EFFECT OF ROLE-PLAY AND SIMULATION ON STUDENTS' KNOWLEDGE AND ATTITUDES TOWARD INHERITANCE IN SOCIAL STUDIES IN EDO STATE

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Abstract

This study examined the effect of role-play and simulation instructional strategies on students' knowledge and attitudes toward inheritance concepts in Social Studies in Edo State. The study adopted a 3 × 2 × 2 factorial pretest–posttest non-equivalent control group design structured into instructional strategies (role-play, simulation, and conventional teaching), sex (male and female), and measurement phases (pretest and posttest). The population comprised all Junior Secondary School II (JSS II) students offering Social Studies in public secondary schools in Edo State. A sample of 422 students was selected through a multistage sampling technique from four public secondary schools across three local government areas. Intact classes were used to avoid disruption of normal classroom activities. The instrument for data collection was the Inheritance Knowledge and Attitude Test (Ikat) developed by the researcher. The instrument consisted of a 40-item multiple-choice test measuring students' knowledge of inheritance concepts and a 20-item Likert-scale questionnaire measuring students' attitudes toward inheritance. The instrument was validated by three experts in Social Studies Education and Measurement and Evaluation. A pilot study involving 30 students outside the sampled schools produced reliability coefficients of 0.86 using Kuder–Richardson Formula 20 (KR-20) for the knowledge test and 0.84 using Cronbach's alpha for the attitude scale. Data collection lasted six weeks and involved pretest, treatment, and posttest administration. Mean and standard deviation were used to answer research questions, while paired sample t-test, ANOVA, and ANCOVA were used to test hypotheses at the 0.05 level of significance. The findings revealed that simulation and role-play strategies significantly improved students' knowledge and attitudes toward inheritance concepts compared with the conventional method. Simulation produced the highest knowledge gain, while role-play recorded the highest improvement in attitude. Sex significantly influenced knowledge but had no significant effect on students' attitudes. The study concluded that learner-centred strategies enhance meaningful learning in Social Studies.

Keywords: Role-play, Simulation, Inheritance Concepts, Knowledge, Attitude, Social Studies.

Introduction

Education plays a critical role in country development and social change. In Nigeria, education is viewed as a critical tool for providing students with the knowledge, skills, attitudes, and values needed for meaningful involvement in society (Oba et al., 2020). Individuals learn how to understand their surroundings, relate effectively with others, and contribute constructively to society progress. One of the educational disciplines designed to help students attain these goals is Social Studies. Social studies is an integrated subject that studies human connections, social structures, culture, and how people interact with their surroundings. The topic strives to produce responsible individuals with the knowledge, attitudes, and values required to solve societal problems and promote peaceful coexistence.

Among the various concepts taught in Social Studies is inheritance. Inheritance refers to the process through which property, rights, responsibilities, values, and cultural practices are transferred from one generation to another within a family or society. The concept of inheritance helps learners understand family relationships, cultural continuity, and social responsibilities within their communities. Teaching inheritance in Social Studies enables students to appreciate issues related to succession, family property, social justice, and cultural traditions. Understanding inheritance also helps students develop awareness of societal norms and legal frameworks guiding the transfer of property and responsibilities within families and communities. Despite the importance of Social Studies in the school curriculum, students' knowledge and attitudes toward some Social Studies concepts, including inheritance, have continued to raise concern among educators and researchers. One of the major factors responsible for this challenge is the persistent use of conventional teaching strategies, particularly the lecture method. The conventional teaching strategy is largely teacher-centred, where the teacher dominates classroom

instruction while students remain passive recipients of information. In this approach, learners have limited opportunities to actively participate in the learning process. Consequently, students may find it difficult to relate theoretical classroom instruction to real-life situations, which may negatively affect their understanding of concepts and their attitude toward the subject.

In response to this challenge, educational researchers have emphasized the need for innovative and learner-centred instructional strategies that actively engage students in the learning process. Such strategies encourage participation, interaction, and experiential learning, which can improve students' understanding and attitudes toward learning. Among the instructional strategies that have received attention in recent years are role-play and simulation teaching strategies. These strategies are activity-based approaches that enable students to participate directly in the learning process by acting out situations or experiencing simulated real-life events related to the subject matter.

Role-play is an instructional strategy in which learners assume specific roles and act out real-life social situations to enhance learning. This approach promotes active participation by allowing students to explore different perspectives, express ideas, and better understand social concepts through experience. Aladwan (2024) stated that role-play enables learners to participate in simulated social or historical events, which improves comprehension and classroom engagement. Similarly, Afolabi and Okunloye (2024) observed that role-play encourages interaction among students and creates a learner-centred learning environment that supports understanding of Social Studies concepts. In addition, role-play helps develop communication, expressive, and social skills among learners. Ojoko (2019) explained that role-play activities improve pupils' confidence, interaction abilities, and emotional awareness by allowing them to practice real-life social behaviours in the classroom. Role-play also increases students' interest and motivation to learn Social Studies because it makes lessons more practical, enjoyable, and meaningful. Therefore, role-play is an effective strategy for improving students' understanding of social concepts and learning outcomes.

