunities for both boys and girls in the mathematics classrooms as well as being sensitive to the needs of the female students. The mathematics teacher should therefore create a c centered classroom environment, where students have opportunities to reason and construct their understanding as part of a community of learners. Mathematics instruction should provide students opportunities to engage in mathematical inquiry and meaning making through discourse. Stein (2014) is of the idea that mathematics should be taught in a way that encourages students to use mathematical discourse to make conjectures, talk, question, and agree or disagree about problems in order to discover important mathematical concepts. Teachers can encourage this by remaining flexible and responsive to students' response and feedback (NCTM, 2010).

Develop, foster and build girls' confidence about their abilities

Researchers has shown that females have less confidence in their mathematics abilities than their males counterparts and begin to lose interest in maths careers from early adolescent (Herbert and Stipek, 2013). The girls noted that both their parents and teachers should find means of strengthening girls' beliefs regarding their abilities in

mathematics. Teachers and parents should make the girls aware that abilities in mathematics are not fixed and therefore can be improved upon through consistent effort and hard work. The school and the home environment should thus be supportive to build girls' interest and confidence. Asimeng (2015), notes that teachers also encourage participation and foster self-confidence by giving consistent positive reinforcement for their comments and questions.

At first glance, the obstacles for girls' disengagement from mathematics look insurmountable. However, a closer examination reveals that while some of them are located outside of teachers' control, there is a lot teachers can do to alleviate the problem. For example, Daly and Grant (2016) identified six areas of good practice in a Mathematics classroom that promote positive girls' attitudes about mathematics. They include:

1. **Pedagogy:** teaching and learning mathematics in a way that is accessible and engaging for girls
2. **Classroom management:** engaging and supporting girls;
3. **Careers:** emphasizing the value of mathematics and mathematics-related careers;
4. **Progression:** making mathematics relevant for girls (and boys) in secondary and postsecondary education;
5. **Workforce:** girls (and boys) have access to good mathematics teaching;
6. **Culture and ethos:** Mathematics is for everyone developing a positive perception of mathematics

Zohar and Bronshtein (2016) produced a similar list of pedagogical approaches aimed at engaging girls with mathematics:

1. **Promoting student active engagement inside and outside of school:** Using group projects dealing with real life problems, Peer Instruction, real life data collection and analysis.
2. **Focusing on developing students' metacognitive strategies:** Helping them learn how to study mathematics effectively and become confident learners; engaging students in critical reflection, helping them acquire better learning skills, modeling problem solving and thinking using cognitive apprenticeship approaches.
3. **Using modern technologies to make mathematics relevant to students' lives and to their future aspirations:** Using real life data collection and analysis with sensors, video analysis, etc.
4. **Using history & philosophy of science to build a more realistic picture of science and scientists:** Uncovering the process of discovery, showing that science is not an individual pursuit, emphasizing the roles women played in science.
5. **Introducing female role-models and mentoring:** Connecting students with women scientists, engineers, and high-tech leaders.
6. **Providing continuous constructive feedback on students' progress:** Using formative assessment to help students learn mathematics, utilizing technology and collaborative pedagogies.
7. **Using multiple ways to assess student understanding:** Tests and quizzes, projects (group and individual), lab practical, etc.
8. **Emphasizing collaborative nature of science:** Using collaborative projects, activities, encouraging girls' participation. Modeling collaboration and mutual support.

9. **Raising teachers' awareness of their beliefs and attitudes about girls' engagement with mathematics:** Discussing with the girls how they feel in class, encouraging them, focusing on their successes, while acknowledging what we learn from failures. Making practicing and prospective mathematics teachers aware of the factors affecting girls' disengagement from mathematics is the first step in addressing the problem. The second step is equipping mathematics teachers with the relevant pedagogical approaches that can help address these issues. In the last decades a number of research groups studied how to implement these approaches in secondary and post-secondary mathematics classrooms.

2.2 Theoretical Framework

This section examines theories supporting the increase in female participation in advanced level mathematics among undergraduate science education students in Federal University of Technology Minna

Cognitive Theory

Beliefs influence our perception of reality. David Bohm, a physicist who worked closely with Einstein, is credited with making the following statement during a 1977 lecture given at Berkley University, Reality is what we take to be true. What we take to be true is what we believe. What we believe is based upon our perceptions. What we perceive depends on what we look for. What we look for depends on what we think. What we think depends on what we perceive. What we perceive determines what we believe. What we believe determines what we take to be true. What we take to be true is our reality. (Ricard and Thuan, 2000).

The theoretical frameworks used in this study are about confidence in one's personal agency for purposeful action and confidence about one's inherent intellect and learning

ability. These confidence systems combine to form powerful sources of motivation, persistence, and resilience, especially in the face of challenges. Pajares (1992) argued that teacher confidence represent an important path of inquiry, as exploration may find a "strong relationship between students' educational confidence and their planning, instructional decisions, and classroom practices". As novice students navigate the early years of developing teaching skill and confidence, challenges can be a professional way of life. Developing an understanding of the confidence these students hold for their own personal agency and intelligence may assist in providing essential support and targeted feedback to enable the professional growth that is critical to overcoming the challenges in their promising careers (Levin, 2015).

