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EFFECT OF METACOGNITIVE SELF-ASSESSMENT STRATEGY ON SELF-EFFICACY IN ALGEBRA AMONG SENIOR SECONDARY SCHOOL STUDENTS, DUTSIN-MA QUALITY ASSURANCE ZONE, KATSINA STATE, NIGERIA

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Abstract

This study examined the effect of metacognitive self-assessment strategy on self-efficacy in algebra among senior secondary school students in Dutsin-Ma Quality Assurance Zone, Katsina State, Nigeria. Two research questions and two hypotheses guided the study. The researchers employed a quasi-experimental design involving two groups: experimental and control. The population consisted of 3,691 senior secondary school two (SSS 2) students from public secondary schools in Dutsin-Ma Quality Assurance Zone of Katsina State. Two coeducational schools were selected through simple random sampling, and from these, two intact classes were also randomly chosen from the SSS 2 arm. One hundred and two (102) students participated as the sample, comprising 77 males and 25 females. The instrument used for data collection was the Algebra Self-Efficacy Scale (ASES), which had a reliability

Keywords:
Instructional Strategies, Metacognitive Self-Assessment, Mathematics Education, Mathematics, Algebra, Self-Efficacy, Quasi-Experimental Design, Nigeria.

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coefficient of 0.75. Data were analysed using descriptive statistics—mean and standard deviation—to answer the research questions. The hypotheses were tested using inferential statistics, specifically the Mann-Whitney U test at a significance level of $\rho \leq 0.05$. The results indicated a significant difference in self-efficacy favouring the experimental group exposed to the Metacognitive Self-Assessment Strategy, while no significant difference was observed between male and female students' self-efficacy when exposed to the strategy. The study concluded that the Metacognitive Self-Assessment Strategy effectively enhanced students' algebra self-efficacy more than the traditional lecture method among senior secondary school students, and it is a gender-neutral teaching approach. Based on these findings, the researchers recommended that curriculum developers incorporate empirical data from this study to embed the metacognitive self-assessment strategy as a pedagogical tool for improving self-efficacy in algebra and mathematics in general in secondary schools.

INTRODUCTION

Mathematics is one of the school subjects that relates to every aspect of human endeavour. It is a branch of science concerned with measurements, numbers, and quantities. Mathematics is the science of structure, order, and relationships that has developed from fundamental practices such as counting, measuring, and describing the shapes of objects (Ukwueze et al., 2020). It is a mental activity involving sequentially performing mental constructions, which are both inductive and effective (Ukwueze, 2017). Mathematics appears in all areas of our lives and forms the basis for many of our daily activities. According to Umaru et al. (2013), mathematics is vital for success in studying science and other related fields.

Mathematics is an essential subject. No nation can develop scientifically and technologically if it neglects Mathematics (Eisner in Kurumeh & Iji, 2009). Therefore, any society's absence of basic mathematical knowledge and skills may isolate it from global scientific progress. Recognising the importance of Mathematics, it is studied as a compulsory subject in school curricula at both primary and secondary levels in nearly every part of the world, ensuring each schoolchild acquires appropriate scientific and mathematical knowledge (Oluokun, 2010). The admission requirements demonstrate this for tertiary institutions in Nigeria, which mandate a credit in Mathematics before students can be considered for admission into any course or programme (Akerele, 2011).

Ayeni (2012) stated that knowledge of Mathematics can help us measure, pay, calculate sales tax, take medical measurements, measure temperatures, cook, and work in architecture, among other things. Mathematics is fundamental in life, as it helps us quantify all the visible things we deal with daily; it also assists us in planning for the future.

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Mathematics is applied everywhere, such as in a country's economy, the construction of buildings, and many other fields. Its usefulness is extensive. For instance, a tailor uses it to measure parts of the body and clothing materials, a carpenter measures before cutting planks, a driver determines speed, time, and distance, a town planner and surveyor rely on it for their calculations, while a photographer uses it to mix chemicals in precise proportions for pictures to turn out well and for enlargement and reduction purposes. Mathematics has therefore played a vital role in helping us keep pace with the fast-moving world and its comforts and pleasures.