Another important learner-centred instructional strategy is simulation. Simulation refers to a teaching technique that recreates or imitates real-life situations, events, or processes within a controlled classroom environment in order to facilitate meaningful learning experiences. Through simulation activities, learners are exposed to realistic scenarios that enable them to explore concepts, make decisions, and observe the consequences of their actions in a safe learning setting. This approach allows students to move beyond passive listening to active engagement with learning content. According to Amuah (2021), simulation provides learners with opportunities to participate in practical learning experiences that closely reflect real-world situations, thereby improving conceptual understanding and developing critical thinking skills. In a simulation-based classroom, learners are encouraged to analyze problems, discuss possible solutions, and apply knowledge to situations that resemble real societal issues. Such experiences promote deeper learning because students are actively involved in the instructional process. Simulation can take different forms in the classroom, including role enactment, computer-based simulations, games, and multimedia demonstrations. These forms of simulation help students visualize abstract concepts and understand how theoretical ideas operate in real situations. Akudo (2025) noted that simulation activities, particularly those supported by animated and interactive learning tools, create engaging and stimulating learning environments that enhance students' participation, comprehension, and retention of instructional content. By allowing learners to experiment with ideas and observe outcomes, simulation helps bridge the gap between theoretical knowledge and practical application. Consequently, students develop analytical and problem-solving skills that are essential for understanding complex social issues.

The use of role-play and simulation strategies is particularly relevant in the teaching of Social Studies because the subject focuses on real-life social issues, human relationships, and societal processes. Many Social Studies topics involve situations that occur within families, communities, and societies, making experiential and activity-based instructional approaches more suitable for effective learning. Instructional strategies that promote active participation enable students to examine social problems, understand different perspectives, and develop appropriate civic values. Abudulai (2020) emphasized that interactive teaching strategies such as role-play and simulation help learners develop positive attitudes, social awareness, and problem-solving skills necessary for effective participation in society. These strategies encourage learners to discuss issues, exchange ideas, and cooperate with one another in solving problems related to their social environment. Furthermore, simulation and role-play strategies help make Social Studies lessons more interesting, meaningful, and relevant to students'

everyday experiences. When students are actively involved in dramatizing or simulating real-life events, they are more likely to develop curiosity, motivation, and sustained interest in the subject. Cochran (2015) reported that drama-based instructional strategies, including role-play and simulation, make Social Studies instruction more engaging by allowing students to experience historical and social events from different perspectives. Such learning experiences enhance students' understanding of concepts and improve their ability to relate classroom knowledge to real-life situations. Therefore, integrating simulation and role-play strategies in the teaching of Social Studies can significantly enhance students' participation, comprehension, and overall learning outcomes

Empirical studies have also provided evidence on the effectiveness of interactive teaching strategies in improving learning outcomes. Gbindé et al. (2025) found that role-play and other activity-based strategies significantly improved students' academic performance and attitudes toward Social Studies. Lawani (2025) also reported that innovative instructional strategies that integrate interactive learning activities enhance pupils' achievement and attitudes toward Social Studies concepts. Nathasabilla and Ratnawati (2025) further observed that simulated role-playing activities improved students' understanding and analytical skills in social science-related subjects. These findings suggest that learner-centred strategies such as role-play and simulation can positively influence students' learning outcomes when compared with conventional teaching methods.

Knowledge is one of the key variables in this study because it represents students' understanding, awareness, and mastery of instructional content acquired through learning experiences. Knowledge in education refers to the cognitive ability of learners to recall, comprehend, interpret, and apply learned concepts. According to Anderson and Krathwohl (2021), knowledge is the foundation of cognitive learning and involves more than memorization, as it includes meaningful understanding and application of information. In educational research, students' knowledge is commonly measured using achievement tests administered before and after instruction. Pretest scores are used to determine students' initial level of understanding, while posttest scores measure knowledge gained after instructional intervention. The difference between pretest and posttest scores helps determine the effectiveness of teaching strategies in improving learning outcomes. Furthermore, knowledge development is influenced by instructional methods, classroom interaction, and students' engagement in learning activities. Activity-based strategies such as role-play and simulation are believed to enhance knowledge retention because they encourage experiential and meaningful learning. Schunk (2020) explained that learning is more effective when learners actively construct knowledge by connecting new information with prior experiences. Similarly, Hattie (2020) reported that instructional strategies that promote active participation and feedback tend to improve students' knowledge acquisition. In this study, knowledge specifically refers to students' understanding of inheritance concepts in Social Studies after exposure to role-play, simulation, and conventional teaching strategies.