Self-Efficacy

Cognitive theory centers on the exercise of personal agency, or the ability to produce desired effects through the actions taken in our lives. Efficacy beliefs exert a wide range of influence over the courses of action chosen, including the amount of effort one is willing to put forth, the level of perseverance shown, how well one will cope with challenges, and resilience to adversity (Bandura, Barbaranelli, Caprara and Pastorelli, 1996; Chu, 2011). Through the symbolic representation of aspirational outcomes, we can motivate our behaviour in pursuit of those outcomes, and while doing so, our efficacy beliefs influence current action (Bandura, 1971). This ability to activate both thought and behaviour in the service of future achievements can have beneficial results or unintended consequences, but it is the belief in our personal power to make things happen that will have profound effects on the actions we take in our lives.

Our efficacy beliefs are a key factor in the development of competence in the pursuits we choose. People with similar skills in a particular area, for instance, may operate poorly,

adequately, or exceptionally, depending on their confidence system. Those who regard themselves as notably efficacious in a given area will tend to perform at a higher level than those who have a poor formulation of their ability in the same area. It is worth noting that this process is independent of a person's actual skill level at the outset. Having high efficacy beliefs can facilitate increased cognitive functioning; foster interest and motivation; improve goals and the commitment to reaching them; and improve effort when challenged (Bandura, 1997). These are individuals who accept difficult tasks as challenges to be undertaken, and maintain belief not only in their ability to prevail, but also that the effort put forth will increase their skill and capacity. People with low efficacy beliefs will display doubt in their abilities, find it hard to stay motivated, and give up quickly in the face of obstacles. This leads to a tendency to set low goals and aspirations for themselves, and when facing adversity to dwell on diagnosing personal deficiencies and conjuring calamitous outcomes. Once thinking has been diverted to predicting personal failings and poor results, cognitive processes, and hence effective functioning, become diminished (Bandura, 1997; Bandura et al., 1996; Boyatzis and Akrivou, 2006). The implementation of self-efficacy beliefs is applicable to everyone.

2.3 Review of Related Empirical Studies

Female's perceptions towards mathematics must in part at least, depend upon what they define as being mathematical in nature this question goes to the heart of this study. Is mathematics carried out within everyday life, and simply recognised as such when it is met in school, or does mathematics not start until when someone performatively asserts that what students were doing was mathematics' (Pais, 2011). Similarly, part of the lack of appeal of mathematical study may be the narrow definition of mathematics as dealing only in numbers (Epstein, 2010). This latter interview-based study revealed that some children did not appear to have a view about the nature of mathematics at all, leading

them to speculate that 'if children don't have a view about what mathematics is, that may make it difficult for them to capitalise on the mathematics they encounter at home and in other out-of-school settings,' (Young, 2016). A small-scale project carried out by Grootenboer and colleagues in Australia explored feelings about mathematics amongst 9-12 year-olds. Number and calculation were prevalent in their descriptions of what mathematics is about, a finding echoed by Walls (2017), with little focus on measures, geometry, algebra or statistics. Times tables received privileged status in the minds of the children, and examples were exclusively drawn from experiences of mathematics in school, although the reasons for this may be methodological. Perhaps the most interesting finding was that children were well able to 'articulate and discuss their affective responses to their mathematical experiences' (Grootenboer *et al.*, 2013), contradicting the findings of (Young, 2016), with a resulting plea from the authors to teachers to discuss feelings about mathematics with children to inform their teaching approach.

An alternative characterisation of mathematics based on a study of ten high-attaining children in England focused on characterised mathematics and mathematicians. The metaphorical labels generated by Kelly (2014), were labourer, mechanic, performer, craftsperson and academic, with labourer and mechanic the most frequently occurring categories, mechanical aspects of mathematics being particularly emphasised by girls. There is some evidence of links between children's perceptions of the nature of mathematics, and the extent to which they identify with doing mathematics outside school.

Drawing on Bishop's (2015) typography of mathematical activity described above when working with Kenyan primary level students, Masingila *et al*. (2011) found a correlation between those reporting 'broader' activities defined as location, playing or explaining and those who answered positively to whether they had learned mathematics out of school.

Girls were also less likely than boys to report they had learned mathematics out of school. Overwhelmingly, views were closely tied to school arithmetic rather than broader views of mathematics as a way of thinking, leading the authors to conclude 'These students may very well be mathematically powerful in their out-of-school mathematics practice, but they may not count that as mathematics due to the disconnection between the discourses of everyday and school' (Masingila *et al.,* 2011).

An attempt to portray perceptions of mathematics through the eyes of the children was made by Borthwick (2011), using analysis of children's drawings of mathematics lessons created by primary-aged children in the UK. Themes arising included perceptions of mathematics as a solitary activity, dominated by number and calculation. A similarly limited view of mathematics was found by Ashby (2013) in his small-scale study of 7-8 year-olds, where children displayed difficulties in making connections between the work carried out on paper in mathematics lessons and its practical applications, with the exception of working with money. Also worrying was the lack of self-belief shown by many of the children, together with an association of mathematics with cleverness children perceived that not only did you have to be clever to do mathematics, but mathematical ability was a defining feature of cleverness itself. The combination of these two factors, lack of understanding of the point of mathematics together with assumption of the likelihood of failure, provides a powerful disincentive to effort and further study: 'Human nature does not favour futile endeavours; if a difficult task appears to have no purpose, then few will continue to follow it through,' (Ashby, 2013).