According to Akissani et al. (2025), Mathematics consists of different branches, one of which is algebra. Algebra is a branch of Mathematics that uses letters to represent numbers and quantities. It is a branch of Mathematics that uses mathematical statements to describe relationships between things that vary over time. Algebra is the bedrock of all mathematics branches and is considered one of the most important areas of school Mathematics. It is a part of Mathematics in which letters and other general symbols represent numbers and quantities in formulae and equations. It is one of the broad parts of Mathematics. It is the study of Mathematical symbols and the rules for manipulating them; it is a unifying thread of almost all of Mathematics. Algebra is generally considered to be essential for any study of Mathematics, science, or engineering, as well as such applications as medicine and economics ("History of algebra", n.d.; "What is algebra?", n.d.).

Imasuen and Stanley (2022) asserted that algebra is a branch of mathematics. It is derived from the Arabic word Al-jabr, meaning the reunion of broken parts. It is that part of mathematics that demands extensive abstract thinking. It utilises logic in manipulating signs and symbols. Knowledge of algebra takes students beyond a focus on arithmetic operations. It helps students to reason logically using symbols and to solve equations, enabling them to propose solutions to real-life problems. Akissani et al. (2025) stated that algebra, as an aspect of mathematics, involves using letters and numbers. When combined with figures, these letters can confuse students, as their values may change or be replaced by other letters at intervals. Consequently, this makes students wonder whether they are learning mathematics or the alphabet of the English language. Furthermore, they asserted that algebra not only deals with properties of numbers but also shows how these properties can be applied to solve everyday practical problems. Therefore, good skills and competencies in algebra are valuable assets to any secondary school student because it is a tool for developing critical and logical thinking, which can facilitate learning other branches of mathematics and even other science subjects. This indicates that students who master and retain algebraic knowledge and skills are more likely to apply them successfully in real-life situations. However, most students perform poorly in mathematics annually, especially algebra (Achor et al., 2012).

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Despite the importance of algebra and Mathematics in general to the individual and society, literature review shows that their teaching and learning in the secondary school in Nigeria has been deplorable. Despite the government's effort to develop Mathematics teaching and provide opportunities for improving teaching, there are still problems with Mathematics teaching and learning. For instance, Ayogu et al. (2019) revealed that students' performance in mathematics has been consistently below average, especially in external examinations. Poor performance in mathematics in Nigerian secondary schools has assumed an alarming proportion and attracts the attention of researchers in the field (Ukwueze, 2017). Lassa (2012) lamented that in Nigeria, mathematics is in a sorry state in primary and secondary schools, colleges, and universities due to many factors. These include poor teaching, poor performance and achievement in senior secondary school certificate examinations, poor quality and quantity of teachers, insufficient teaching and learning resources and materials, the quest for paper qualifications and the negative attitudes of students and society towards the subject. Furthermore, some other problems of Mathematics teaching and learning include a lack of curriculum integration, poor government policy, poor classroom organisation by teachers, a lack of an equipped Mathematics laboratory for practicals, overpopulation of students, which may impede effective demonstration during practicals, teachers' impatience and unpreparedness and poor remuneration of teachers. These problems have led many students in the secondary school to record poor performance and develop negative attitudes toward Mathematics (Bot, 2012).

In addition, Osibodu et al., as cited in Adeniyi and Salmam (2015), identified the quality of instructional techniques employed by teachers as the primary cause of poor performance in Mathematics among secondary school students. In recent years, these problems have led many candidates to perform poorly in Mathematics in Nigeria's West African Senior School Certificate Examinations (WASSCE). For instance, Uwadiae in Bot and Iliya (2015) analysed the performance profile of candidates in Mathematics (that is, November/December WASSCE) from 2008 to 2010 in Nigeria. It was discovered that in 2008 alone, only 23.54% of the candidates passed with credit. In 2009, the figure increased to 31.96%; in 2010, it dropped to 20.04%. This performance profile, based on the November/December WASSCE, is clearly poor, below standard and discouraging. Thus, it will be difficult for Nigeria to develop scientifically and technologically, given that mathematics is essential. Consequently, there is a need to reverse the ugly trend in performance to enable Nigeria to develop and compete favourably with countries doing well in mathematics. To achieve this, there is a need to develop and use innovative instructional strategies to enhance students' academic performance in Mathematics.

