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# Exploring the Role of Multiple Representation Strategies in Social Studies Learning Outcomes Among Secondary School Students in Nigeria

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## *Abstract*

The study investigates the effectiveness of a multiple representation strategy in social studies instruction on learning outcomes in Lagos State junior secondary schools. One hundred and twenty students in JSS II intact classes were used as the sample. The study employed a quasi-experimental research design with a 2x1x1 factorial matrix. The participants were drawn from the Oshodi-Isolo zone in Education District VI. Sixty students were taught using the Multiple Representation Strategy, and sixty students were taught using the conventional method. Four research questions were raised, and four null hypotheses were formulated to guide the study. The Social Studies Achievement Test was used to collect data for the study. Data collected were analyzed with mean, standard deviation, and analysis of covariance (ANCOVA) at a 0.05 significance level. Findings revealed that students treated with Multiple Representation Strategy performed academically well the F-value 7.77(2, 145) is significant at 0.05, and that student's attitude and gender is not a factor in using MRS in Social Studies class which shows that [F (2, 145) =1.740 and 1.00 (1, 145)] respectively is not significant at 0.05. The study concluded that MRS was effective in enhancing efficient learning outcomes in Social Studies. The study recommends that large-scale further application of the therapy should be employed generally at Lagos State junior secondary schools.

***Keywords:*** *Multiple Representation strategy, Conventional strategy, Instruction, learning outcome, Social Studies*

## INTRODUCTION

Junior secondary schools offer the subject of Social Studies, which is intended to give pupils the attitudes, values, abilities, and information necessary for a harmonious social existence in human society. It has been noted that social studies frequently offer coordinated systematic study within the junior secondary school curricula, drawing from a variety of disciplines, including anthropology, archaeology, economics, geography, history, law, political science, and religion, to name a few, as well as appreciable content from the humanities, mathematics, and natural sciences. It is a multidisciplinary investigation of a subject, issue, problem, worry, or aspiration (Ogundare, 2000).

Students are required to employ a variety of strategies, procedures, and approaches to help solve problems correctly when solving social difficulties. Teachers of Social Studies classes are constantly searching for new strategies to assist students learn more effectively, as well as for motivating or attitudinal effects of the subject matter. Learning is a proactive, intelligent, and complex process. Learning involves a complicated dynamic system that includes environmental, social, motivational, and other factors (Cheema & Mirza, 2013). Teachers have therefore been looking for appropriate and

relevant ways to promote effective learning over the years in order to promote meaningful learning.

Various teaching-learning techniques are created to speed up students' learning. At the moment, passive student behaviour during lessons and a teacher-dominated classroom atmosphere are the majority of school practices in use in Nigeria (Emaiku, 2013). Researchers and educators from all over the world are paying close attention to how teaching methods affect students' performance. How students are taught has a significant impact on what they learn (Abdulhamid, 2013). According to Hassan (2002), teaching methods are the approaches, methodologies, and strategies that a teacher uses to successfully carry out his lesson. (Daluba, 2013). The tools a teacher uses to accomplish the predetermined aims and objectives are called teaching methods. Students use learning techniques to increase their understanding of new material (Liu, 2009). According to Harrison et al (2003) research, students who use the right learning techniques when doing academic assignments perform better than those who do not. In social studies classes, a variety of learning techniques are employed to assist students in overcoming some of the obstacles to learning.

Emaikwu (2013) asserts that during the past few decades, student performance standards in Nigeria have drastically decreased at all educational levels. There are various reasons why students perform poorly in school, many of which have psychological and environmental roots. The teaching strategies used by teachers in schools can be blamed for the decline in performance quality, for example, at the secondary school level. Squeira (2012) emphasizes that some techniques of education encourage passive rather than active learning. Researchers and educators have frequently noted the shortcomings of rigorous lecture-based teaching methods.

In enhancing learning outcomes in social studies, teaching and learning methods such as problem solving, inquiry method, demonstration method, simulation method, discussion method, dramatization method, questioning method, construction method, method, creative activity method, concept mapping, multiple representation and many others have been developed to make learning more meaningful and less complex. It has been observed that students in Social Studies classrooms normally show satisfaction, and others displayed symbolic or abstract representations, some in visual or physical forms. (Kohl & Finkelstein, 2004). Students with high problem-solving capabilities usually demonstrate enormous skills in solving immediate problems through manipulating their language translation and representations, including vocal, visual, and formal (sentence, phrase, rule, and formula) representations. Conversely, students with poor problem-solving skills frequently struggle with translation and representation while solving problems.