A similar drawing methodology to that deployed by Borthwick was utilised by Picker and Berry a decade earlier (Picker & Berry, 2015). They asked their 12-13 year-old participants to draw mathematicians and write a commentary to explain their drawings, with striking results. Across all five countries involved, children had great difficulty in

explaining why anyone might want to hire a mathematician, either leaving the question blank, stating that they didn't know why anyone would wish to do so, or referring to asking for help with their homework. Alongside themes of mathematicians with special powers (like wizardry), images were dominated by drawings of mathematics teachers, with a common theme of small children powerless before authoritarian and threatening teachers. Picker and Berry (2015) concluded that there is a greater distance between children and mathematics than with any other subject, with children therefore reliant upon societal stereotypes for their references on the role and nature of mathematics.

This concept of distance, or a disconnect between mathematics and children's real lives, resonates across the literature. In analysing the responses of 215 children asked to explain what mathematicians do, Rock and Shaw (2016) found that not one respondent provided an example drawn from outside the life of the classroom. They drew the conclusion that teachers should stress the role of mathematics, 'making connections to children's everyday lives to help them learn to value mathematics. Perhaps this top-down discourse, pleading the importance of mathematics in children's lives rather than trying to draw upon the mathematics which is already there, contributes to the very sense of distance that Rock and Shaw are trying to overcome.

As predicted by the literature (Ashby, 2013; Borthwick, 2011; Walls, 2013) number and calculation were prominent in the girls' visions for what constitutes mathematics as a subject, and speed and size were important factors. Alongside number and calculation, aspects of mathematics such as fractions were emphasised, with all of these appearing both within children's portrayals of mathematics within the classroom and within their determined attempts to get better at mathematics through repetition and self-regulated practice. Coupled with this emphasis on certain areas of mathematics there emerged, predominantly in the discourse of less confident mathematicians within the group, a lack

of understanding of why these areas were actually so important. For the most part the girls accepted this curriculum without question and their emphasis upon number and calculation reflected the balance of the taught curriculum they received, however the lack of emphasis upon some of the more dynamic topics of the curriculum such as geometry, key life skills such as handling data, and algebraic reasoning provides food for thought and leads back to the question explored within the literature review of the overall purpose of the mathematics curriculum.

The girls' propensity to see mathematics as contrived, inventing the kinds of word problems that could only be features of a mathematics lesson rather than genuinely found in the world around them was a striking theme, as was the geographical location of where mathematics is carried out, revealed particularly through their drawings. Few of the girls were able to articulate examples of applying mathematics as a tool to realistic problems in real-life; instead, many of them took the kind of questions only found within mathematics textbooks and tests with them into their home lives via their scrapbooks.

The theme of dichotomies in views of mathematics, the tendency of this group of girls to see it as a subject which is either hard or easy, right or wrong, emerged across the data sources and particularly within the interviews, drawings and scrapbooks, echoing results reported by Mendick *et al.* (2015). The data suggests, however, that the picture underpinning these dichotomies is subtle and complex. Some children preferred working on mathematical skills such as estimation because these skills released them from the pressure of having to gain a right answer, whilst others felt one of the contrasts between home and school mathematics was the need to be 'right' at school or have their mathematics judged. For some mathematics as a subject that could be judged 'correct' was a source of satisfaction and enjoyment, for others a source of stress and discouragement. All of this points to the importance of the class teacher understanding

the viewpoint of the individual, their perceptions of the nature of the subject, and providing a variety of ways into meaningful tasks that allow children to understand not only how areas of mathematics connect together but why mastering them is important.

Integrally linked to, informing and informed by how this group of girls characterised mathematics as a subject was the second question concerning what mathematics they would recognise as part of their daily lives. Reviewing the writings of authors such as Masingila *et al.* (2011) and Rowlands and Carson (2012), this study aimed to ascertain whether children would recognise activities in the home as mathematical unless they were validated by formal academic activity, and whether commonalities or differences would predominate when portraying home and school mathematics. Analysing and contrasting the more home-based elements of the study, the scrapbooks and photographs, against the more school-based data collection methods such as concept maps and children's drawings, revealed a mixed picture. There were many heartening examples of home-based mathematical activity being recognised as such, particularly amongst the games and hobbies of Jasmine, the many and varied family-based activities of Hetty and the recognition of mathematics as a problem-solving tool within the pictures and annotations included by Taylor. In supporting the findings of Winter *et al.* (2004) that puzzles, games and practical activities were a feature of home-based mathematics, but contradicting those of Masingila *et al.* (2011) in finding that at least some of the children did recognise them as such, the data suggests that there is scope for more frequent and consistent links being made between the two predominant locations for learning in a child's life, home and school. One possible bridge supported by the data is the use of cultural artefacts as recommended by Bonotto and Basso (2012); receipts, recipes or travel guides are examples of the kind of artefacts that might be used as a starting point for classroom-based mathematical enquiry, and the presence of these within the higher- but not the

lower-attaining children's scrapbooks suggest the potential benefits of making these links explicit for all children.