Zouhor et al. (2017) confirmed that using appropriate teaching strategies and methods directly relates to students' academic achievements. It can be said that students' success

depends on the strategy that the teacher uses in the classroom. Learning strategies are specific learning approaches and mental activities students use to advance their knowledge in a chosen field. Therefore, the need for initiating and sustaining active teaching and learning strategies cannot be overemphasised. Active learning using innovative strategies could include the metacognitive self-assessment strategy.

Metacognitive self-assessment could be defined as a self-monitoring approach in which learners assess their progress and deficiencies in the learning process (Rivers, 2001). It is a reflective process where students use criteria to evaluate their performance and determine how to improve (Andrade, 2007). It involves students in evaluating their own work and learning progress. In other words, metacognitive self-assessment occurs when learners assess their performance. Furthermore, McMillan and Hearn (2008) opined that metacognitive self-assessment is a process by which students monitor and evaluate the quality of their thinking and behaviour when learning and identify strategies that improve their understanding and skills. That is, metacognitive self-assessment occurs when students judge their work to improve performance as they identify discrepancies between current and desired performance. As they monitor their learning, they learn to check their responses and become conscious of errors or answers that do not make sense. Research findings have suggested that students who possess relevant skills in metacognitive self-assessment and are aware of these skills are more strategic in pursuing learning and perform better in their academic venture (Kuiper, 2002; Rivers, 2001). When learners are exposed to the skills of self-assessment of their progress, they perform more. Rivers (2001) further averred that when skills in metacognitive strategies are acquired, they become potentially powerful stimulants to higher performance. The application of instructional strategies could include algebra self-efficacy in Mathematics.

The concept of self-efficacy is the focal point of Albert Bandura's social cognitive theory in 1986. He defined self-efficacy as a personal judgement of how well or poorly a person can perform a specific task or cope with a given situation based on their skills and circumstances (Bandura, 2010). It is an individual's beliefs about his/her abilities or capabilities in a specific performance domain. Self–efficacy is a person's judgment about being able to perform a particular activity. It is a student's "I can" or "I cannot" belief (Yunusa, 2010). Unlike self-esteem, which reflects how students feel about their worth or value, self-efficacy shows confidence in performing a specific task (Joanne & Shui-fong in Yunusa, 2010). Many researchers have demonstrated that self-efficacy affects human motivation, persistence, effort, action, behaviour, and performance. They have indicated that higher self-efficacy is predictive of higher performance. Furthermore, increased self-efficacy has a positive impact on performance. In general, individuals with high efficacy not only outperform those with low efficacy, but they also invest greater effort and persistence when facing setbacks (Bandura, 2000; 2001; Baron, 2004; Bong & Skaalvik,

2003; Pajares & Urdan, 2006). Also, Margolis and McCabe (2006) opined that students with a strong self-efficacy are more likely to challenge themselves with complex tasks and be intrinsically motivated. Self-efficacious students will exert much effort to meet their commitments and attribute failure to factors in their control, rather than to external factors. These students recover quickly from setbacks and will likely achieve their personal objectives. However, students with low self-efficacy believe they cannot be successful. Thus, they are less likely to make a concerted, extended effort and may consider challenging tasks as threats to be avoided. From the foregoing discussion, it can be seen that self-efficacy is the belief that one can master a situation in a given task and produce a positive outcome.