Additionally, different pupils have various ways of learning and absorbing information. Therefore, it is preferable for teachers to use various teaching tactics to boost students' performance through efficient learning techniques that can significantly increase students' grasp of Social Studies subjects (Opfermann et al., 2017; Treagust et al., 2017).

Assessment in education has traditionally relied on standardized tests and examinations that emphasize memorization and factual recall. While such methods can reveal what students remember, they often fail to capture the depth of understanding, problem-solving abilities, and capacity to apply knowledge in real-life contexts (Widianingtiyas et al., 2015). In Social Studies, where the objectives extend beyond cognitive achievement to include values, attitudes, and civic participation, there is a pressing need for more authentic forms of assessment. The Multiple Representation Strategy (MRS), originally introduced as an instructional approach, offers significant potential as an assessment tool because it allows students to demonstrate their learning in varied and complementary ways (Treagust et al., 2017).

MRS involves presenting and expressing knowledge through diverse modes such as verbal, graphical, symbolic, pictorial, and experiential representations. By incorporating these formats into assessment, teachers can evaluate multiple dimensions of students' understanding that may not be visible through traditional tests (Tang et al., 2014; Opfermann et al., 2017). In this way, MRS promotes fairness and inclusivity by recognizing that students possess different strengths and learning styles. This approach also aligns with constructivist learning principles, as it requires learners to interpret, connect, and integrate knowledge across different representational forms, thereby deepening their comprehension (Masrifah et al., 2022).

In social studies, the use of MRS as an assessment tool has practical applications that reflect the subject's holistic objectives (Adeyemi, 2008; Ayanwale et al., 2021). Tasks such as oral debates on civic issues, essays on population growth, concept maps showing cause-and-effect relationships, interpretation of demographic data, or dramatizations of civic duties can all be integrated into assessment practices (Ikwumelu et al., 2014; Jančič & Hus, 2019). These multiple forms of representation not only capture what learners know but also how they think, reason, and apply knowledge to social realities (Olukoya & Jimoh, 2022). By offering opportunities for learners with visual, auditory, or kinesthetic preferences to express their competencies, MRS provides a richer and more authentic picture of learning outcomes (Üstün & Karatekin, 2022; Atubi, 2024). Ultimately, its application as an assessment tool strengthens the relevance of Social Studies education by evaluating not only recall but also the critical values, skills, and problem-solving abilities necessary for responsible citizenship.

Studies like Janvier (1987) explored the use of multiple representations in learning holistically and characterized it as a cumulative process based primarily on the ability to deal with an ever-expanding variety of representations. Tang et al. (2014) defines representations as anything used in the humanities and social sciences to symbolize an idea or concept. These items can include vocal explanations, written texts, diagrams, and graphs.

Due to the fact that a subject given using various representations can promote deep knowledge, multiple representations have been playing a crucial role in assisting Social Studies students in obtaining a better understanding of the relevant concepts. Multiple representations allow students to understand complicated concepts in different ways and then apply these concepts to teach successfully (Masrifah et al., 2020).

Multiple representations encourage the use of conceptual learning, such as in Social Studies, because they place a stronger emphasis on conceptual understanding and qualitative reasoning in learning. Effective learning could result from teaching and learning strategy that uses many representations. By engaging students' hands-on and mental learning capacities, diverse representations will foster an environment where learning takes place with their active participation. This will make learning more meaningful. This is supported by the findings of Siswanto et al. (2016) study, which found that in order for students to absorb Social Studies ideas successfully, they must correctly and fully comprehend their various representations.

Additionally, according to Widianingtiyas et al. (2015), using multiple representations when teaching has a positive impact on students' cognitive abilities in Social Studies because it helps students understand concepts by giving them access to all the information in the various forms of representation that are being used. The achievement of students and the consistency of science can both be improved by teaching Social Studies through diverse representations (Sari et al., 2015).

The ability to reason analytically, think critically, and produce effectively in problem-solving is often seen as requiring quantitative, linguistic, manual, and critical reaction abilities. Learners need a strategy that fully conveys the notion to improve and gain problem-solving skills through multiple representations (De Jong et al., 2010).

