# Effect of Cooperative Learning Strategy on Students' Attitude in Senior Secondary School Mathematics

**Uyiosa Osarumen Ugiagbe**

**University of Georgia, United States of America (USA)**

**DOI: https://dx.doi.org/10.47772/IJRISS.2024.8120157**

**Received: 01 December 2024; Accepted: 11 December 2024; Published: 08 January 2025**

## ABSTRACT

This study investigated the effect of cooperative learning strategy on senior secondary school students' attitudes toward mathematics in Owen East Local Government Area of Edo State, Nigeria. The study employed a quasi-experimental setting of non-equivalent and control group design (pretest, posttest). The study population comprised 1,268 senior secondary school students. Using a purposive sampling technique, coeducational schools were selected, followed by a multi-stage random sampling procedure to choose two schools. Intact classes of Senior Secondary School II (SS II) students were utilized, resulting in a total sample size of 131 students. Data were collected using the Mathematics Students' Attitude Scale (MSAS), which demonstrated a reliability coefficient of 0.822. Analytical techniques included mean and standard deviation statistics, independent sample t-tests, and interaction effect analysis at a 0.05 level of significance. The results revealed a significant improvement in the attitudes of students taught using the cooperative learning strategy compared to their peers in the traditional instruction group. However, there was no significant difference in the attitudes of male and female students exposed to the cooperative learning strategy. The findings underscore the potential of cooperative learning strategies to enhance students' attitudes toward mathematics, suggesting its adoption as a viable instructional approach in senior secondary school mathematics classrooms.

**Keywords:** Cooperative learning strategy, students' attitude, mathematics education, MSAS, educational methods

## INTRODUCTION

Mathematics is considered by many people, institutions, and administrators, among others, to be very important. Mathematics is considered indispensable because it is used in all human affairs, including school subjects such as Physics, Accounting, Chemistry, Economics, and Agricultural Science. Its distinctive importance explains why mathematics is given priority in the school curriculum. Besides, Mathematics is used for analyzing and communicating information and ideas to address a range of practical tasks and real-life problems (Stephen, 2011). Also, employers in the engineering, construction, pharmaceutical, financial, and retail sectors have all expressed their continuing need for people with adequate mathematical skills (Okoronka & Wada, 2014). With this situation, there is a demand that students should be purposefully included in Mathematics instruction at the secondary school level.

However, despite the numerous applications of mathematics in technology for human and national development, many students might opt out of selecting it as a science subject at the senior secondary level when given the choice (Ariyo & Adeleke, 2018). Students' attitudes towards Mathematics may be one of the causes of low achievement in standardized examinations. Other reasons for students' poor achievement in Mathematics have been attributed to many factors, such as the nature of Mathematics itself (Ariyo, 2011), lack of qualified teachers and poor learning environment (Fasanya, 2015), unavailability of learning materials and teaching strategy adopted by the teachers (Hassan & Mankilik, 2015).

The instructional approach used by Mathematics teachers in Nigerian secondary schools is pivotal in shaping students' attitudes towards the subject. A teacher's teaching method directly impacts students' grasp of the material and their academic performance. Challenges in teaching and learning Mathematics can lead to

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VIII Issue XII December 2024

disinterest and lower performance in significant exams such as the West African Examinations Council (WAEC) terminal examination, and the National Examinations Council (NECO) terminal examination (Oladejo, Olosunde, Ojebisi, & Isola, 2011; Ariyo & Adeleke, 2018). For example, in the 2018 WASSCE examination, the National Bureau of Statistics (NBS) report indicated that out of 59,831 candidates who sat for the WASSCE Mathematics examination in Edo State, 37,334 candidates obtained a credit pass in Mathematics. In addition, the WAEC Chief Examiner report, 2018 indicated that most students found questions on Statistics and Probability challenging to tackle. If this trend of failure and negative attitude in Mathematics continues, Nigeria will undoubtedly have a problem with human resources for its technological breakthrough.