In the 21st century, societies across the globe are confronted with changes and innovations in all spheres of life, including the educational system. In the educational system, these changes and innovations are meant to improve the quality of instruction in different subject areas, including Mathematics. Researchers like Agwagah (2005), Eze (2007), and Kankia (2008) have shown that the most commonly used instructional strategy in Nigerian Mathematics classrooms is the lecture method, which is still popular in schools despite its obvious and severe limitations. The lecture method, also called the conventional teaching method, is the oldest. This method refers to the teacher explaining the topic to the students. The emphasis is on the presentation of the content. The teacher clarifies the content for the students, using gestures, simple devices, changing voices, changing positions, and using facial expressions. In the lecture method of teaching, teachers are more active and students are passive, but the teacher also asks questions to keep the students attentive. This method is economical and can be used for a large class. It saves time and also covers the syllabus. It is the simplest method for teachers and does not require any arrangements. It gives the students training in listening. This method makes the students passive listeners. There is minimal scope for students' activity. It is against the principle of learning by doing. It does not take into consideration individual differences. It does not develop the students' reasoning power; hence, it becomes monotonous to the students. Bichi (2002) observed that the lecture method is one of the teaching methods that encourages rote learning and regurgitation of information without necessarily aiding understanding and, consequently, does not enhance students' academic performance. Furthermore, Okpala in Awolabi (2003) and Joshi (2008) observed that the conventional teaching method in most Nigerian classrooms is more teacher-centred than learner-centred. There is little or no participation of students; consequently, they remain passive learners. Emphasis seems to be on teaching rather than learning, with less attention on the 'process' of learning or 'how' the students learn. This has dwarfed the students' creative thinking necessary in today's workplace. Anyichie and Onyedike (2012) opined that the inability of students to engage actively in the learning

process tends to incline them to constant rote learning and examination malpractice, leading to poor academic performance. Though this method has many limitations, it is still the most used method (Meenu, 2014). In the school setting, the conventional method of teaching Mathematics confines the students to solely depending on their teachers for every bit of knowledge and skill. The central preoccupation of teachers is to impart to their learners, knowledge and skills as contained in the curriculum. The teacher achieves this by giving notes and solving problems for students to copy, even when they do not understand what they are copying or why they are compelled to learn them.

Alsalhi et al. (2021) observed that emphasis in the field of education has moved to active learning for students, which is defined as mentally active learning that keeps students engaged, and where the instructor or teacher can select the preferred method of teaching style based on the students' needs. Given this, it can be assumed that appropriate teaching and learning strategies, such as the metacognitive self-assessment instructional strategy, could affect students' self-efficacy in algebra. The persistent poor performance of students in Mathematics in internal and external examinations indicates the need to research other teaching strategies, including using the metacognitive self-assessment instructional strategy (Iji, 2007). Therefore, in view of the reported relevance of metacognitive self-assessment instructional strategy in teaching and learning, as well as the need to reduce the abysmal performance of students in algebra and Mathematics in general, this study seeks to investigate the effect of metacognitive self-assessment strategy on self-efficacy in algebra among senior secondary school students, Dutsin-Ma Quality Assurance Zone, Katsina state, Nigeria.

STATEMENT OF THE PROBLEM

Although mathematics is a core subject in the curriculum of secondary schools and is very relevant for the meaningful development of any nation, many secondary school students perform poorly in it. Records have shown that the subject usually has the highest number of failures in WAEC. It has been observed that approximately 6% of school-age children have significant difficulty with mathematics. It has also been observed that the use of poor instructional strategies by teachers to teach the subject is the lynch pin of the cause of students' poor performance. The challenge has continued to be a source of worry to stakeholders within and outside the school system. The researchers have equally observed that most senior secondary students cannot study algebra effectively, and their self-efficacy in Mathematics has consistently remained low, which causes poor performance in their academics and career progression, leading to a lack of self-confidence. Thus, it has become necessary to check the level of self-efficacy beliefs of the students because if they are confident to do the tasks given to them, they can achieve the set goals designed for them properly.

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OBJECTIVES OF THE STUDY

This study's main objective is to determine the Effect of Metacognitive Self-Assessment Strategy on Self-Efficacy in algebra among Senior Secondary School Students, Dutsin-Ma Quality Assurance Zone, Katsina State, Nigeria. Specifically, the objectives of the study are to:

1. Determine the effect of metacognitive self-assessment strategy on senior secondary students' self-efficacy in algebra.
2. Examine the effect of metacognitive self-assessment strategy on the gender of senior secondary students' self-efficacy in algebra.