Multiple representations are one of the crucial methods for enhancing the learning performance of students (Cai & Hwang, 2002). Olaleye (2013) asserted that to support learning outcomes, multiple representations are often used in solving problems. According to Hwang et al. (2014), students can use a multi-modal system to represent their ideas (internal model) through text, images, or spoken communication. The majority of students are happy with the value and simplicity of the multi-modal system.

Utilizing many learning modalities is known as multi-modal learning. The utilization of new media and teaching techniques created and made available by computer and communication technologies is encouraged by multi-modal learning (Jeffery, 1993; Pilgrim, 1996). Students first identify some hints to solve the problems by experimenting with various methods, such as formula, graphic reasoning, or written explanation. They then use a variety of tools offered by the multi-modal system to translate their concepts and methodologies into multiple representational solutions.

To address distinct learning issues among pupils and challenging Social Studies subjects, other representations might be created (Hinrichs, 2005; Jimenez & Perales, 2001; Savimainen et al., 2005). Social studies education researchers have been particularly interested in using different representations to solve problems (Neugen & Rchelio, 2011). The advantages of adopting multiple representations to

solve different Social Studies problems have been studied by some of these Social Studies education scholars (Van Henvelen & Zou, 2001). According to Rosengrant & Finkeistein (2007), students' responses to issues with comparable formulations may produce noticeably diverse outcomes.

It is believed that one of the great performances of Social Studies education is to enable students to use their knowledge in solving problems. Many researchers, according to Gok & Silay (2010) and Selcuk et al. (2008), have found that many students do not solve problems at the desired level of proficiency, even though there are improvements in the development of effective Social Studies problem-solving methods. Most efforts then had been to identify differences between experienced and inexperienced Social Studies problem solvers. The differences had been in the manner and approach in which the different Social Studies groups solved problems.

While the experienced Social Studies problem solvers have substantial training in Social Studies and consider a qualitative analysis of problem before embarking on quantitative analysis, the inexperienced solvers have little or no deep knowledge of Social Studies and quickly involve in quantitative expression, a technique that involves haphazard social problems and solution patterns, and because of these differences, inexperienced Social Studies problem solvers often fail to do so for problems at less than the required proficiency level (Yerushalam & Magen,2006)

Students had trouble representing concepts, according to Nugen and Rebello's 2007 study. Their inability to transfer their problem-solving abilities between representations is a challenge. However, as they solve more problems in different representations, students become better at transferring knowledge across representations (Nguyen and Rebello, 2011). Using multiple representations of information in the Social Studies classroom strengthens learning and boosts students' success in problem solving (Nguyen & Rehello, 2011).

Multiple representations, including verbal, sketch, or graphical diagrams and graphs, are employed in Social Studies (Van Heuvelen & Zou, 2001). To address distinct learning difficulties among pupils and challenging Social Studies subjects, several representations might be used. Thus, by encouraging teachers to use the right strategies, this study aims to address specific learning challenges among Social Studies students and help students' ability to solve problems (Orulebaja et al., 2021).

Abimbola (2004) asserts that to reduce the difficulty students face in learning concepts, teachers must analyze concepts meant for learning and specify their level of complexity, abstractness, and sophistication. This analysis would enable teachers to lead students to know the relationships between concepts. Hence, determining the effects of multiple representation strategy on learning outcome is useful to help teachers in knowing what to teach, how to teach it and how to evaluate students in social studies is the focus of this study.

1. Research Questions

i. What is the effect of the multiple representation and conventional teaching strategy on students' attitude to Social Studies?
ii. What is the effect of using multiple representations and conventional teaching strategies on students' learning outcomes in social studies?
iii. What is the effect of gender on the learning outcome of students in social studies when taught through multiple representations and conventional means?
iv. Is there any interaction effect of the treatments (multiple representation and conventional teaching strategy) and gender on students' attitude in Social Studies?

2. Null Hypotheses

- $H_{O1}$: There is no significant effect of the multiple representation and conventional teaching strategy on students' attitude to Social Studies.
- $H_{O2}$: There is no significant effect of multiple representations and conventional teaching strategies on students' learning outcomes in Social Studies.
- $H_{O3}$: There is no significant effect of gender on the learning outcome of students in social studies when taught through multiple representations and conventional means.
- $H_{O4}$: There is no significant interaction effect of the treatment (multiple representations and

conventional teaching strategy) and gender on students' attitude in Social Studies.