Another important variable in this study is students' attitude toward inheritance in Social Studies. Attitude refers to learners' feelings, beliefs, and predispositions toward a particular subject or concept. Students who develop positive attitudes toward a subject are more likely to show interest, participate actively in learning activities, and achieve better academic outcomes. Lawani (2025) observed that instructional strategies that involve creativity, interaction, and active participation tend to improve students' attitudes toward Social Studies learning. Similarly, Gbindé et al. (2025) reported that activity-based instructional strategies help students develop positive dispositions toward Social Studies concepts.

Sex is also considered an important variable in this study because it may influence how students respond to instructional strategies during the learning process. Sex refers to the biological classification of individuals as male or female based on physical and physiological characteristics such as chromosomes, hormones, and reproductive organs. Westbrook and Schilt (2022) explained that sex is a biological concept that distinguishes individuals based on their genetic and anatomical attributes. In educational research, sex is often examined to determine whether male and female students differ in their academic achievement, attitudes, and responses to instructional strategies. Differences in brain structure and physiological development between males and females may also influence cognitive processes and learning behaviours (Rippon et al., 2023). Apart from biological influences, social and environmental factors may shape how male and female students participate in classroom activities. Differences in socialization and communication patterns may affect the way students engage with interactive teaching strategies such as role-play and simulation. For example, studies have shown that males and females may differ in their communication styles and responses during social interaction (Wood & Eagly, 2020).

However, research findings on the influence of sex on learning outcomes remain inconsistent, as some studies report no significant differences between male and female students, while others indicate slight variations in achievement and attitudes depending on the instructional approach (Reilly et al., 2022).

Although previous studies have examined innovative instructional strategies in Social Studies and other related subjects, there is still a need to investigate the effectiveness of role-play and simulation teaching strategies in improving students' knowledge and attitudes toward specific Social Studies concepts such as inheritance. Variations in educational settings, instructional practices, and learner characteristics may influence the effectiveness of these strategies. Therefore, this study seeks to examine the effect of role-play and simulation teaching strategies on students' knowledge and attitudes toward inheritance in Social Studies in Edo State. The study also examines the influence of sex on students' knowledge and attitudes when taught using these instructional strategies. The findings of this study are expected to provide useful insights for teachers, curriculum planners, and educational stakeholders on effective teaching strategies that can enhance students' understanding of Social Studies concepts and promote positive attitudes toward learning.

Objectives of the Study

The main objective of this study is to examine the influence of role-play and simulation teaching strategies on students' knowledge and attitudes toward inheritance in Social Studies in Edo State.

Specifically, the study seeks to:

1. Determine the difference between the pretest and posttest mean knowledge scores of students taught inheritance concepts in Social Studies using the role-play, simulation and conventional teaching strategies in Edo State.
2. Determine the difference between the pretest and posttest mean attitudes scores of students taught inheritance concepts in Social Studies using the role-play, simulation and conventional teaching strategies in Edo State.
3. Examine the difference between the pretest and posttest mean knowledge scores of students taught inheritance concepts in Social Studies using the role-play, simulation and conventional teaching strategies based on sex in Edo State.
4. Examine the difference between the pretest and posttest mean attitude scores of students taught inheritance concepts in Social Studies using the role-play, simulation, conventional teaching strategies in Edo State.

Research Questions

The following research questions guided this study:

1. What is the difference between the pretest and posttest mean knowledge scores of students taught inheritance concepts in Social Studies using role-play, simulation, and conventional teaching strategies in Edo State?
2. What is the difference between the pretest and posttest mean attitude scores of students taught inheritance concepts in Social Studies using role-play, simulation, and conventional teaching strategies in Edo State?
3. What is the difference between the pretest and posttest mean knowledge scores of students taught inheritance concepts in Social Studies using role-play, simulation, and conventional teaching strategies based on sex in Edo State?
4. What is the difference between the pretest and posttest mean attitude scores of students taught inheritance concepts in Social Studies using role-play, simulation, and conventional teaching strategies in Edo State?

Hypotheses

H_{01}: There is no significant difference between the pretest and posttest mean knowledge scores of students taught inheritance concepts in Social Studies using role-play, simulation, and conventional teaching strategies in Edo State.

H_{02}: There is no significant difference between the pretest and posttest mean attitude scores of students taught inheritance concepts in Social Studies using role-play, simulation, and conventional teaching strategies in Edo State.

H_{03}: There is no significant difference in the pretest and posttest mean knowledge scores of students taught inheritance concepts in Social Studies using role-play, simulation, and conventional teaching strategies based on sex in Edo State.