Enhancing students' understanding of mathematics requires a shift in teaching methodologies to encourage and improve their attitudes and performance in the subject. This improvement can be realized through an approach that focuses on activity-based and student-centered learning, commonly called cooperative learning. In this environment, the teaching emphasizes fostering students' participation, creativity, and critical thinking. For Mathematics education to be effective, it is essential to adopt instructional strategies that promote active learning, enabling students to be actively engaged in their educational journey (Ariyo & Adeleke, 2018; Mohammed, 2015).

The method of teaching is the vehicle through which a message is delivered. However, the lecture method is regarded as the traditional method of instruction in a regular classroom setting, probably due to teachers' heavy workload in most schools, which may affect students' academic performance. There is still a need to search for and incorporate modern instructional strategies, which the advanced world has long accepted into their classroom (Ariyo & Adeleke, 2018; Okono, Sati, & Awuor, 2015). Hence, there is a need for research to examine the influence of cooperative learning strategies on the attitudes of students' in senior secondary school Mathematics.

Several studies abound on the efficacy of cooperative learning in Nigeria. Such studies include those of Okebukola and Ogunniyi (1984), Adeyemi (2008), Akinbobola (2009), Olatoye, Stephen (2011), and others. These studies showed that cooperative learning strategies seem more valuable and effective than other instructional strategies. Some of the mentioned studies are in Mathematics education. These studies were conducted in different states of Nigeria, but none were carried out in the Edo North Senatorial District.

Cooperative Learning Strategy is a teaching model in which students of different abilities work together in small groups to achieve a purpose. In this kind of teaching approach, students are grouped and, in the groups, interact with each other, manipulate or interact with materials, share ideas and information, seek additional information, and make the decision about their findings known to the entire class; it is a students' centred approach. It is an interaction pattern where students work in subgroups. Members of each subgroup work towards mutual goals, complete class assignments, and exercise together. Each student's achievement is based on the group's collective efforts. This type of instruction encourages teachers to use alternative assessment techniques, reducing the emphasis on competitive examinations (Akinbobola, 2009).

Students' attitude is likely to play a significant role in any satisfactory explanation of students' variable level of performance in their school subjects. Many students in secondary schools in Nigeria perceived Mathematics as a complex subject. They classified the three core science subjects – Biology, Chemistry, and Mathematics – into difficulty levels, with Biology being the easiest and Chemistry and Mathematics being the most difficult. The impression cuts across gender. The causes of students' negative attitudes towards mathematics include fear of mathematical calculation, poor methods of teaching, and students' unreadiness to study. Therefore, understanding students' perceptions will help Mathematics teachers shape their students' class perception and their achievement in Mathematics (Adeyemo, 2011; Akinbobola, 2009; Jegede & Adedayo, 2013).

Therefore, this study investigated the effect of cooperative learning strategy on students' attitudes in senior secondary school Mathematics.

**Research Questions**

The following research questions guided the study, which are in line with the purpose of the study.

1. What is the difference between the attitude of students taught Mathematics with Cooperative Learning

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VIII Issue XII December 2024

Strategy and those taught with lecture method?

2. What is the difference between the attitude of males and females taught Mathematics using Cooperative Learning Strategy?

**Hypotheses**

The following null hypotheses were formulated and tested at 0.05 level of significance.

1. There is no significant difference in the attitudes of students taught Mathematics with Cooperative Learning Strategy and those taught with lecture method.

2. There is no significant difference in the attitudes of males and females taught Mathematics using Cooperative Learning Strategy.

## LITERATURE REVIEW

Several definitions of cooperative learning have been offered by educationists. Johnson et al (2013) describe cooperative learning as an educational approach where small groups are used instructionally, enabling students to collaborate to enhance not only their own learning but also that of their peers. This method involves students working in small teams to mutually support the mastery of academic material. Similarly, Eraikhuemen (2010) stated that cooperative learning strategy is a method of teaching which involves student in small groups working together as a team. She mentioned that a group usually consist of students of varied ability levels working together to achieve a common goal. A major unique feature of this teaching method is that the students help each other to learn successfully. The learning activities that the students work on are pre-prepared by the teacher and given to the students during the lesson. The function of the teacher during lesson is to act as a guide and facilitator of learning. The teacher does this by moving around during lessons encouraging the members of a group to dialogue and agree on an answer before it is adopted by the group.

