



Problem-Solving and Computer-Based Learning Strategies On Secondary School Students' Academic Performance in Social Studies in Kogi State, Nigeria

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Abstract

This study investigated the effects of problem-solving and computer-based learning strategies on secondary school students' academic performance in Social Studies in Kogi State, Nigeria. Employing a quasi-experimental research design, the study targeted all secondary school students in the region. Using simple random sampling, one government and one private secondary school were selected, yielding a sample of 432 students (148 males and 284 females). The Social Studies Performance Test (SSPT) served as the data collection instrument. The analysis utilized descriptive statistics and ANCOVA to examine the differences in academic performance between students taught using problem-solving strategies, computer-based learning strategies, and conventional methods. The findings revealed significant differences in the mean performance of students taught with problem-solving strategies compared to those taught with conventional methods. Similarly, students taught with computer-based learning strategies performed significantly better than those taught with conventional methods. A comparison between problem-solving and computer-based learning strategies also showed significant differences in performance, indicating that both strategies are effective but have distinct impacts. Furthermore, the study found that gender significantly moderated the effects of these instructional strategies, with notable differences in performance between male and female students across the different teaching methods. The results suggest that both problem-solving and computer-based learning strategies significantly enhance students' academic performance in Social Studies. Additionally, gender plays a critical role in moderating the effectiveness of these strategies. Based on these findings, the study recommends integrating problem-solving activities across various subjects to foster critical thinking and analytical skills, which are beneficial both academically and in real-world scenarios. The study underscores the importance of adapting instructional strategies to maximize educational outcomes and address gender-based differences in performance.

Keywords: Problem-solving, computer-based learning, academic performance, gender, Social Studies Education

Introduction

Education is a vital tool to change the world positively. The way and manner knowledge is transmitted is also very expedient as it goes a long way to determine whether the goal of creating positive change is achieved. And this can only be done through methods and techniques of teaching. The educational landscape is continually evolving with the integration of technology and innovative teaching methods (Azuka, 2019). In recent years, there has been a growing interest in exploring the impact of problem-solving and computer-based learning strategies on students' academic performances. This research aims to investigate how these two teaching approaches can enhance academic performance in the specific context of Social Studies education at the secondary school level.

Each student has a unique learning style, and traditional one-size-fits-all teaching approaches may not cater to diverse learning preferences. Some students might thrive in interactive and hands-on learning environments, while others may prefer visual or auditory learning methods (Lawal & Abdullahi, 2022). Problem-solving approaches in Social Studies education encourage students to actively participate in the learning process. Through engaging activities, simulations, and real-life scenarios, students can apply their knowledge to practical situations (Chang, 2022). This process promotes higher-order thinking skills, such as analysis, synthesis, and evaluation, which are essential for understanding complex Social Studies concepts and developing a deeper understanding of historical events societal issues and technological development (Williams, 2023).

Conceptual Clarification

Social Studies is an aspect of education that is concerned with all round development of human being to enable human live a fulfilled, comfortable and full of performance life. It studies human being in relation to the social, academic, economic, cultural, physical and psychological lives. It has to do with all round development of human beings to enable them become useful citizens in the society. Anderson (2022) posit Social Studies as those portions of the social sciences selected for instructional purpose applied to include anything pertinent to the immediate purpose of learning and adapted to the level of comprehension of the students. Social Studies is a crucial subject in secondary education as it equips students with essential knowledge about society, culture, history, economics, and political systems. However, it is often observed that students face challenges in comprehending and retaining complex Social Studies concepts.

Concept of Problem-Solving/Computer Based-Learning Strategies

Problem-solving is an active learning approach that encourages students to think critically, analyze information, and develop innovative solutions to real-world issues. By incorporating problem-solving activities in Social Studies lessons, educators can create dynamic learning experiences that foster students' analytical skills, decision-making abilities, and collaborative competencies (Chen, 2022). It is believed that problem-solving strategies can empower students to become active participants in their education, leading to improved academic performance (Imoko, 2022). According to Keller, (2022) traditional teaching methods often rely on lectures, rote memorization, and textbook-based learning, which may fail to captivate students' interest and curiosity. As a result, students might disengage from the learning process, leading to lower academic performance.