## METHODS

The methods employed by the researchers are extensively discussed below:

1. Research Design

A quantitative research method entails a quasi-experimental research design, which involves pre-test, post-test, experimental, and control groups.

2. Population and Sample

The target population for the study, for which generalizations are based, consists of students in Lagos State Public Junior Secondary Schools with a total population of 11,077, with 20 Junior Secondary Schools (Lagos State Ministry of Education, 2022). The population covers both male and female students from all the Junior Public Secondary Schools in Lagos State.

The sample for the main study comprises 120 participants whose ages range from 12-17 years of junior secondary school II and were selected from four sampled co-educational schools in Lagos State Education District VI. Lagos State is clustered into six Education Districts, but Education District VI was randomly selected from the six Education Districts, and simple random sampling techniques were adopted to select four schools from the Oshodi-Isolo zone in Education District VI. The schools were co-educational because gender is one of the moderating variables in the study. Intact classes of thirty (30) JSS II students in the four sample schools were involved in the study.

3. Instrument for Data Collection

The instrument used for data collection is the Social Studies Achievement Test (SSAT). The Social Studies Achievement Test (SSAT) was used to find out the students' level of learning social studies concepts. It contains sections A and B. Section A contains items on the Bio data of the students and information on the educational background of parents. Section B comprised twenty-five (25) multiple-choice objective test items with four options per item. The questions were adopted from past questions for Junior Secondary Certificate Examination on Social Studies (JSCE) 2016-2022. The questions covered the concepts of resources in the first term JSSII of the Social Studies syllabus as stipulated in the National Curriculum for Junior Secondary Social Studies and Lagos State Ministry of Education modified scheme of work. The validity of the SSAT, being a standardized test, has been established by the Lagos State Examination Board.

The test-retest reliability was performed using 50 students from two public junior secondary schools that were not part of the schools for the main study on two occasions, with an interval of two weeks. K-21 was used to determine the reliability of the Social Studies Achievement Test (SSAT). The Social Studies Achievement Test (SSAT) was a reliable index of 0.81.

4. Data Collection

The pre-test was administered to all the groups together. Thereafter, the students were divided into two groups: control (conventional) and experimental (multiple representation) groups. Each of the groups received a treatment with the aid of an instructional guide. A lesson note was prepared for the students in the experimental group 1, which exposed them to the topics, resources in social studies using multiple representation Teaching Strategy. The control group was also exposed to the same content using the conventional method of teaching lesson notes. However, the scores of all the subjects were taken before and after the treatments. The treatment lasted for four consecutive weeks.

The post-test is a comprehensive test on the same topics that participants had attempted in the pre-test, irrespective of whether they were in the treatment group or the control group. The question

items drawn on social studies from junior secondary school (JSS) examination organized by Lagos State Ministry of Education were administered to them. The participants (students) were tested with the social studies' academic achievement test at the end of the 4 weeks of treatment.

The data obtained from the administration of the instrument were analysed; thus, the descriptive statistics used included arithmetic means and standard deviation for answering the research questions. The second stage was the testing of hypotheses using inferential statistics of ANOVA the stated hypotheses at a 0.05 level of significance.

## RESULT

From Table 1, a total of 120 students participated in the study. 52 of these participants, which correspond to 45% are male, while 68 of these participants, which correspond to 56.6% are female students. Furthermore, Table 1 reveals that out of a total of 120 students that participated in the study, 60 of these students, which correspond to 50% were in the multiple representation strategy group, while 60 students (50 %) were in the conventional strategy group.

**Table 1** Distribution of respondents by teaching strategies and gender

| Variable | Factor | Ƒ | % |
|---|---|---|---|
| Teaching strategies | Multiple representation | 60 | 50 |
| | Conventional | 60 | 50 |
| | Male | 52 | 45.0 |
| Gender | Female | 68 | 55.0 |

1. Research Question 1

What is the effect of the treatment (multiple representation) and conventional teaching strategy on students' attitudes in Social Studies?

Table 2 reveals that students who have a positive attitude had a higher mean gain of 3.924 than their counterparts with a negative attitude who had a mean gain of 1.810.