H_{04}: There is no significant difference in the pretest and posttest mean attitude scores of students taught inheritance concepts in Social Studies using role-play, simulation, and conventional teaching strategies in Edo State.

Methodology

This study adopted a 3 × 2 × 2 factorial pretest–posttest non-equivalent control group design. The factorial structure represents three instructional strategies (role-play, simulation, and conventional teaching), two levels of sex (male and female), and two measurement phases (pretest and posttest). The design was considered appropriate because it allowed the researcher to examine the main effects of instructional strategies, the effect of sex, and the interaction effects of these variables on students' knowledge and attitudes toward inheritance concepts in Social Studies.

The population of the study comprised all Junior Secondary School II (JSS II) students offering Social Studies in public secondary schools in Edo State. The sample size for the study was 422 students, selected through multistage sampling technique. Three local government areas were randomly selected from Edo State, and four public secondary schools were subsequently selected. Intact classes were used to avoid disruption of normal classroom activities. The sample was distributed across the three instructional strategy groups. The role-play strategy group consisted of 146 students (68 males and 78 females), the simulation strategy group consisted of 147 students (93 males and 54 females), and the conventional teaching group consisted of 129 students (46 males and 83 females). This distribution allowed analysis of instructional strategy effects and gender differences.

The main instrument used for data collection was the Inheritance Knowledge and Attitude Test (IKAT) developed by the researcher. The instrument consisted of two sections: a 40-item multiple-choice test measuring knowledge of inheritance concepts and a 20-item Likert-scale questionnaire measuring students' attitudes toward inheritance. Each multiple-choice item had four options (A–D) with only one correct answer.

The instrument was validated by three experts: two specialists in Social Studies Education and one expert in Measurement and Evaluation from the University of Benin. Their suggestions were used to modify ambiguous items and ensure alignment with research objectives. A pilot study involving 30 students from schools outside the sampled schools was conducted. Reliability testing using Kuder-Richardson Formula 20 (KR-20) for the knowledge test yielded a coefficient of 0.86, while Cronbach's alpha for the attitude scale yielded 0.84, indicating high reliability.

Data collection lasted for six weeks and was conducted in three phases. In the first phase, pretest was administered to determine baseline knowledge and attitude levels. In the second phase, treatment was given according to group assignment. The role-play group was taught inheritance concepts through dramatization of social and family inheritance scenarios. The simulation group was exposed to interactive simulated learning activities, while the conventional group was taught using lecture-based methods. All teaching was carried out by qualified Social Studies teachers under the supervision of the researcher. In the third phase, posttest was administered to determine the effect of the instructional strategies. Ethical approval was obtained from the Edo State Ministry of Education, and permission was granted by the principals of the selected schools. Participation was voluntary, and confidentiality of student information was ensured. Data were analyzed using descriptive statistics (mean and standard deviation) to answer research questions. Paired sample t-test, ANOVA, and Analysis of Covariance (ANCOVA) were used to test hypotheses at 0.05 level of significance using SPSS version 23.

Table 1: Design of the Study

Groups (Instructional Strategies)	Pretest	Treatment	Posttest
Role-Play Group	O_1	X_1	O_2
Simulation Group	O_1	X_2	O_2
Conventional Group	O_1	X_3	O_2

Key:
O_1 = Pretest observation for all groups
O_2 = Posttest observation for all groups
X_1 = Role-Play Strategy
X_2 = Simulation Strategy
X_3 = Conventional Strategy

Results

Hypothesis One

There is no significant difference between the pretest and posttest mean knowledge scores of students taught inheritance concepts using role-play, simulation, and conventional teaching strategies in Edo State.

Table 2: Mean and Standard Deviation of Knowledge Scores

Strategy	N	Pretest Mean	SD	Posttest Mean	SD	Mean Gain
Role-play (Simulation-based)	146	13.36	4.48	16.08	4.95	2.72
Simulation Strategy	147	14.24	3.63	18.40	4.28	4.16
Conventional Strategy	129	12.38	4.33	14.33	3.65	1.95

The data in Table 2 contains the mean and standard deviation of the pretest and posttest knowledge scores of students taught inheritance concepts using role-play, simulation, and conventional teaching strategies in Edo State. The results revealed that the simulation strategy group recorded a mean of 14.24 (SD = 3.63) at pretest and 18.40 (SD = 4.28) at posttest, giving the highest mean gain of 4.16. The role-play group had a mean of 13.36 (SD = 4.48) at pretest and 16.08 (SD = 4.95) at posttest with a mean gain of 2.72, while the conventional group obtained a mean of 12.38 (SD = 4.33) at pretest and 14.33 (SD = 3.65) at posttest with the lowest mean gain of 1.95. The findings showed that all the groups recorded higher posttest mean knowledge scores compared to their pretest scores, indicating improvement in students' knowledge after treatment. The simulation teaching strategy was the most effective, followed by role-play strategy, while the conventional strategy was the least effective in improving students' knowledge of inheritance concepts.