According to Igboanugo and Njoku (2015), cooperative learning connotes a learning strategy where learners are arranged into small learning groups where they work together with functional teaching that assist one another in the learning tasks. According to them, the students interact to get a particular task done. As cooperative group members, their successes are tied together since each group member's success depends on the success of other members; this implies that in a cooperative learning situation, individual work is de-emphasized while teamwork is promoted. They share experiences and information leading to accomplishing the learning tasks, just as a football team must work effectively together to ensure success.

Several studies have been carried out on the efficacy of cooperative learning in Nigeria. Such studies include those of Okebukola & Ogunniyi (1984), Adeyemi (2008), Akinbobola (2009), Eraikhuemen (2010), Olatoye, Aderogba & Aanu (2011), Stephen (2011), Nwabueze & Igbinedion (2013), Igboanugo & Njoku (2015), and Cornelius-Ukpepi, Aglazor, & Odey (2016). The findings of these studies indicated that the cooperative learning approach seems more useful and efficient than other instructional strategies such as the lecture method.

According to Nwabueze and Igbinedion (2013), Cooperative learning is a type of learning in which students of varying abilities collaborate in small groups to achieve a common goal. It's a teaching-learning technique in which small groups of students with varying levels of ability employ a variety of learning activities to increase their grasp of a concept. It is a social process in which a group of people working together to attain a common objective is evaluated and rewarded based on their collective achievement. Each team member is accountable for learning what is taught and assisting the rest of the team in learning, resulting in a positive learning environment. Students work through the assignment until all members of the group have a thorough understanding of the task and have completed it. According to Aljanian (2012), cooperative learning is an approach based on group learning activity that beholds learning attached to the social interchange of information between learners. Each learner is responsible for his or her learning and is instigated to help boost the achievement of others. In a study carried out by Hijazi & Al-Natour (2012), cooperative learning is seen as students working together to attain group goals that cannot be achieved by working alone or competitively.

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VIII Issue XII December 2024

Theodora (2011) emphasizes that cooperation is an essential life skill, vital in every professional or social setting for achieving collective objectives. She notes that cooperative learning techniques vary, considering factors like group size, task division, competition between groups, collective rewards, methods of student assessment, and their relevance to specific learning goals. In such a learning environment, students within a group engage with each other, exchanging ideas and information, seeking further knowledge, and collectively presenting their discoveries to the class. This approach is student-focused, prioritizing learning over mere performance objectives.

## METHODS

### Design of the Study

In this study, the quasi-experimental, non-equivalent pre-test, post-test research design was adopted to determine the effect of cooperative learning strategy on students' attitude in senior secondary school Mathematics. The quasi-experimental design was adopted because it is difficult to ensure equivalence of experimental and control groups in a school by random assignment of students because classrooms are formed as intact groups that cannot be dismantled for the purpose of a study, given the length of treatment (six weeks), which is capable of altering the regular school programs. The design is presented in Table 1.

**Table 1: The Pre-Test, Post Test non- equivalent Experimental Design**

| Grouping | Pre-test | Treatment | Post-test |
|---|---|---|---|
| Group 1 E | $O_1$ | X | $O_2$ |
| Group 2 C | $O_3$ | $X_2$ | $O_4$ |

**Source: Anaekwe, 2015**

E represents the experimental group, while C represents the control group. $O_1$ and $O_3$ represent pre-test for both the experimental group, and the control group respectively, while $0_2$ and $0_4$ represent the post-test for the experimental group, and the control group. X represents the treatment given to the experimental group, while $X_2$ represents the group taught with the conventional lecture method. The experimental group (E) will be exposed to cooperative learning strategy. The control group (C) will be exposed to the traditional (conventional) lecture method. Both the experimental and control groups were pre-tested before the commencement of the treatment.