**Table 2** Effectiveness of the treatment (multiple representation) and conventional teaching strategy on students' attitude in social studies

| Attitude | N | Pre-Test Scores | | Post Test Scores | | Mean Gain |
|---|---|---|---|---|---|---|
| | | Mean | SD | Mean | SD | |
| Positive attitude | 78 | 11.92 | 3.661 | 15.85 | 3.301 | 3.924 |
| Negative attitude | 42 | 11.21 | 3.025 | 13.02 | 3.509 | 1.810 |

2. Research Question 2

What is the effect of using multiple representations and conventional teaching strategies on students' learning outcomes in social studies?

Table 3 reveals that students who were in the Multiple representation group had the best mean score with a mean difference of 3.85 and a standard deviation of -0.78. However, the students in the traditional teaching strategy group had the least mean difference of 1.81 and a standard deviation of 0.305.

**Table 3** Effects of multiple representations and conventional teaching strategies on students' learning outcomes in social studies

| Treatment | N | Mean | | Mean Dif. | SD | | SD Dif. |
|---|---|---|---|---|---|---|---|
| | | Post test | Pre-test | | Post test | Pre-test | |
| Concept Mapping | 60 | 16.25 | 12.40 | 3.85 | 2.65 | 3.432 | -0.778 |
| Conventional | 60 | 12.84 | 11.03 | 1.81 | 3.54 | 3.233 | 0.305 |
| Total | 120 | 15.11 | 11.74 | 3.37 | 3.57 | 3.510 | 0.061 |

3. Research Question 3

What is the effect of gender on the learning outcome of students in social studies when taught through concept mapping?

Table 4 shows that female students in the concept mapping group had the best performance in their learning outcomes, with a mean difference of 4.30, and male students in the Multiple representation group had a mean difference of 3.44.

**Table 4** Effects of gender on learning outcomes of students in social studies when taught with multiple representations and conventional teaching strategies

| **Treatments** | | **Male** | | | **Female** | |
|---|---|---|---|---|---|---|
| | **Post test** | **Pre-test** | **Mean Dif.** | **Post test** | **Pre-test** | **Mean Dif.** |
| Concept Mapping | 16.28 | 12.84 | 3.44 | 16.22 | 11.91 | 4.30 |
| Conventional | 12.95 | 11.79 | 1.16 | 12.79 | 10.67 | 2.13 |
| Total | 15.35 | 11.82 | 3.53 | 14.91 | 11.67 | 3.24 |

4. Hypothesis 1: There is no significant effect of the treatment (Multiple representation) and conventional strategy on students' attitude to Social Studies

Table 5 shows that the [F (2, 145) =1.740; $p > 0.05$, $\eta p^2$=0.023] is not significant. Since the F-value is not significant, the hypothesis which states that there is no significant effect of the treatment (Multiple representation) and conventional strategy on student's attitude to Social Studies is not rejected. The partial eta square (0.023) which is very small indicates that the effect size is very small. Despite the insignificant difference, the Figure 4.3 shows the attitude with the best effectiveness.

**Table 5** Effectiveness of the treatment (multiple representation) and conventional strategy on students' attitude to social studies

| **Source** | **Type III SS** | **Df** | **MS** | **F** | **Sig.** | **$\eta p^2$** |
|---|---|---|---|---|---|---|
| Corrected Model | 1152.281[a] | 14 | 82.306 | 13.641 | 0.000 | 0.568 |
| Attitude | 21.003 | 2 | 10.502 | 1.74 | 0.179 | 0.023 |
| Error | 874.913 | 145 | 6.034 | | | |

5. Hypothesis 2: There is no significant difference in the learning outcome of concept mapping and conventional teaching strategies on students' learning outcomes in Social Studies.

Table 6 reveals that the F-value 7.77 (2, 145) is significant at 0.05. It follows that there is a significant main effect of treatment on students' learning outcomes in Social Studies. The R-squared shows that the independent variables accounted for 56.8% of the variation in students' learning outcomes in Social Studies. The partial estimate indicates that the treatments accounted for 9.7% of the variance observed

in the post-test on students' learning outcomes in Social Studies. The implication of this is that the students in the treatment groups improved on their learning outcome in Social Studies than their counterparts in the control group after treatment.