Taken as a whole, the data suggests that this group of girls did recognise a variety of mathematics within their daily lives, but there were individual differences in this regard, and this authentic home-based mathematics tended to be overwhelmed by rehearsal of the more formal, arithmetically-based activity deemed necessary for success at school. As for the future, the limited view of the usefulness of mathematics in terms of money and measures (both stronger features of home- rather than school-based data collection methods) and absence of a vision for how some of the fundamental ideas and processes in mathematics (proportional relationships, logic and deduction, patterns and algebraic reasoning) might prove useful suggest that as educators we are currently missing an opportunity to hook children into believing that mathematics is a subject to which they should commit.

2.4 Summary of Reviewed Literature

As result it is found that in international level Females mathematics achievements were lower than boys. Self-confidence emerges in higher school level. It means boys had better self-confidence than mathematics in high school. Children that are supported by their parents had better result. In Nigeria mathematics achievements had no significant difference between male and female learners in senior secondary schools. Some teachers related ability of learning mathematics to students' sex. In the study girls had less interest with mathematics. Educators must promote greater participation for both boys and girls and they must use best method to encourage girls in learning mathematics.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Research Design

The study adopted a casiest research design. Casiest Research Design: A case study refers to the study of a particular case. In other words, case study is an indepth investigation of one phenomenon, one event, one place over an extended period of time.. This study sought the opinions of students and teachers for evaluating the factors influencing Mathemaics Education Students performance in Science Education department in Federal University of Technology Minna

3.2 Population of the Study

The population of the study comprises of all 100 level undergraduate students in two departments which are Department of Science Education and Department of Educational Technology in School of Science and Technology Education in Federal University of Technology Minna which consist of One hundred and ten (110) students, session 2019/2020 as shown in the table 3.1 below

Table 3.1: Population of 100level Students

S/N	DEPARTMENTS	Population
1	Science Education	52
2	Educational Technology	58
	Total	**110**

Source: Department of Science Education and Educational Technology,(2021).

3.3 Sample and Sampling Techniques

There will be no sampling technique because the population is of manageable size.

3.4 Research Instrument

A Research instrument was designed and titled 'female participation in advanced level mathematics among undergraduate Science Education Students in Federal University of Technology Minna' was used for data collection using four likert rating scale and it's contains four sections as well as the same scaling for all sections. Section "A" will be made up of the demographic data of the respondent that is gender and department, section "B" contains eight (8) items, while section "C" contains six (6) items and section "D" contains Nine (9) items . With response mode of Strongly Agree rated as 4, Agree as 3, Disagree as 2, and strongly Disagree as 1 point pertinently.

3.5 Validation of the Research Instrument

After drafting the instrument was taken to two Senior lecturers in the Department of Science Education, Federal University of Technology Minna, Niger state and one lecturer in department of Educational Technology, Federal University of Technology Minna, Niger state to ensure face to face validity of the instrument. As well as the validate of this study and their comments was used to readjust the instrument.

3.6 Reliability of the Instrument

The reliability of the instrument will be determined by selecting 10 students apart from each department of the selected sample to determine the reliability of the instrument using Cronbach alpha. A result of 0.76 was obtained which indicate that the result

3.7 Method of Data Collection

After permission will be sorted, copies of the questionnaire will be directly administered to the respondents to be fill and data will be collected and all copies will be retrieved and the responds of the students will be used to analyze the data.

3.8 Method of Data Analysis

The data collected was analyze using mean and standard deviation to analyze the research questions.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Research Question One

What are the perception of females in studying advanced level mathematics among undergraduate science education students in Federal University of Technology Minna?

Table 4.1: Shows the mean responses of the respondent on the perception of females in studying advanced level mathematics among undergraduate science education students in Federal University of Technology Minna.

S/N	ITEMS	$\bar{X}_A$	SD	Remarks
1.	Females perceive that they possesses low intellect and cannot grasp advanced level mathematics as the males	2.54	1.27	Agreed
2.	Female perceived they lack creative abilities and original thinking to study mathematics	2.50	1.23	Agreed
3.	Females avoid competition with males	2.74	1.18	Agreed
4.	Females think that their marriage opportunities reduce their advance mathematics careers.	2.51	1.19	Agreed
5.	Females see no relevance of advanced level Mathematics	2.31	1.23	Disagreed
6.	There are not many female role models to influence girls' choice of careers in advanced level mathematics course	2.57	1.01	Agreed
7.	Females in advance level Mathematics usually experience prejudices and antagonisms from male colleagues and subordinates	2.52	1.17	Agreed
8.	Females are not favourably considered when it comes to employment in term mathematics	2.70	1.37	Agreed
	Grand Average	**2.55**	**1.20**	**Agreed**

Decision=2.5

Table 4.1 above revealed that the grand mean average of (2.55) which indicated that the respondents agreed on the perception of females in studying advanced level mathematics among undergraduate science education students in Federal University of Technology Minna.

4.2 Research Question Two

What are the factors affecting female participation in advanced level mathematics among undergraduate science education students in Federal University of Technology Minna?