### Population of the Study

The target population for this study was the entire SSII Mathematics students in all the Secondary Schools within Owan East Local Government Area of Edo State. The choice of this population is based on the fact that SSII students will be the next set of students preparing to seat for the Senior Secondary School Certificate national and regional Examinations and must have been exposed to sufficient Mathematics curriculum during their SS1 period. The Local Government Area has a total of fifteen (15) co-educational public secondary schools. The population size of SSII Mathematics students in public secondary schools in the Local Government Area is 1,268 which are comprised of 672 boys and 596 girls. This is presented in Table 2.

**Table 2: Distribution of SS2 Mathematics students by School and Gender**

| School | Male | Female | Total |
|---|---|---|---|
| Aroko S/S Arokho | 23 | 22 | 45 |
| Azama College | 141 | 106 | 247 |
| Edeki G/S Otuo | 70 | 61 | 131 |
| Evbiamen G/S | 14 | 25 | 39 |

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VIII Issue XII December 2024

| | | | |
|---|---|---|---|
| GSTC Afuze | 14 | 5 | 19 |
| Igue Sale S/S, Igue | 34 | 25 | 59 |
| Ihievbe G/S | 17 | 12 | 29 |
| Ikao S/S Ikao | 35 | 29 | 64 |
| Ikhin S/S Ikhin | 43 | 37 | 80 |
| Inu – Umoru S/S | 46 | 37 | 83 |
| Ivbiaro S/S Ivbiaro | 26 | 34 | 60 |
| Okpokhumi G/S | 36 | 29 | 65 |
| Otugo G/S Ake | 36 | 30 | 66 |
| St. James G/S Afuze | 65 | 74 | 139 |
| Uokha G/S Uokha | 72 | 70 | 142 |
| **Total** | **672** | **596** | **1,268** |

Source: Ministry of Education Office, Owan East Local Government Area, 2021

G/S – Grammar School; S/S – Secondary School; GSTC – Government Science and Technical College

**Sample and Sampling Techniques**

The sample for the study is 131 students drawn from two (2) Secondary Schools in Owan East Local Government Area of Edo State, which were used as intact classes. The study selected two (2) secondary schools, using purposive sampling, with comparable characteristics from the target zone. Purposive sampling was appropriate because the researcher had previous knowledge of the population and had a specific purpose for the study. A list of secondary schools in the target zone was obtained from the ministry of education zonal office, from which a sample of two (2) schools was selected. The researcher visited the schools and ascertained their suitability for the study, which included factors like, adequate enrolment of students into SSII, availability of professionally trained and experienced teachers, adequate teaching and learning materials for Mathematics, the willingness of the school administrators and staff to participate in the study. The distance between the schools was not too close to discourage interaction between experimental and control groups and was not too far for easy accessibility and supervision. The two (2) sampled schools were then randomly assigned to treatment and control groups respectively.

**Research Instruments**

The instrument used for data collection is the Mathematics Students' Attitude Scale (MSAS), which was adapted. It was validated, and further subjected to appropriate statistical procedures for estimating its internal consistency or reliability. Item facility indices were computed for the tests. The MSAS instrument was designed to elicit information from the respondents about their attitude towards or how they perceived Mathematics. MSAS is likert scale which consists of 18 items on a four-rating scale response pattern that comprised of Disagree (D), Agree, (A), Strongly Agree (SA), and Strongly Disagree (SD). The attitude scale was adapted from the studies of Okebukola & Ogunniyi (1984) and Omaga et al (2015) to measure students' attitude in the Nigerian context.

**Validity of the Instrument**

To validate the Mathematics Students' Attitude Scale (MSAS), a copy was given to three experts in the field of Mathematics Education, Educational Psychology and Measurement and Evaluation, University of Benin. This was done to establish face and construct validity of the instrument.