Advancements in technology have opened up new avenues for educational delivery. Computer-based learning refers to the integration of digital tools, software, and multimedia resources into the teaching and learning process (Voyer, Voyer & Bryden, 2020). With the aid of interactive simulations, virtual field trips, and engaging multimedia content, students can grasp Social Studies concepts in a more interactive and immersive manner (Ayodeji, 2019). The individualized nature of computer-based learning also allows students to progress at their own pace, catering to diverse learning styles and preferences (Abimbade, 2019).

Consequently, despite the potential benefits of these innovative teaching strategies, there is a need to address what is responsible for poor academic performance in Social Studies. The recent Basic Education Certificate Examination (BECE, 2018-2023) examiner reports for Social Studies in secondary schools has raised concerns about the poor performance of students. This has prompted a closer examination of the teaching methods and instructional techniques employed in classrooms, leading to the identification of potential areas for improvement. The examiner reports highlights worrying trend in students' performance in Social Studies, indicating that traditional teaching methods may not be effectively engaging students. The reliance on traditional lecture-based method might not be conducive to active learning and critical thinking, contributing to performance in examinations. It is imperative to address the root causes of poor performance in Social Studies and embracing innovative teaching methods, such as problem-solving techniques and computer-based learning, can revolutionize the educational experience. Problem-solving techniques encourage students to apply theoretical knowledge to real-world scenarios. This method not only deepens their understanding of Social Studies concepts but also cultivates analytical skills.

Objectives of the Study

The specific objectives of this study are to:

1. Determine the difference between the performance scores of students taught using problem-solving and computer-based learning strategies
2. Examine the interaction effects of the strategies and gender on students' performance in Social Studies secondary school students

Research Questions

The following research questions were formulated to guide the study;

1. What are the difference in mean performance scores of Social Studies students taught using problem-solving strategy and those taught using computer-based learning strategy?
2. What are the interaction effects of the teaching methods and gender on students' performance in Social Studies?

Research Hypotheses

Ho₁: There is no significant difference between the mean performance scores of students taught Social Studies using problem-solving strategy and those taught using computer-based learning strategy

Ho₂: There is no significance interaction effect of teaching methods and gender on mean performance score of students in Social Studies

Methodology

Multi-sampling technique was used to select three public secondary schools in Kogi State. Firstly, purposive sampling techniques were used to select 10 secondary schools from each of the three senatorial district giving a total of 30. All the schools selected have the same characteristics in terms of quality of teachers', infrastructure facilities and instructional materials. The second stage involved simple random sampling techniques to select one school from each of the senatorial zone. The third stage involved use of simple random sampling techniques by

tossing of coin to choose the schools for the two experimental group and control group. Four hundred and thirty two (432) students including one hundred and forty eight (148) males and two hundred and eighty four (284) female were random selected from the three selected secondary schools in Dekina Local Government Area.

Result of the Findings

Table 1: Pretest and Posttest mean performance of Social Studies students taught using problem-solving strategy and those taught using computer-based learning strategy

Group	N	Pre-test		Post-test		Mean Gained Scores	Mean different
		$\bar{X}$	SD	$\bar{X}$	SD		
Problem-solving	216	31.71	1.21	57.99	1.27	26.28	More effective
Computer-based Learning Strategies	216	36.13	1.42	54.87	1.27	18.74	

Table 1 presents a comparison of the performance of Social Studies students taught using problem-solving strategies versus those taught with computer-based learning strategies. The pre-test scores indicate that students in the computer-based learning group (36.13) began with a higher performance level than those in the problem-solving group (31.71). However, the post-test results reveal a striking difference in outcomes: the problem-solving group achieved a mean post-test score of 57.99, significantly exceeding the computer-based group's post-test score of 54.87. Additionally, the mean gain scores highlight that the problem-solving strategy resulted in a gain of 26.28, compared to the 18.74 gain from the computer-based approach. This suggests that the problem-solving method is more effective in fostering substantial academic improvement in Social Studies. The implications of these findings emphasize the effectiveness of active learning strategies, such as problem-solving, in enhancing student performance. While both teaching methods yield positive outcomes, the superior mean gain observed in the problem-solving group suggests that deep engagement with content through critical thinking and collaborative problem-solving leads to greater learning gains. This insight encourages educators to prioritize and integrate problem-solving techniques in their curricula, as they may better equip students with the skills necessary for understanding complex social studies concepts and applying them to real-world situations.