To test hypothesis one, paired sample t-test statistics was used as follows.

Table 3: Paired Sample t-test Summary of Knowledge Scores

Strategy	N	Mean	SD	df	tcal	Sig (2-tailed)
Role-play/Simulation	146	2.72	7.43	145	4.409	.000
Simulation Strategy	147	4.16	5.71	146	8.84	.000
Conventional Strategy	129	1.95	6.00	128	3.68	.000

Table 3 contains the repeated measures t-test analysis of students' knowledge scores at pretest and posttest. The results showed that role-play/simulation strategy at df = 145 produced t = 4.409, p = .000; simulation strategy produced t = 8.84, p = .000; and conventional strategy produced t = 3.68, p = .000 at 0.05 alpha level. Since the p-values (.000) are less than 0.05, the null hypothesis is rejected. This means there is a significant difference between pretest and posttest knowledge scores of students taught inheritance concepts using the teaching strategies. The simulation strategy produced the highest mean gain, indicating superior effectiveness in knowledge improvement.

Hypothesis two

There is no significant difference between the pretest and posttest mean attitude scores of students taught inheritance concepts using the teaching strategies in Edo State.

Table 4: Mean and Standard Deviation of Attitude Scores

Strategy	N	Pre-Attitude Mean	SD	Post-Attitude Mean	SD	Mean Gain
Role-play (Simulation-based)	146	54.96	6.96	58.10	6.33	3.14
Simulation Strategy	147	58.89	4.92	59.06	4.88	0.17
Conventional Strategy	129	57.19	6.65	58.55	5.58	1.36

The data in Table 4 contains the mean and standard deviation of the pre-attitude and post-attitude scores of students taught inheritance concepts using role-play, simulation, and conventional teaching strategies in Edo State. The results revealed that the role-play (simulation-based) group obtained a mean of 54.96 (SD = 6.96) at pretest and 58.10 (SD = 6.33) at posttest, giving the highest mean gain of 3.14. The conventional group recorded a mean of 57.19 (SD = 6.65) at pretest and 58.55 (SD = 5.58) at posttest with a mean gain of 1.36, while the simulation strategy group had a mean of 58.89 (SD = 4.92) at pretest and 59.06 (SD = 4.88) at posttest with the lowest mean gain of 0.17. The findings showed that all groups recorded higher posttest attitude scores compared to their pretest scores, indicating improvement in students' attitude after treatment. The role-play strategy was the most effective in improving students' attitude, followed by the conventional strategy, while the simulation strategy was the least effective.

To test hypothesis two, paired sample t-test statistics was used.

Table 5: Paired Sample t-test Summary of Attitude Scores

Strategy	N	Mean	SD	df	tcal	Sig (2-tailed)
Role-play/Simulation	146	3.14	9.32	145	4.08	.000
Simulation Strategy	147	0.17	7.46	146	0.28	.783
Conventional Strategy	129	1.36	8.69	128	1.77	.079

Table 5 contains the paired sample t-test analysis of students' attitude scores after being taught inheritance concepts using role-play/simulation, simulation, and conventional teaching strategies in Edo State. From the results, the role-play/simulation group at degree of freedom 145 recorded a calculated t-value of 4.08 and a significance value of .000, which is significant at 0.05 alpha level. The simulation strategy group at degree of freedom 146 obtained a calculated t-value of 0.28 and a significance value of .783, which is not significant at 0.05 alpha level. For the conventional strategy group, at degree of freedom 128, the calculated t-value was 1.77 with a significance value of .079, which is also not significant at 0.05 alpha level. Therefore, the null hypothesis is rejected for the role-play/simulation strategy, indicating a significant difference between pretest and posttest attitude scores. However, the hypothesis is accepted for simulation and conventional strategies, showing that these strategies did not produce significant changes in students' attitude scores.

Hypothesis Three

There is no significant difference in knowledge scores based on sex among students taught inheritance concepts using the teaching strategies in Edo State.