**Reliability of the Instrument**

To determine the reliability of the MSAS instrument, it was administered to 20 SSII Mathematics students in a

co-educational school in a zone that is not part of the study area but has comparable characteristics as the sample for the study. The researcher used a Public Secondary School in Owan West Local Government Area of Edo State. The choice of this school for the administration was because it does not fall within the region or district of the main study and the school has the same characteristics in terms of quality of teachers, infrastructure and learning environment as the schools in the target area for the main study. The reliability coefficient of the MSAS was calculated using the Cronbach's Alpha and a reliability coefficient of 0.822 was found. From the result of the pilot test and the reliability of the research instrument, it therefore implies that the instrument is highly reliable for the purpose of collecting data for analysis, in this study.

### Method of Data Collection

The direct contact procedure was adopted for the collection of data in this study. This began with the survey tour to the schools used for the study, to find out if they have adequate instructional materials, adequate professionally qualified (B.Sc (Ed) or B.Sc + N.C.E or PGDE) Mathematics teachers, good learning environment, willingness of the school administrators (principals and staff) to take part in the research and willingness to allow their facilities to be used for the study. Only the schools that possessed the above characteristics were selected for the study.

### Administration of the Instrument

### Pre - Test Administration

Before the commencement of the treatment, the Mathematics Students' Attitudes Scale (MSAS) was administered on the participants in both groups as pre – test.

### Treatment Implementation

Treatment started five days after the administration of the pre – test for each group. Each school was randomly assigned to cooperative and control group. The cooperative classroom structure was patterned in line with what Johnson and Johnson (1989) suggested. In the cooperative class, students were subdivided into 5 members. The sitting arrangement in this class was structured in such a way that students in the same group could discuss with one another during treatment implementation. They were instructed to work together as a team and to help one another. They were informed that individuals within the group will not be praised for the success or failure of the group, but that the group will jointly share success or failure (Ezirim, 2006). The researcher prepared lesson plans weekly for the six weeks treatment for the study. Each group had three (3) periods per week.

### Post – Test Administration

After the six weeks of treatment, the MSAS was administered on the participants in both groups. The procedure for administering was the same as that of the pre – test.

### Method of Data Analyses

Data analysis methods in the study were tailored to align with the stated research questions and hypotheses. The two hypotheses were evaluated at a 0.05 significance level using t-test statistics. Hypotheses 1 and 2 were specifically tested using the independent sample t-test, as this method is suitable for hypotheses involving two independent groups. The scoring procedure is based on the subjects' response to the items. For the attitude scale, for positive statements, strongly agree (SA), agree (A), strongly disagree (SD), and disagree (D) are awarded 4,3,2, and 1 respectively. For negative statements, (SA), (A), (SD) and (D) are awarded 1, 2, 3 and 4.

## RESULTS AND DISCUSSION

This section deals with the presentation of results and discussion of findings.

### Presentation of Results

Research Question One: What is the difference in the attitude of students taught Mathematics with Cooperative

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VIII Issue XII December 2024

Learning Strategy and those taught with lecture method?

**Table 4: Mean and standard deviation of the experimental (cooperative learning strategy) and Control group (lecture method)**

| Variable | N | Mean | SD | MD |
|---|---|---|---|---|
| Experimental Group Post-test | 66 | 39.82 | 8.41 | 9.29 |
| Control Group Post-test | 65 | 30.53 | 8.73 | |

Results in Table 4 above indicates that the mean post-test scores of the experimental group taught with the cooperative learning strategy was 39.82 with a standard deviation of 8.41 while the mean of the control group post-test score was 30.53 with a standard deviation of 8.73. The mean difference (MD) of the scores was 9.29 in favor of the experimental group. This implies that the scores of the students taught with the cooperative learning strategy were higher than those taught with the lecture method. Therefore, there is a difference in the attitude of students taught with the cooperative learning strategy than those taught with the lecture method.

**Hypothesis 1:** There is no significant difference in the attitude of students taught Mathematics with Cooperative Learning Strategy and those taught with lecture method.

The inferential statistic t-test was used to test this hypothesis and table 5 below presents the summary of the analysis.