Table 4.2: Shows the mean responses of the respondent on the factors affecting female participation in advanced level mathematics among undergraduate science education students in Federal University of Technology Minna

S/N	ITEMS	$\bar{X}$	SD	Remarks
1.	Instructional procedure used by lecturers in schools contribute to low participation of females in advanced level mathematics	2.56	1.21	Agreed
2.	Females exploitation by male lecturers in advanced level mathematics contribute to low participation of females in advanced level mathematics	2.70	1.25	Agreed
3.	Poor advanced level mathematics foundation in high school contribute to low participation of females in advanced level mathematics	2.54	1.23	Agreed
4.	Peer group influence affects participation of females in advanced level mathematics	2.57	1.02	Agreed
5.	Family background affect participation of females in advanced level mathematics	2.53	1.05	Agreed
6.	Females have low intelligence quotient (IQ) and this affect their participation in advanced level mathematics	2.77	1.08	Agreed
	Grand Average	**2.61**	**1.14**	**Agreed**

Decision=2.5

Table 4.2 above revealed that the grand mean average of (2.61) which indicated that the respondents agreed on the factors affecting female participation in advanced level mathematics among undergraduate science education students in Federal University of Technology Minna.

4.3 Research Question Three

What are the strategies for increasing female participation in advanced level mathematics among undergraduate science education students in Federal University of Technology Minna?

Table 4.3: Shows the mean responses of the respondent on the strategies for increasing female participation in advanced level mathematics among undergraduate science education students in Federal University of Technology Minna

S/N	ITEMS	$\bar{X}$	SD	Remarks
1.	Scholarships to females in advanced level mathematics will increase participation of females in advanced level mathematics	2.64	1.02	Agreed
2.	The Learners should be ready to learn	2.60	1.21	Agreed
3.	Exposing girls to female role models who have succeeded in advanced level mathematics	2.64	1.20	Agreed
4.	Fostering a conducive classroom climate that enhance interest and curiosity in mathematics	2.61	1.19	Agreed
5.	Develop, foster and build girls' confidence about their abilities	2.51	1.27	Agreed
6.	Parents should not hinder but encourage their females to study Mathematics careers	2.67	1.01	Agreed
7.	Females intending to go into advanced level mathematics should encourage themselves to disregard what people will say against their career	2.62	1.17	Agreed
8.	Females should not be stereotyped into certain courses. Females should be made to understand that anybody can read any course, whether male or female	2.72	1.37	Agreed
9.	Advanced level mathematics teachers should make their subjects interesting to learn	2.81	1.10	Agreed
	Grand Average	**2.65**	**1.17**	**Agreed**

Decision=2.5

Table 4.3 above revealed the results on the grand mean average of (2.65) which indicated that the respondents agreed on strategies for increasing female participation in advanced level mathematics among undergraduate science education students in Federal University of Technology Minna.

4.4 Summary of Major Findings

The major findings of the study are;

1. Females avoid competition with males.

2. Females have low intelligence quotient (IQ) and this affect their participation in advanced level mathematics
3. Advanced level mathematics teachers should make their subjects interesting to learn
4. Peer group influence affects participation of females in advanced level mathematics
5. Scholarships to females in advanced level mathematics will increase participation of females in advanced level mathematics
6. Exposing girls to female role models who have succeeded in advanced level mathematics
7. Fostering a conducive classroom climate that enhance interest and curiosity in mathematics
8. Develop, foster and build girls' confidence about their abilities

4.5 Discussion of Results

The result revealed that the grand mean average of (2.55) which indicated that the respondents agreed on the perception of females in studying advanced level mathematics among undergraduate science education students in Federal University of Technology Minna. The study is inline with Fennema, (2016), In Nigeria by 1990 when studying of mathematics become optional for students, less females selected mathematics to study than males because young women believed that mathematics is not useful and they had no self-confidence in learning mathematics (Fennema, 2016). By the way researchers started an intervention program and explained the effectiveness of math to students it impacted on female confidence. As a result, the number of girls students increased in math classes but the female students had anxiety about math.

In Pakistan some teachers had an idea that Allah creates male superior then women, because of that boys are better in mathematics. They think deeply and try to find better solutions than girls (Halai, 2010). Moreover girls are obedient and would prepare themselves with family's rules that they are expected to follow their hard work.

A research which was conducted in US, when teachers evaluated students success in mathematics, teachers had an idea that boys' success related to their ability but girls' success more related to efforts (Fennema, 2016). Researchers have different findings about girls' math achievements. According to Ray (2016), "there are believes that as a matter as genetic disability, women are essentially excluded from the upper end of mathematic achievement curve. It is natural from the begining if you explain something to girls they accept. So then boys from the childhood usually ask lots of questions like what, why, how (Halai, 2010).

It revealed the grand mean average of (2.61) which indicated that the respondents agreed on the factors affecting female participation in advanced level mathematics among undergraduate science education students in Federal University of Technology Minna. The study is inline with Meredith and Redish (2015) conducted an investigation of undergraduate mathematics curriculum for life-science majors (most of whom are women). They also pointed out that while reimagining mathematics curriculum, we also have to reconsider how we use assessment in mathematics courses. Research indicates that traditional mathematics assessment that puts a sole emphasis on the final product, while ignoring the process, is unfavourable for girls. Considering that girls often have low self-efficacy about mathematics, the high-stakes exams that emphasize the ability to arrive at the correct answer in a very short period of time only reinforce these feelings and diminish girls' chances for success. willing to deal with this problem both at K-12 and undergraduate levels. The good news, however, is that there are research-based

pedagogies that can help teachers address this problem. There is also ample research evidence that the pedagogical approaches that are effective for engaging girls in science are also beneficial to other students.