Table 6: Knowledge Scores by Sex

Strategy	Sex	N	Pretest Mean	Posttest Mean	Mean Gain
Role-play Strategy	Male	68	12.99	17.07	4.03
Role-play Strategy	Female	78	13.69	15.21	1.52
Simulation Strategy	Male	93	14.44	18.05	3.61
Simulation Strategy	Female	54	13.89	19.00	5.11
Conventional Strategy	Male	46	13.37	14.35	0.98
Conventional Strategy	Female	83	11.83	14.31	2.48

Table 6 contains the mean scores of students' knowledge performance based on sex after being taught inheritance concepts using role-play, simulation, and conventional teaching strategies in Edo State. The results revealed that in the role-play strategy group, male students recorded a pretest mean of 12.99 and a posttest mean of 17.07 with a mean gain of 4.03, while female students had a pretest mean of 13.69 and a posttest mean of 15.21 with a mean

gain of 1.52. In the simulation strategy group, male students obtained a mean gain of 3.61, whereas female students recorded the highest mean gain of 5.11. For the conventional strategy group, male students recorded a mean gain of 0.98, while female students recorded a mean gain of 2.48. The results show that the simulation strategy was more effective for female students, while role-play strategy improved male students' knowledge more than female students in some cases. To test the hypothesis on knowledge difference based on sex, Analysis of Covariance (ANCOVA) was considered appropriate and was used for further analysis.

Table 7: ANCOVA of Knowledge Scores Based on Sex

Source	SS	df	MS	F	Sig	Partial Eta Squared
Corrected Model	1468.878	6	244.813	13.334	.000	.162
Intercept	12145.146	1	12145.146	661.516	.000	.614
Pretest Covariate	153.155	1	153.155	8.342	.004	.020
Sex	1422.417	5	284.483	15.495	.000	.157
Error	7619.216	415	18.360			

Table 7 presents the Analysis of Covariance (ANCOVA) of students' knowledge scores based on sex. The result shows that the corrected model was significant, $F(6, 415) = 13.33$, $p = .000$, partial $\eta^2 = .162$, indicating that sex and the covariate jointly influenced students' knowledge scores. The intercept was also significant, $F(1, 415) = 661.52$, $p = .000$, partial $\eta^2 = .614$. The pretest covariate significantly influenced knowledge scores, $F(1, 415) = 8.34$, $p = .004$, partial $\eta^2 = .020$, showing that students' pretest performance contributed to their posttest knowledge scores. Similarly, sex had a significant effect on knowledge scores, $F(5, 415) = 15.50$, $p = .000$, partial $\eta^2 = .157$.n The result therefore indicates that there is a significant difference in knowledge scores based on sex among students taught inheritance concepts using the teaching strategies. The effect size suggests a moderate influence of sex on students' knowledge achievement. The error term recorded a mean square value of 18.36 with 415 degrees of freedom.

Hypothesis Four

There is no significant difference in attitude scores based on sex among students taught inheritance concepts using the teaching strategies in Edo State.

Table 8: Attitude Scores by Sex

Strategy	Sex	N	Pre-Attitude	Post-Attitude	Mean Gain
Role-play Strategy	Male	68	54.34	57.19	2.85
Role-play Strategy	Female	78	55.50	58.90	3.40
Simulation Strategy	Male	93	58.97	59.25	0.28
Simulation Strategy	Female	54	58.76	58.74	0.02
Conventional Strategy	Male	46	57.37	58.83	1.46
Conventional Strategy	Female	83	57.10	58.40	1.30

Table 8 presents the mean attitude scores of students taught inheritance concepts using the teaching strategies by sex. The result shows that in the role-play strategy group, males had a pre-attitude mean of 54.34 and a post-attitude mean of 57.19, giving a mean gain of 2.85. Their female counterparts had a pre-attitude mean of 55.50 and a post-attitude mean of 58.90, with a mean gain of 3.40. In the simulation strategy group, males recorded a pre-attitude mean of 58.97 and a post-attitude mean of 59.25, resulting in a mean gain of 0.28. The females had a pre-attitude mean of 58.76 and a post-attitude mean of 58.74, giving a mean gain of 0.02. For the conventional strategy group, males had a pre-attitude mean of 57.37 and a post-attitude mean of 58.83, producing a mean gain of 1.46. The females recorded a pre-attitude mean of 57.10 and a post-attitude mean of 58.40, with a mean gain of 1.30. The result indicates that the role-play strategy improved female students' attitude slightly more than males, while the simulation and conventional strategies showed marginally higher attitude gains for males. To determine the significance of the observed differences in attitude scores based on sex, preliminary analysis using t-test statistics showed $t = 0.251$, $df = 420$, $p = .802$, which was not significant at the 0.05 level. Since there was no significant difference at pre-attitude, One-Way Analysis of Variance (ANOVA) was used to test hypothesis four.

To test hypothesis four, One Way ANOVA was used.