RESEARCH QUESTIONS

The following research questions were formulated to guide the study;

1. What is the difference in the algebra self-efficacy of students exposed to metacognitive self-assessment strategy and those exposed to the lecture method?
2. What is the difference in the algebra self-efficacy of male and female students taught using metacognitive self-assessment strategy?

NULL HYPOTHESES

The following null hypotheses were formulated to be tested at $p \leq 0.05$ level of significance;

Ho_1: There is no significant difference between the self-efficacy of students exposed to metacognitive self-assessment strategy and those exposed to lecture method.

Ho_2: There is no significant difference between the self-efficacy of male and female students exposed to metacognitive self-assessment strategy.

METHODOLOGY

Research Design

The study employed a non-randomised, non-equivalent control quasi-experimental design with pre-test and post-test measures. In this design, the researchers used experimental and control groups to assess the effect of metacognitive self-assessment strategy on senior secondary students' self-efficacy in algebra, in Dutsin-Ma Quality Assurance Zone, Katsina State, Nigeria. The groups included both male and female students. The experimental group (EG) received instruction using the metacognitive self-assessment strategy, while the control group was taught via the lecture method. A pre-test was administered to both groups before the treatment to ensure their equivalence at

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baseline. Both groups studied algebra in seven weeks. After the intervention, a post-test was conducted to evaluate changes in the students' self-efficacy.

Population and Sample

The target population of this study consisted of all sixteen (16) public senior secondary schools in Dutsin-Ma quality assurance zone of Katsina State. There are three thousand six hundred and ninety-one (3691) SS 2 students in all the public schools. From the number, one thousand seven hundred and sixty-nine (1769) are males, while one thousand nine hundred and twenty-two (1922) are females. Two co-educational schools were selected using the simple random sampling technique through balloting from the schools in the study area. The schools were also randomly placed into experimental and control groups using the simple random sampling technique. In each school, one intact class from three classes was also randomly selected using the simple random sampling procedure as the class for the study. The sample for this study thus consisted of one hundred and two (102) SS 2 students (seventy-seven (77) males and twenty-five (25) females). The choice of these 102 students as the sample was supported by Sambo (2008) and the central limit theorem, which proposes a minimum of 30 subjects for research.

Instrumentation

The instrument for data collection was Algebra Self-Efficacy Scale (ASES). ASES contained two sections. Section A sought personal information from the respondents, such as the school's name, serial number, class, and sex. Whereas, section B contained fifteen (15) statements seeking information relating to the self-efficacy belief of the respondents on algebra learning and problem solving. It is a five-point Likert rating scale with the response options ranging from Strongly Agree (SA = 5), Agree (A = 4), Undecided (U = 3), Disagree (D = 2) to Strongly Disagree (SD = 1). ASES was administered to both groups before and after treatment to measure the change in the efficacy of the subjects' beliefs regarding algebra before and after treatment.

The instrument was validated by specialists from the Department of Psychology and from the mathematics section in the Science Education Department, all from the Faculty of Education, Ahmadu Bello University, Zaria. The experts were requested to vet and scrutinise the research instrument for face and content validity to ensure the items were unambiguous and relevant to the study. The instrument was trial tested on thirty (30) SS 2 students (20 males and 10 females). The purpose of the test was to establish the instruments' reliability and determine the time that would be adequate for the main study. The reliability coefficient of the Algebra Self-Efficacy Scale (ASES) was calculated using Cronbach's Alpha, and a reliability coefficient of 0.75 was obtained. Therefore, the instrument was reliable and considered suitable for the research.

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Procedure for Data Analysis

Data obtained from the field were analysed using descriptive and inferential statistics. Mean and standard deviation were used to answer research questions, while the Mann-Whitney U test statistic was used to test null hypotheses at $\rho \leq 0.05$. The results obtained from ASES provided data for testing the hypotheses.

Ethical Considerations

1. Permission was obtained from the relevant educational authorities and school principals.
2. Participants provided informed consent.
3. Participants' anonymity and confidentiality was ensured.
4. Data were handled in accordance with ethical research standards.