**Table 5: t-test scores of Experimental group and Control group**

| Method | N | Mean | SD | Df | SEM | t | p-value | Remark |
|---|---|---|---|---|---|---|---|---|
| Experimental | 66 | 39.82 | 8.41 | 64 | 1.16 | -5.663 | 0.000 | Significant |
| Control | 65 | 30.53 | 8.73 | | 1.22 | | | |

Results in Table 5 above show that the t-value is -5.663 while the p-value is 0.000 at degree of freedom 64. Since the p-value is less than $\alpha = 0.05$, the null hypothesis is rejected. This means that there is a significant difference in the attitude of students who were taught with the cooperative learning strategy and their counterparts taught with a lecture method.

**Research Question Two:** What is the difference in the attitude of male and female students taught Mathematics using Cooperative Learning Strategy?

**Table 6: Means and standard deviations of attitudinal scale of male and female students taught Mathematics using cooperative learning strategy**

| Variable | N | Mean | SD | MD |
|---|---|---|---|---|
| Male | 38 | 40.84 | 7.50 | 2.38 |
| Female | 28 | 38.48 | 10.37 | |

From Table 6 above, the male students had a mean score of 40.84 with standard deviation of 7.50 while the female students had mean and standard deviation scores of 38.48 and 10.37 respectively. The mean difference was 2.38 in favour of the male students. This indicates that there is a difference in the attitude of male and female students taught Mathematics using the cooperative learning strategy.

**Hypothesis 2:** There is no significant difference in the attitude of male and female students taught Mathematics

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VIII Issue XII December 2024

using Cooperative Learning Strategy.

**Table 7: t-test scores of male and female students' attitudes in the cooperative learning strategy group**

| Sex | N | Mean | SD | Df | SEM | t | p-value | Remark |
|---|---|---|---|---|---|---|---|---|
| Male | 38 | 40.84 | 7.50 | 27 | 1.388 | 1.709 | 0.102 | Not significant |
| Female | 28 | 38.48 | 10.37 | | 2.163 | | | |

The result in Table 7 above shows that the t-value is 1.709 while the p-value is 0.102 at degree of freedom 27. Since the p-value is greater than $\alpha = 0.05$, the null hypothesis is accepted. This means that there is no significant difference in the attitude of male and female students taught Mathematics using the cooperative learning strategy.

## DISCUSSION OF RESULT

This research explored the effect of cooperative learning strategies on students' attitudes in senior secondary school Mathematics. Two research questions were raised, and two hypotheses were also formulated from these research questions respectively, to guide the study. Hypotheses one and two were tested using independent sample t-test. This was appropriate because the hypothesis involves two independent groups.

The first hypothesis which was rejected hypothesizes that "there is no significant difference in the attitude of students who were taught with the cooperative learning strategy and their counterparts taught with a lecture method". Table 5 shows that the post-test mean score of students taught with the cooperative learning strategy is 39.82, which the post-test mean score of the group taught without being exposed to the cooperative learning strategy (control group) is 30.53. A further analysis of the mean scores shows a t-value of -5.663, which is significant at p-value of 0.000 and therefore significant at 0.05 alpha levels. As a result, the null hypothesis was rejected which signifies there is a significant difference in the attitudes of students who were taught with the cooperative learning strategy and their counterparts taught with a lecture method. This shows that the cooperative learning strategy can improve students' attitude in mathematics. This finding supports the assertions of Zacharia et al. (2010), that the integration of the cooperative learning strategy in the classroom is one of the most educationally effective ways of positively increasing student's attitude in mathematics.

The second hypothesis which was accepted is: there are no significant differences in the attitudes of males and females taught Mathematics using the cooperative learning strategy. Table 7 shows that the post-test mean score of male students in the experimental group was 40.84, while the post-test mean score of the female students in the experimental group was 38.48. This implies that the post-test mean score of the male students in the experimental group is more than the post-test mean score of the female students in the experimental group. Table 7 also reveals that the calculated t-value of 1.709 is not significant at p-value of 0.102 levels, which is greater than alpha level of 0.05. Thus, this suggests there are no significant differences in the attitudes of males and females taught Mathematics using the cooperative learning strategy. The finding is in line with the findings of Cornelius-Ukpepi et al. (2016) and, Effandi and Zanaton (2007).