Table 9: ANOVA of Post-Attitude Scores

Source	SS	df	MS	F	Sig
Between Groups	187.358	5	37.472	1.186	.315
Within Groups	13145.865	416	31.601		
Total	13333.223	421			

Table 9 shows the ANOVA analysis of post-attitude scores of students taught inheritance concepts using the teaching strategies in Edo State. The result indicates that there was no significant difference in post-attitude scores among the groups, $F(5, 416) = 1.186$, $p = .315$, which is not significant at the 0.05 level of significance. Therefore, the null hypothesis of no significant difference is accepted. This implies that the teaching strategies did not significantly influence students' post-attitude scores based on sex among students taught inheritance concepts.

Discussions

The findings of this study revealed that students taught inheritance concepts using role-play, simulation, and conventional teaching strategies recorded significant improvement in knowledge scores from pretest to posttest. Among the instructional strategies, simulation strategy produced the highest mean gain in knowledge, followed by role-play strategy, while the conventional teaching strategy recorded the least improvement. This suggests that activity-based instructional methods were more effective in promoting cognitive understanding of inheritance concepts than teacher-centred instruction. This finding is consistent with the study of Banet and Ayuso (2021) and Shuaib et al. (2023) who reported that students' knowledge of inheritance concepts improved significantly when taught using structured conceptual teaching strategies. Similarly, Pacaci et al. (2024). observed that students exposed to interactive teaching approaches demonstrated higher conceptual understanding compared to those taught using traditional methods.

The result also indicated that role-play and simulation strategies enhanced students' attitude toward inheritance concepts, although the magnitude of improvement varied across groups. The role-play strategy produced the highest attitude gain, suggesting that dramatization and interactive participation promote positive learning disposition. This finding supports the work of Bizimana et al. (2022), who found that activity-based instructional strategies significantly improved students' attitudes toward learning. In the same vein, Ojo (2025) reported that constructive and interactive learning strategies positively influence students' attitude toward science-related concepts. The improvement in attitude may be attributed to the learner-centred nature of role-play and simulation strategies, which increase motivation, interest, and classroom engagement.

Regarding sex differences, the study revealed a significant difference in knowledge scores based on sex among students taught inheritance concepts using the instructional strategies. Female students recorded slightly higher knowledge gains in some groups, particularly under simulation strategy, while male students performed better in role-play activities in certain cases. This finding is supported by Rippon et al. (2023), who reported that biological and cognitive differences may influence learning patterns between male and female students. Similarly, Wood and Eagly (2020) explained that social and communication differences between sexes may contribute to variations in learning behaviour and academic performance.

However, the study found no significant difference in attitude scores based on sex among students taught inheritance concepts. This implies that role-play, simulation, and conventional teaching strategies influenced students' attitudes similarly regardless of sex. This finding aligns with Reilly, Neumann, and Andrews (2022), who reported minimal gender differences in academic attitudes when learners are exposed to effective instructional strategies. Contrary to this finding, Westbrook and Schilt (2022) stated that learning outcomes are more strongly influenced by instructional quality than by sex differences.

Conclusion

Based on the findings of this study, it is concluded that role-play and simulation instructional strategies are effective in improving students' knowledge and attitude toward inheritance concepts in Social Studies. The simulation strategy was the most effective in enhancing knowledge acquisition, while role-play strategy showed stronger influence on students' attitude development. The study also established that sex had a significant effect

on knowledge achievement but did not significantly influence students' attitude toward inheritance concepts. Overall, learner-centred instructional strategies were found to be more effective than conventional teaching methods in promoting meaningful learning.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. Social Studies teachers should adopt role-play and simulation instructional strategies in teaching inheritance concepts to enhance students' understanding and engagement.
2. Curriculum planners should integrate activity-based instructional approaches into the Social Studies curriculum to promote experiential learning.
3. School administrators should provide instructional resources and learning support materials needed for effective implementation of role-play and simulation strategies.
4. Teachers should encourage equal participation of male and female students during classroom activities to promote inclusive learning.
5. Educational authorities should organize professional development programmes to train Social Studies teachers on the effective use of interactive teaching strategies.

References

Abudulai, I. (2020). Social studies teachers' instructional techniques knowledge and its impact on learners' attitudes, values and skills in senior high schools. *Social Studies Research Journal, 7*(2), 45–60.

Afolabi, A. A., & Okunloye, R. W. (2024). Effects of role-play and guided-inquiry strategies on the performance of upper basic social studies students. *African Journal of Educational Management, 25*(1), 12–36.

Akudo, F. U. (2025). Teachers' utilization of computer animation for managing pre-primary school pupils' social skills in Delta State. *African Journal of Educational Management, Teaching and Entrepreneurship Studies, 6*(1), 88–101.

Aladwan, S. (2024). The effectiveness of using role play strategy in teaching history for sixth-grade students. *Evolutionary Studies in Imaginative Culture, 8*(1), 141–156.

Amuah, U. (2021). *Assessing the pedagogical content knowledge of religious and moral education teachers at basic schools in the Komenda-Edina-Eguafo-Abrem Municipality* (Master's thesis). University of Cape Coast.