**Table 6** Effects of treatment (multiple representation) and conventional methods on students' learning outcomes in social studies

| Source | Type III SS | Df | MS | F | Sig. | $p\eta^2$ |
|---|---|---|---|---|---|---|
| Corrected Model | 1152.281[a] | 14 | 82.306 | 13.641 | 0.000 | 0.568 |
| Treatment | 93.792 | 2 | 46.896 | 7.772 | 0.001 | 0.097 |
| Error | 874.913 | 145 | 6.034 | | | |

R Squared = .568 (Adjusted R Squared = .527)

6. Hypothesis 3: There is no significant main effect of gender on the learning outcome of students in social studies when taught through Multiple representations and conventional means.

Table 7 shows that the F-value 1.00 (1, 145) is not significant at 0.05. It follows that there is no significant main effect of gender on students' learning outcomes in Social Studies when taught through multiple representations and concept mapping. The partial eta square (0.007), which is very small, indicates that the effect size is very small. Despite the insignificant difference, the chart below shows the level of attitude with the better effect.

**Table 7** Effect of gender on students' learning outcomes in social studies

| Source | Type III SS | Df | MS | F | Sig. | $p\eta^2$ |
|---|---|---|---|---|---|---|
| Corrected Model | 1152.281[a] | 14 | 82.306 | 13.641 | 0.000 | 0.568 |
| Gender | 6.041 | 1 | 6.041 | 1.001 | 0.319 | 0.007 |
| Error | 874.913 | 145 | 6.034 | | | |

7. Hypothesis 4: There is no significant interaction effect of the treatments (concept mapping) and gender on students' attitude to Social Studies.

Table 8 shows that the F-value [1.55(2, 145)] is not significant at 0.05. It follows therefore that there is no significant interaction effect of treatments and gender on students' attitude to Social Studies. The partial eta square (0.01) which is very small indicates that the effect size is very small.

**Table 8** Interaction effect of the treatments (multiple representation) and gender on students' attitude to social studies

| Source | Type III SS | Df | MS | F | Sig. | $\eta p^2$ |
|---|---|---|---|---|---|---|
| Corrected Model | 1152.281[a] | 14 | 82.306 | 13.641 | 0.000 | 0.568 |
| Treatment*Gender*Attitude Error | 18.681<br>874.913 | 2<br>145 | 9.34<br>6.034 | 1.548 | 0.216 | 0.021 |

## DISCUSSION

The study establishes the effectiveness of the Multiple representation strategy on social studies instruction and students' learning outcomes in Lagos State junior secondary schools. The result from the test of the first hypothesis ($Ho_1$) through ANOVA denotes that the F-value $1.740_{(2,\ 145)}$ is not significant at 0.05. It follows then that the effect of the treatment (Multiple representation) on students'

attitude to Social Studies was not significant.

This result is in agreement with the findings of Akinlaye (2003), who found that the major objective in Social Studies instruction is to enable learners to develop the right types of attitudes, interests, feelings, and values which are central to the study of man in society. Attitude is an ill-defined area that embraces interest, opinion, values, benefits, and personalities. It is believed that an attitudinal objective is very difficult to pin down and specify precisely. For example, to appreciate, to like or dislike, happiness, joy, love, hatred, and so on. These traits are internal conditions that can only be inferred on the basis of observed behavior. Moreover, changes in attitude and values occur very slowly and over a long period of time. They are very difficult to measure in a short time. Hence, attitude scales are used for evaluating such traits.

The findings from the second hypothesis reveal that the F-value $7.77_{(2, 145)}$ is significant at 0.05. It follows that there is a significant main effect of treatment on students' learning outcomes in Social Studies. The findings generally revealed that students treated with the Multiple representation teaching strategy performed better academically than the conventional means. These results are consistent with those of Orulebaja et al. (2021), who said that the effectiveness of using various representations learning methodologies when learning physics and solving physics issues was demonstrated by the strength of academic success. This suggests that both problem-solving and multiple representational skills may be improved by using many representations with learners. According to the results of Duman and Yakar (2019), it can be argued that while there is no significant difference between students who complete their learning activities through drawing-modal representation and those who complete their learning activities through writing-modal representation in terms of academic achievements or problem-solving skills, a significant difference was observed in terms of their retention.

Similar to this, DeLeone & Gire (2005) said that the use of different representations in problem solving becomes increasingly crucial since it is connected to students' problem-solving ability. Additionally, Kohl & Finkelstein (2006) found that the use of different representations in learning improves students' grasp of social studies subjects in addition to students' existing knowledge and the subject presented. This suggested that one of the key processes that students need to build knowledge of Social Studies subjects is the multiple representations learning strategy. This would help them become better problem solvers.