It revealed the results on the grand mean average of (2.65) which indicated that the respondents agreed on strategies for increasing female participation in advanced level mathematics among undergraduate science education students in Federal University of Technology Minna. The findings of the study corroborate with Halpern *et al.* (2017) have shown that exposure to positive role models have a positive impact on young women's math performance and can help dispel negative stereotypes. Halpern *et al.* (2017) further suggest the use of biographical readings about women scientists, mathematicians, and engineers to help students find positive role models. Watt (2006) has also noted the role of maths-related female role models in countering the stereotypes that promote men in maths- related domains. Stein (2014) is of the idea that mathematics should be taught in a way that encourages students to use mathematical discourse to make conjectures, talk, question, and agree or disagree about problems in order to discover important mathematical concepts.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Summary

The study is to investigate the female participation in advanced level mathematics among undergraduate science education students in Federal University of Technology Minna. The study possesses three specific objectives to guide the study which are the perception of females in studying advanced level mathematics among undergraduate of science education students in Federal University of Technology Minna, the factors affecting female participation in advanced level mathematics among undergraduate of science education students in Federal University of Technology Minna, the strategies for increasing female participation in advanced level mathematics among undergraduate of science education students in Federal University of Technology Minna. Three (3) corresponding research questions were raised. The research design is a casiest survey, the population of the study comprises of One hundred and ten students (110). The major findings of the study revealed that Females avoid competition with males, Females have low intelligence quotient (IQ) and this affect their participation in advanced level mathematics and Advanced level mathematics teachers should make their subjects interesting to learn

5.2 Conclusion

The study concluded that female participation in advance level mathematics is encouraged by the teachers and female role models in the society at large.

5.3 Recommendations

Based on the findings of the study the following recommendations were made;

1. The institutions should provide a conducive environment for adequate female participation in advanced level mathematics..
2. The teachers should make the class more interesting and stimulating for females.
3. The institution should ensure that females exploitation by male lecturers in advanced level mathematics should be restricted and punishable
4. The government should provide scholarships to females in advanced level mathematics to increase participation of females in advanced level mathematics.
5. The teachers should develop, foster and build girls' confidence about their abilities in advance level mathematics

5.4 Contribution to Knowledge

The study contributed by increasing female participation and change their perception positively in advanced level mathematics.

5.5 Suggestion for Further Studies

1. Assessment on female perception in mathematics education in North-Central Nigeria
2. Impact of female perception in mathematics education in south-west Nigeria

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APPENDIX A

QUESTIONNAIRE ON FEMALE PARTICIPATION IN ADVANCED LEVEL MATHEMATICS AMONG UNDERGRADUATE SCIENCE EDUCATION STUDENTS IN FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

Dear respondent,

This Questionnaire is designed to obtain information on female participation in advanced level mathematics among undergraduate science education students in federal university of technology, Minna. Please, kindly assist by filling the necessary information where appropriate. Any information obtained will be held in strict confidence and will be used solely for the purpose of this academic study. Please tick or write in the appropriate location.

SECTION A: Bio data Information

1. School / faculty _____
2. Dep. Of study _____
3. Level of study _____
4. Age Bracket:16-20 ( ) 21-23 ( ) 24-29 ( ) 30-34( ) 35 & above ( )

INSTRUCTION: Use the following statement to fill the questions

Strongly Agree (SA); Agree (A); Disagree (D); Strongly Disagree (SD)

SECTION B: Items on Perception

1. What are the perception of female in studying advanced level mathematics among undergraduate science students in Federal University of Technology, Minna?

S/N	ITEMS	SA	A	D	SD
1	Females perceive that they possesses low intellect and cannot grasp advanced level mathematics as the males				
2	Female perceived they lack creative abilities and original thinking to study mathematics				
3	Females avoid competition with males				
4	Females think that their marriage opportunities reduce their advance mathematics careers				
5	Females see no relevance of advanced level mathematics				
6	There are not many female role models to influence girls' choice of careers in advanced level mathematics course				
7	Females in advanced level mathematics usually experience prejudices and antagonisms from male colleagues and subordinate				
8	Females are not favourably considered when it comes to employment in term of mathematics				

SECTION C

2. What are the factors affecting female participation in advanced level mathematics among undergraduate science education students in Federal University f Technology, Minna?

S/N	ITEMS	SA	A	D	SD
1	Instructional procedure used by lecturers in schools contribute to low participation of females in advanced level mathematics				
2	Females exploitation by male lecturers in advanced level mathematics contribute to low participation of females in advanced level mathematics				
3	Poor advanced level mathematics foundation in high school contribute to low participation of female in advanced level mathematics				
4	Peer group influence affect participation of females in advanced level mathematics				
5	Family background affect participation of females in advanced level mathematics				
6	Females have low intelligence quotient (IQ) and this affects their participation in advanced level mathematics				

SECTION D

3. What are the strategies for increasing female participation in advanced level mathematics among undergraduate science education students in Federal University of Technology, Minna?