RESULTS AND FINDINGS

Research Question One: What is the difference in the algebra self-efficacy of students exposed to metacognitive self-assessment strategy and those exposed to the lecture method?

Table 1: *Results of the Mean Ranks and Sum of Ranks of Post-test on Self-Efficacy of Experimental and Control Groups.*

Group	N	Mean Rank	Sum of Ranks	Mean Rank Difference
Experimental	**44**	65.35	2875.50	24.36
Control	**58**	40.99	2377.50	

Table 1 revealed the mean and sum of ranks for the items of the self-efficacy of the experimental and control groups. The mean rank and sum of ranks for the experimental group were 65.35 and 2875.50, while those of the control group were 40.99 and 2377.50. The results show a difference of 24.36 in the mean rank of the items in favour of the experimental group. However, a corresponding null hypothesis was tested to establish the significance or otherwise of the difference.

Null Hypothesis One

$\mathbf{Ho_1}$: There is no significant difference between the self-efficacy of students exposed to metacognitive self-assessment strategy and those exposed to lecture method.

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Table 2: *Mann-Whitney U Test on Self-Efficacy of Experimental and Control Groups*

Group	N	Mean Rank	Sum of Ranks	U	Z	ρ
Experimental	**44**	65.35	2875.50	666.50	-4.338	0.001
Control	**58**	40.99	2377.50			

Significant at $p \leq 0.05$ level

An examination of the findings in Table 2 showed that the results of the Mann-Whitney U test applied to the self-efficacy scores of the students in the experimental and control groups revealed a statistically significant difference between the self-efficacy of the students taught algebra using metacognitive self-assessment strategy and their counterparts taught using the lecture method. This is because the calculated ρ-value is less than the level of significance ($\rho = 0.001 < \alpha = 0.05$) for the items. Their computed mean ranks of self-efficacy are 65.35 and 40.99 for the students taught algebra using the metacognitive self-assessment strategy and their counterparts taught using the lecture method, respectively, indicating a mean rank difference of 24.36 in favour of the students taught using the metacognitive self-assessment strategy. The result thus showed that the metacognitive self-assessment strategy is more effective in improving students' self-efficacy towards algebra than the lecture method. Therefore, the null hypothesis, which states that there is no significant difference between the self-efficacy of students exposed to the metacognitive self-assessment strategy and those exposed to the lecture method, is hereby rejected.

Research Question Two: What is the difference in the algebra self-efficacy of male and female students taught using metacognitive self-assessment strategy?

Table 3: *Results of the Mean Ranks and Sum of Ranks of Post-test on Self-Efficacy of Male and Female Students*

Gender	N	Mean Rank	Sum of Ranks	Mean Rank Difference
Male	**29**	22.53	653.50	0.10
Female	**15**	22.43	336.50	

Table 3 revealed the mean and sum of ranks for the items of the self-efficacy of the male and female students in the experimental group. The mean rank and sum of ranks for the male students were 22.53 and 653.50, while those of the female students were 22.43 and 336.50. The results showed a negligible difference of 0.10 in the mean ranks of the items between the male and female students. However, a corresponding null hypothesis was tested to establish the significance or otherwise of the negligible difference.

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Null Hypothesis Two

$\mathbf{Ho_2}$: There is no significant difference between the self-efficacy of male and female students exposed to metacognitive self-assessment strategy.

Table 4: *Mann-Whitney U Test on Self-Efficacy of Male and Female Students in the Experimental Group*

Gender	N	Mean Rank	Sum of Ranks	U	Z	ρ
Male	**29**	22.53	653.50	216.50	-0.029	0.977
Female	**15**	22.43	336.50			

Not Significant at $p > 0.05$ level

An examination of the findings in Table 4 revealed that the results of the Mann-Whitney U test for the male and female self-efficacy of the students in the experimental group did not show any statistical difference. This is because the calculated ρ-value is greater than the significance level ($\rho = 0.977 > \alpha = 0.05$) for the items. Their computed mean ranks of self-efficacy are 22.53 and 22.43 for the male and female students taught algebra using the metacognitive self-assessment strategy, respectively, implying an insignificant mean rank difference of just 0.10. The close rank averages of the male and female self-efficacy scores of the students in the experimental group indicate that the self-efficacy of the male and female students exposed to the metacognitive self-assessment strategy does not differ significantly. Thus, signifying that the use of metacognitive self-assessment strategy is gender friendly on the students' self-efficacy towards learning algebra.