In line with the opinion of Abimbola & Danmole (1995) assert that to reduce the difficulty students face in learning concepts, teachers must analyze concepts meant for learning and specify their level of complexity, abstractness, and sophistication. It is therefore suggested that for maximum effectiveness, intervention should include training and re-training of Social Studies teachers in the area of teaching strategies and methods capable of enhancing active participation and improved learning outcomes.

Hypothesis three indicates that there is no significant main effect of gender on students' learning outcomes in Social Studies when taught through multiple representations. Some researchers have reported the prevalence of significant gender differences in the performance of students in Social Studies, some in favor of males, some in favor of females, while some found no difference (Cheema & Mirza, 2013; Ogonnaya et al., 2016). Some of these were attributed to factors which include the teaching strategies adopted, religious beliefs, economic, cultural, and social beliefs, etc.

Gender remains a significant issue concerning both enrolment and achievement amongst social studies students in junior secondary school (Mbamara & Eya, 2015; Oliver et al., 2017). Girls think, learn, and interact with equipment differently from boys (Valentine, 1998). This implies that teaching methods and strategies could be gender biased. Research efforts are therefore geared towards determining instructional strategies that could give equal appeal to both the male and female learners. There is a paucity of research-based information and a lack of agreement on how gender influences or combines with multiple representation strategies to determine achievement in social studies (Appoji & Shailaja, 2017). Other studies Pearsall et al. (1997), show that female university students produce more complex representations than their male counterparts. This was true for the university students in Martin et al. (2000) when the structural complexity and propositional validity of representation were evaluated using a modified version of Novak & Gowin's scoring method. The reasons for such contradictory findings are not evident and warrant further investigation. It is therefore expedient to examine the moderating effect of gender and or its interaction with multiple representation instructional strategy on the achievement of students in social studies, and this formed the inclusion of gender as a variable in this

study.

Abimbola (2004) believes that multiple representation ability is not significantly influenced by students' gender. Bilesanmi-Awoderu (2002) similarly observes no significant main effect of gender on the experimental treatments. Candan (2016) also found that there was no statistically significant difference between students' academic performance based on gender when a particular method of teaching was applied in the classroom. Explaining further, Ikwumelu and Oyibe (2014) observe that there is no significant difference in the mean achievement of male and female students when a self-directed learning strategy is used. multiple representations can serve as one of the self- directed learning strategies. Although some of the previous studies revealed the effectiveness of multiple representations on students' achievement during instruction, one or two others indicated a non-significant effect of multiple representations.

Such differing results may not undermine the effectiveness of multiple representations, especially when the results are critically considered. The need for this current study stems from the reduced achievement of Social Studies objectives and the inability of learners to transfer knowledge and skills acquired in Social Studies. Poor teaching method used, may have contributed to this bottleneck (Adeyemi, 2008). Students are only exposed to rote learning, which does not make room for retention and knowledge application. There is a need to introduce a child-centered method of teaching so as to produce meaningful learning. This is to say that the instructional methodology should be revisited in order to improve students' performance and enhance learners' ability to solve the abounding societal problems.

## CONCLUSION

The main goal of this study is to show the effectiveness of multiple representation teaching strategy on students' learning outcomes in social studies, and the domain of interest is Lagos State Junior Secondary Schools. This study equally seeks to find the moderating effect of the treatment, that is, the multiple representation teaching strategy, on the basis of attitude and gender. It was affirmed that students exposed to multiple representation teaching strategies had improved performance in Social Studies. Thus, this study has shown that the treatment (multiple representation) is relevant and efficacious in enhancing students' learning outcomes.

In view of the above, it is recommended that Social Studies teachers be trained to consistently adopt student-centered approaches in the classroom in order to enhance learner engagement and participation. The government should play an active role by subsidizing textual materials while also ensuring that teachers are adequately provided with the necessary and relevant resources required to achieve instructional objectives effectively. Furthermore, Social Studies teachers should be given continuous training and re-training on innovative teaching strategies and methods that are capable of fostering active student participation and improving overall learning outcomes.

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## DATA AVAILABILITY STATEMENT

Data will be made available on request.

## CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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