S/N	ITEMS	SA	A	D	SD
1	Scholarships to females in advanced level mathematics will increase participation of females in advanced level mathematics				
2	The learners should be ready to learn				
3	Exposing girls to female role models who have succeeded in advanced level mathematics				
4	Fostering a conducive classroom climate that enhance interest and curiosity in mathematics				
5	Develop, foster and build girls' confidence about their abilities				
6	Parents should not hinder but encourage their females to study mathematics careers				

7	Females intending to go into advanced level mathematics should encourage themselves to disregard what people will say against their career				
8	Females should not be stereotyped into certain courses. Females should be made to understand that anybody can read any course, whether male or female				
9	Advanced level mathematics teachers should make their subject interesting to learn				

APPENDIX B

RESEARCH INSTRUMENT VALIDATION FORM

Sir/Ma,

The candidate ALIYU SAFIYA ATTAHIRwith Admission Number 2017/3/69269BE is a student of the department. You are requested to make amends or inputs that will improve the quality of the instrument. Your professional expertise is expected to assist the researcher towards the award of the degree.

Thank you.

Head of Department
Science Education
Fed. University of Technology
Minna
DATE

Dr. Rabiu M. Bello

HOD (Signature, Date & Official stamp)

Title of the Research Instrument: FEMALE PARTICIPATION IN ADVANCED MATHEMATICS AMONG UNDERGRADUATE SCIENCE EDUCATION STUDENTS IN FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

SECTION A

1. Appropriateness of the Research Instrument title: The Research instrument title is appropriate
2. Suggest amendment if not appropriate: None
3. Completeness of Bio-data Information: Good Bio-data information
4. Suggest inputs if incomplete None
5. Suitability of items generated The items generated are suitable
6. Structure of the questionnaire/ test items generated The questionnaire are well structured.
7. Structure of the instrument in line with the objectives of the study. The objectives are structured in line with the objective/topic
8. Items coverage and distribution across constructs and domains measured Items covered the three domains measured.
9. Appropriateness of the instrument in relation to the type of data to be collected It's appropriate enough.
10. What is the general overview and outlook of the instrument? Good instrument.
11. Rate the Instrument between 1-10 8

SECTION B

Name of the validator: ACABI THOMAS OMOTAYO

Designation/Rank: Associate Professor

Name of institution: Federal University of Technology Minna

Department/ School: Educational Technology (SSTE)

Telephone No/GSM No: 08038573000/08036803397

E-Mail Address: drolabiomotayo2072@gmail.com

23/7/2024

Signature, Date and stamp (if available)

QUESTIONNAIRE ON FEMALE PARTICIPATION IN ADVANCED MATHEMATICS AMONG UNDERGRADUATE SCIENCE EDUCATION STUDENTS IN FEDERAL UNIVERSITY OF TECHNOLOGY MINNA

Dear respondent,

This Questionnaire is designed to obtain information on female participation in advanced mathematics among undergraduate science education students in Federal University of Technology Minna. Please, kindly assist by filling the necessary information where appropriate. Any information obtained will be held in strict confidence and will be used solely for the purpose of this academic study. Please tick or write in the appropriate location.

SECTION A

Personal Data

Age:

16-20 ( ) 21-23 ( ) 24-29 ( ) 30-34 ( ) 35 & above ( )

Department: .....

SECTION B

What are the perception of females in studying advanced level mathematics among undergraduate science education students in Federal University of Technology Minna?

S/N	ITEMS	SA	A	SD	D
1	Females perceive that they possesses low intellect and cannot grasp advanced level mathematics as the males				
2	Female perceived they lack creative abilities and original thinking to study mathematics				
3	Females avoid competition with males				
4	Females think that their marriage opportunities reduce their advance mathematics careers.				
5	Females see no relevance of advanced level Mathematics				
6	There are not many female role models to influence girls' choice of careers in advanced level mathematics course				

1

7	Females in advance level Mathematics usually experience prejudices and antagonisms from male colleagues and subordinates				
8	Females are not favourably considered when it comes to employment in term mathematics				

SECTION C

What are the factors affecting female participation in advanced level mathematics among undergraduate science education students in Federal University of Technology Minna?

S/N	ITEMS	SA	A	SD	D
1	Instructional procedure used by lecturers in schools contribute to low participation of females in advanced level mathematics				
2	Females exploitation by male lecturers in advanced level mathematics contribute to low participation of females in advanced level mathematics				
3	Poor advanced level mathematics foundation in high school contribute to low participation of females in advanced level mathematics				
4	Peer group influence affects participation of females in advanced level mathematics				
5	Family background affect participation of females in advanced level mathematics				
6	Females have low intelligence quotient (IQ) and this affect their participation in advanced level mathematics				

SECTION D

What are the strategies for increasing female participation in advanced level mathematics among undergraduate science education students in Federal University of Technology Minna?

S/N	ITEMS	SA	A	SD	D
1	Scholarships to females in advanced level mathematics will increase participation of females in advanced level mathematics				
2	The Learners should be ready to learn				
3	Exposing girls to female role models who have succeeded in advanced level mathematics				
4	Fostering a conducive classroom climate that enhance interest and curiosity in mathematics				
5	Develop, foster and build girls' confidence about their abilities				
6	Parents should not hinder but encourage their females to study Mathematics careers				
7	Females intending to go into advanced level mathematics should encourage themselves to disregard what people will say against their career				
8	Females should not be stereotyped into certain courses. Females should be made to understand that anybody can read any course, whether male or female				
9	Advanced level mathematics teachers should make their subjects interesting to learn				

3

RESEARCH INSTRUMENT VALIDATION FORM

Sir/Ma,

The candidate ALIYU SAFIYA ATTAHIRU with Admission Number 2017/3/69269BSE is a student of the department. You are requested to make amends or inputs that will improve the quality of the instrument. Your professional expertise is expected to assist the researcher towards the award of the degree.