## CONCLUSION

Based on the results of the study, the following conclusions are drawn: Cooperative learning strategy has the potential to improve students' attitudes in senior secondary school Mathematics. Therefore, if Mathematics teachers adopt this strategy in the teaching of Mathematics in their various classrooms, students will improve in their learning of Mathematics contents. The results of this study reveal that male and female students had comparable attitudes when taught Mathematics using cooperative learning strategy. Therefore, both male and female students should be grouped together and allowed equal opportunity to participate actively in group discussions and presentations when taught with cooperative learning strategy. It is therefore pertinent to assert that the effective and consistent application of cooperative learning strategy will lead to the improvement of students' attitudes in mathematics.

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS |Volume VIII Issue XII December 2024

## RECOMMENDATIONS

In light of the study's findings and the derived conclusions, the following recommendations are proposed to enhance students' attitudes in mathematics.

1. Teachers should adopt cooperative learning strategies in classroom environments surrounding teaching and learning of Mathematics. They should also be able to manage the classroom effectively in order to maintain a healthy classroom discussion when adopting this strategy.

2. As curriculum planners design Mathematics curricula, it would be beneficial to incorporate ample opportunities for small-group work, discussions, and collaborative problem-solving.

3. An inclusive curriculum and instructional model that treats all students as capable mathematicians, regardless of gender, is key to achieving optimal success. Curriculum planners should prioritize equitable practices that empower students of both genders to reach their peak.

4. The government and her Ministry of Education should create a healthy classroom environment conducive enough for the application of the cooperative learning strategy. They should provide adequate buildings and equipment for the teaching and learning of Mathematics.

5. The mathematics laboratory is therefore recommended in senior secondary schools for students to have adequate materials and tools needed to comprehend mathematical concepts and ideas. This will also help Mathematics teachers by reducing the stress of changing and distorting the normal classroom arrangement during the application of cooperative learning strategy.

## REFERENCES

1. Adeyemi, B.A. (2008). Effects of cooperative learning and problem-solving strategies on junior secondary school students' achievement in social studies. Journal of Research in Educational Psychology, 16(6), 691-708.
2. Akinbobola, A.O. (2009). Enhancing students' attitude towards Nigerian senior secondary Mathematics through the use of cooperative, competitive and individualistic learning strategies. Australia Journal of Teacher Education, 34(1), 29-38.
3. Aljanian, E. (2012). The effects of students' team achievement divisions (STAD) technique on English achievement of Iranian efl learners. Journal of Theory and Practice in Language Studies, 2(9), 71-75.
4. Ariyo, O.A. (2011). Gender differences and school location factor as correlate of secondary schools' achievement in Mathematics. Mavi International Academic Conference, 6(2), 38-44.
5. Ariyo, S.O., & Adeleke, J.O. (2018). Using after school programme to improve mathematics achievement and attitude among grade ten low achievers. Journal of the International Society for Teacher Education, 22(2), 47-58.
6. Cornelius-Ukpepi, B. U., Aglazor, G. N. & Odey, C. O (2016). Cooperative Learning Strategy as Tool for Classroom Management. Advances in Multidisciplinary & Scientific Research Journal, 2(2), 67-76.
7. Effandi, Z., & Zanaton, I. (2007). Promoting cooperative learning in science and mathematics Education: A Malaysian perspective. Eurasia Journal of Mathematics, Science and Technology Education, 31(1), 35-39.
8. Eraikhuemen, L. (2010). Co-operative learning as a strategy for improving Mathematics teaching and learning for the attainment of Millennium Development Goals. Benin Journal of Gender Studies, 2(1), 67-82.
9. Ezirim, M.U. (2006). Scaling up girls' participation in science education: towards a score card on quality education. In E. Okeke and M. Opara (Eds); Journal of the Science Teachers Association of Nigeria, Gender and STM series 1.
10. Fasanya, A.G. (2015). Gender differences and cognitive preferences of Mathematics students in electromagnetism (case study of Biu Local Government Area of Borno State, Nigeria). In F.M. Nekang (Ed). Proceedings of International Conference on Sustainable Development, 15(12), 63 – 70; October, 2015.