DISCUSSION

This study investigated the Effect of Metacognitive Self-Assessment Strategy on Senior Secondary Students' Self-Efficacy in Algebra, Dutsin-Ma Quality Assurance Zone, Katsina State. To achieve this aim, students in the experimental group were taught algebra concepts using the metacognitive self-assessment strategy. In contrast, students in the control group were taught the same concepts using the conventional lecture method. The experimental and control group students were pre-tested and post-tested, and their self-efficacy was compared and measured.

The result of the testing of hypothesis one, as shown in Table 2, revealed that the students in the experimental group who were taught concepts in algebra using the metacognitive self-assessment strategy had a significantly higher algebra self-efficacy than those in the control group. The findings of this study may be explained in line with the study of Wan and Ahmad (2010), Yunusa (2010), Hatice and Mustafa (2017) and Prabawanto (2018) who

found that students exposed to training in metacognitive self-assessment skills manifest higher sense of efficacy and appeared to be more competent in the subject taught than those in the conventional classroom. The instruction in metacognitive self-assessment, which helped the students ensure ownership of their learning processes, could have been the reason for the higher self-efficacy demonstrated by those in the treatment condition. The result of the testing of hypothesis two, as shown in Table 4, showed that the male students did not have a significantly higher algebra self-efficacy than the female students in the experimental group. Gender was, therefore, not a significant factor in the self-efficacy belief of the mathematics students. The finding was in agreement with earlier findings of Aremu and Tella (2009) and Shane et al. (2009), who in their study showed that there were no significant differences between male and female students in mathematics self-efficacy, and this shows that the students exposed to the metacognitive self-assessment strategy exhibit the same algebra self-efficacy belief regardless of their gender. However, the finding does not support the findings of Naz et al. (2016) and Senol et al. (2018), who in their study found that gender had a significant main effect on mathematics self-efficacy in favour of the male students, that is, the male students had significantly higher mathematics self-efficacy than their female counterparts. The finding from this study shows that the metacognitive self-assessment instructional strategy does not discriminate against gender but provides equal opportunities for every student to strengthen their self-efficacy and improve their algebra performance and Mathematics in general.

CONCLUSION

Findings from the study showed a significant difference between the post-test self-efficacy of the experimental and control groups in favour of the experimental group, and there was no significant difference between the self-efficacy of the male and female students. Based on these findings, it was concluded that the metacognitive self-assessment strategy was observed to promote students' algebra self-efficacy belief better than the lecture method. This follows from the higher self-efficacy belief obtained by the students exposed to it. It was also observed that the strategy is gender friendly concerning self-efficacy, as seen in the self-efficacy beliefs of the male and female students.

RECOMMENDATIONS

Based on the findings, the following recommendations were made:

1. Curriculum developers should use empirical data from this study to inculcate metacognitive self-assessment strategy as a teaching strategy for enhancing self-efficacy in algebra and Mathematics in general in secondary schools.

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2. Authors of Mathematics textbooks should be encouraged to incorporate the metacognitive self-assessment strategy as a teaching strategy and provide the required guide for adopting it.
3. The government and school administrators should organise workshops and seminars for mathematics teachers to sensitise them to the importance and use of appropriate learning strategies, such as metacognitive self-assessment.
4. All stake holders in education, the federal and state government, professional bodies such as the Mathematical Association of Nigeria (MAN), Nigeria Mathematical Society (NMS), Science Teachers Association of Nigeria (STAN) as well as the education boards, such as UBEB (Universal Basic Education Board) should organize enlightenment programmes like workshops and seminars for teachers and students on learning strategies like metacognitive self-assessment and their use for effectiveness in learning.

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