Thank you.

Head of Department
Science Education
Fed. University of Technology
Minna

Dr. Rabiu M. Bello

HOD (Signature, Date & Official stamp)

Title of the Research Instrument: Perception of FEMALE PARTICIPATION IN ADVANCED MATHEMATICS AMONG UNDERGRADUATE SCIENCE EDUCATION STUDENTS IN FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

SECTION A

1. Appropriateness of the Research Instrument title: Adequate
2. Suggest amendment if not appropriate: Suggestion Made
3. Completeness of Bio-data Information: Complete
4. Suggest inputs if incomplete None
5. Suitability of items generated Suitable
6. Structure of the questionnaire/ test items generated Adequate
7. Structure of the instrument in line with the objectives of the study. Okay.
8. Items coverage and distribution across constructs and domains measured Okay.
9. Appropriateness of the instrument in relation to the type of data to be collected Appropriate
10. What is the general overview and outlook of the instrument? Satisfactory
11. Rate the Instrument between 1-10

SECTION B

Name of the validator: Dr Rabia M. Zeidho

Designation/Rank: Snr Lecturer.

Name of institution: Future Q

Department/ School: Dept of Science Educ

Telephone No/GSM No: 0803 592 7009.

E-Mail Address: drrabia2021@gmail.com

Signature, Date and stamp (if available)

23-07-2021.

QUESTIONNAIRE ON FEMALE PARTICIPATION IN ADVANCED MATHEMATICS AMONG UNDERGRADUATE SCIENCE EDUCATION STUDENTS IN FEDERAL UNIVERSITY OF TECHNOLOGY MINNA

Dear respondent,

This Questionnaire is designed to obtain information on female participation in advanced mathematics among undergraduate science education students in Federal University of Technology Minna. Please, kindly assist by filling the necessary information where appropriate. Any information obtained will be held in strict confidence and will be used solely for the purpose of this academic study. Please tick or write in the appropriate location.

SECTION A : Biodata Information

~~Personal Data~~ 1. School/Faculty
2. Dept of Study
3. Level of Study

~~Age:~~

~~16-20 ( ) 21-23 ( ) 24-29 ( ) 30-34 ( ) 35 & above ( )~~

4. Age Bracket:

~~Department:~~ 5.

SECTION B : Items on Perception

Instruction: Use the following statements to fill the questionnaire:

1. What are the perception of female~~s~~ ~~in studying~~ advanced level mathematics among undergraduate science education students in Federal University of Technology Minna?

Strongly Agree (SA); Agree (A) Disagree (D) Strongly Disagree (SD)

S/N	ITEMS	SA	A	~~SD~~ D	~~SD~~ SD
1	Females perceive that they possesses low intellect and cannot grasp advanced level mathematics as the males				
2	Female perceived they lack creative abilities and original thinking to study mathematics				
3	Females avoid competition with males				
4	Females think that their marriage opportunities reduce their advance mathematics careers.				
5	Females see no relevance of advanced level Mathematics				
6	There are not many female role models to influence girls' choice of careers in advanced level mathematics course				

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7	Females in advance level Mathematics usually experience prejudices and antagonisms from male colleagues and subordinates				
8	Females are not favourably considered when it comes to employment in term mathematics				

SECTION C

What are the factors affecting female participation in advanced level mathematics among undergraduate science education students in Federal University of Technology Minna?

S/N	ITEMS	SA	A	SD	D
1	Instructional procedure used by lecturers in schools contribute to low participation of females in advanced level mathematics				
2	Females exploitation by male lecturers in advanced level mathematics contribute to low participation of females in advanced level mathematics				
3	Poor advanced level mathematics foundation in high school contribute to low participation of females in advanced level mathematics				
4	Peer group influence affects participation of females in advanced level mathematics				
5	Family background affect participation of females in advanced level mathematics				
6	Females have low intelligence quotient (IQ) ~~and this~~ affect their participation in advanced level mathematics				

SECTION D

What are the strategies for increasing female participation in advanced level mathematics among undergraduate science education students in Federal University of Technology Minna?

S/N	ITEMS	SA	A	SD	D
1	Scholarships to females in advanced level mathematics will increase participation of females in advanced level mathematics				
2	The Learners should be ready to learn				
3	Exposing girls to female role models who have succeeded in advanced level mathematics				
4	Fostering a conducive classroom climate that enhance interest and curiosity in mathematics				
5	Develop, foster and build girls' confidence about their abilities				
6	Parents should not hinder but encourage their females to study Mathematics careers				
7	Females intending to go into advanced level mathematics should encourage themselves to disregard what people will say against their career				
8	Females should not be stereotyped into certain courses. Females should be made to understand that anybody can read any course, whether male or female				
9	Advanced level mathematics teachers should make their subjects interesting to learn				

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