11. Hassan, S., & Mankilik, M. (2015). Views of teachers and students on causes of students' mass failure in senior certificate Mathematics examination in Gombe, Nigeria. International Journal of Research in Science, Technology and Mathematics Education, 3(2), 238 – 253.
12. Hijazi, D., & Al-Natour, A. (2012). Teachers' attitude towards using Cooperative Learning. Interdisciplinary Journal of Contemporary Research in Business, 3(2), 443-460.
13. Igboanugo, B.I., & Njoku, Z.C. (2015). Effects of cooperative learning and peer-teaching on senior secondary school students' achievement in some difficult chemistry concepts. Journal of the Science Teachers Association of Nigeria, 50(1), 151-162.
14. Jegede, S.A., & Adedayo, J.O. (2013). Enriching Mathematics education in Nigeria towards enhancing a sustainable technological development. Greener Journal of Educational Research, 3(2), 080 – 084.
15. Johnson, D. W. & Johnson, R. T. (2014). Cooperative Learning in 21st Century. Anales de psicología, 30(3), 841-851.
16. Johnson, D. W., Johnson, R. T., & Holubec, E. J. (2013). Cooperation in the Classroom (9th ed.). Edina, MN: Interaction Book Company.
17. Mohammed, S.A. (2015). Assessment of gender differences in students' achievement and retention in Mathematics using explicit problem – solving strategy in Bauchi State. International Journal of Research in Science, Technology and Mathematics Education, 3(1), 72 – 82.
18. Nwabueze, A.I. & Igbinedion, D.A. (2013). The implication of cooperative learning strategy on students' academic achievement. African Journal of Education and Technology, 3(1), 115-124.
19. Okebukola, P.A., & Ogunniyi, M.B. (1984). Cooperative, competitive and individualistic laboratory interaction patterns: Effects on students' performance and acquisition of practical skill. Journal of Research in Science Teaching, 21(2), 875-884.
20. Okono, E.O., Sati, L.P., & Awuor, F.M. (2015). Experimental approach as a methodology in teaching Mathematics in secondary schools. International Journal of Academics in Business and Social Sciences, 5(6), 457- 474
21. Okoronka, A.U., & Wada, Z.B. (2014). Effect of analogy instructional strategy, cognitive style and gender on senior secondary school students' achievement in some Mathematics concepts in Mubi metropolis, Nigeria. American Journal of Educational Research, 2(9), 788 – 792.
22. Oladejo, M, A., Olosunde, G.R., Ojebisi, A.O., & Isola, O.M. (2011). Instructional material and students' academic achievement in Mathematics: some policy implications. European Journal of Humanities and Social Sciences, 2(6), 223-248.
23. Olatoye, R.A., Aderogba, A.A., & Aanu, E.M. (2011). Effect of cooperative and individualized teaching methods on senior secondary school students' achievement in organic chemistry. The Pacific Journal of Science and Technology, 12(2), 310-319.
24. Omaga, J.O., Baba, M.M., & Bala, S.M. (2015). Undoing phobia in Mathematics through counseling strategies: Implication for national development. International Journal of Research in Science, Technology and Mathematics Education, 3(2), 1 – 14.
25. Stephen, U.A.S. (2011). The status of material resources for effective teaching of Mathematics in secondary schools in Akwa Ibom State of Nigeria. International Multidisciplinary Journal, 5(4), 242-249.
26. Theodora, O.B. (2011). Effects of Group instructional strategies on students' performance in selected Mathematics concepts. Journal of the Africa Educational Research Network, 11(1), 71-79.
27. Zacharia, E., Chin, C.L., & Daud, Y. (2010). Effects of cooperative learning on students' mathematics achievement and attitude towards mathematics. Journal of Social Sciences, 6(2), 272-275.