Anderson, L. W., & Krathwohl, D. R. (2021). *A taxonomy for learning, teaching, and assessing*. Pearson.

Banet, E., & Ayuso, E. (2000). Teaching genetics at secondary school: A strategy for teaching about the location of inheritance information. *Science Education, 84*(3), 313–351.

Bizimana, E., Mutangana, D., & Mwesigye, A. (2022). Enhancing students' attitude towards biology using concept mapping and cooperative mastery learning instructional strategies: Implication on gender. *LUMAT: International Journal on Math, Science and Technology Education, 10*(1), 242–266.

Cochran, D. J. (2015). *Drama and history: Teaching historical thinking through role-play* (Doctoral dissertation). University of Wisconsin–Madison.

Gbindé, T., Shamija, A., & Garba, F. (2025). Effects of role-play and service-learning strategies on students' attitude and academic performance in social studies. *BSU Journal of Education, 25*(2), 102–115.

Hattie, J. (2020). *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*. Routledge.

Jones, J. C., & Washko, S. (2022). More than fun in the sun: The pedagogy of field trips improves student learning in higher education. *Journal of Geoscience Education, 70*(3), 292–305.

Lawani, E. (2025). Effects of two modes of digital storytelling instructional strategies on pupils' achievement and attitude towards Social Studies in Osogbo, Osun State, Nigeria. *Preprints, 2025*(1), 1–21.

Nathasabilla, N., & Ratnawati, N. (2025). The effect of historical thinking-based role playing on local history learning outcomes. *Jurnal Pendidikan Ilmu Sosial, 34*(1), 55–66.

Nkok, E., & Anietie, E. (2022). Interaction effect of gender and teaching methods on students' interest, achievement and retention in sexual reproduction in plant. *International Journal of Innovative Social & Science Education Research, 10*(4), 56–65.

Oba, A. I., Mahmud, W. A., & Mustapha, Y. (2020). Availability of, attitude and proficiency of agricultural science teachers in the use of information and communication technology in Dutse Metropolis, Jigawa State. *Journal of Curriculum and Instruction, 13*(1), 34–43.

Obro, S., Ogheneakoke, C. E., & Akpochafo, W. P. (2022). Effective social studies pedagogy: Effect of simulation games and brainstorming strategies on students' learning outcome. *International Journal of Learning, Teaching and Educational Research, 20*(3), 1–13.

Ojo, A. T. (2025). Situated learning and biology education: Effects of constructive controversy strategy and genetics self-efficacy on secondary school students' attitude to genetics concepts. *Cadernos de Educação Tecnologia e Sociedade, 18*(3), 747–763.

Ojoko, B. A. (2019). *Effects of fantasy and role-play instructional strategies on primary two pupils' acquisition of expressive and social skills* (Unpublished doctoral dissertation). University of Ibadan, Nigeria.

Onyekpe, S. J., & Ogbemudiare, B. (2025). Effectiveness of field trip learning instructional strategy on achievement in Social Studies among primary school pupils in Delta State. *Kontagora International Journal of Educational Research, 2*(1), 308–323.

Pacaci, C., Ustun, U., & Ozdemir, O. F. (2024). Effectiveness of conceptual change strategies in science education: A meta-analysis. *Journal of Research in Science Teaching, 61*(6), 1263–1325.

Reilly, D., Neumann, D. L., & Andrews, G. (2022). Gender differences in academic achievement: A meta-analysis. *Psychological Bulletin, 148*(1), 1–26.

Rippon, G., Jordan-Young, R., Kaiser, A., & Fine, C. (2023). Recommendations for sex/gender neuroimaging research: Key principles and implications for research design. *Frontiers in Human Neuroscience, 17*, Article 682782.

Schunk, D. H. (2020). *Learning theories: An educational perspective* (8th ed.). Pearson.

Shuaib, S. B., Adesanya, E. O., Oba, A. I., Afolabi, K. O., & Jimoh, S. B. (2023). Assessing agricultural literacy among senior school students in Kwara, Nigeria: Implication for educational interventions. *Indonesian Journal of Curriculum and Educational Technology Studies, 11*(1), 1–8.

Ukanah, I. A. (2023). The effectiveness of an activity-based education technique using a role-playing analogy in improving students' conceptual grasp of hydrocarbon. *Educational Practice Journal, 1*(1), 45–59.

Westbrook, L., & Schilt, K. (2022). Distinguishing between sex and gender: History, current conceptualizations, and implications. *Gender & Society, 36*(3), 421–447.

Wood, W., & Eagly, A. H. (2020). Biosocial construction of sex differences and similarities in behavior. *Advances in Experimental Social Psychology, 62*, 1–60.