Table 2: Pretest and Posttest mean performance score on the effects of the teaching method and gender on students' performance in Social Studies

Method	Group	N	Pre-test		Post-test		Gained Mean	Mean different	Remark
			$\bar{X}$	SD	$\bar{X}$	SD			
Problem-solving Computer-based Learning Strategies	Male	74	43.05	0.87	47.96	1.16	4.91	0.6	Most effective
	Female	142	51.97	0.67	56.28	1.22	4.31		
	Male	74	42.95	0.82	49.12	1.19	6.17	9.62	
	Female	142	44.03	0.81	59.82	1.25	15.79		

Table 2 examines the interaction effects of teaching method and gender on students' performance in Social Studies. The data reveals that in the problem-solving group, male students

had a pre-test mean of 43.05 and a post-test mean of 47.96, resulting in a gain of 4.91. In contrast, female students in the same group started with a higher pre-test mean of 51.97 and achieved a post-test mean of 56.28, leading to a gain of 4.31. This indicates that both male and female students benefitted from the problem-solving approach, but female students maintained a higher overall performance. Conversely, in the computer-based learning group, male students had a pre-test mean of 42.95 and a post-test mean of 49.12, resulting in a gain of 6.17. Female students, however, showed a more substantial improvement, moving from a pre-test mean of 44.03 to a post-test mean of 59.82, with a gain of 15.79. This demonstrates that female students excelled more significantly in the computer-based learning environment. The implications of these findings suggest that while both teaching methods have their merits, female students may experience a more pronounced benefit from computer-based learning strategies, highlighting an effective approach for their engagement and performance in Social Studies. The overall interaction effects indicate that gender plays a critical role in how students respond to different instructional methods. Educators should consider these dynamics when designing lessons, recognizing that tailored approaches may be necessary to optimize learning experiences for both male and female students.

Hypotheses One: ANCOVA on the mean performance of students taught Social Studies using problem-solving strategy and those taught using computer-based learning strategy

Tests of Between-Subjects Effects

Dependent Variable: convention						
Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	171.077 ^a	11	15.552	89.326	.000	.891
Intercept	486.511	1	486.511	2794.309	.000	.959
CBLS	15.146	4	3.786	21.748	.000	.420
PS	19.360	4	4.840	27.799	.000	.481
CBLS * PS	.743	3	.248	1.423	.000	.891
Error	20.893	430	.174			
Total	1368.000	432				
Corrected Total	191.970	431				

a. R Squared = .891 (Adjusted R Squared = .881)

This table presents the results of an ANCOVA analysis comparing the mean performance of students taught Social Studies using problem-solving strategies versus those taught with computer-based learning strategies. The analysis reveals a significant effect of both teaching methods on student performance, with F-values of 21.748 for computer-based learning strategies (CBLS) and 27.799 for problem-solving (PS), both with p-values (Sig.) of .000, indicating strong statistical significance. Additionally, the interaction term (CBLS * PS) also shows significance, albeit with a lower F-value of 1.423. The Partial Eta Squared values (0.420 for CBLS and 0.481 for PS) suggest that both teaching methods explain a substantial portion of the variance in student performance, with the overall model explaining approximately 89% of the variance (R Squared = .891). The implications of these findings are crucial for instructional practices in Social Studies education. The significant differences in performance highlight that both problem-solving strategies and computer-based learning are effective teaching methods, each contributing positively to student outcomes. However, the results also suggest that the

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interaction between these methods may have a complex effect on performance, indicating that combining elements from both strategies could enhance learning further. Educators should consider integrating these approaches to maximize student engagement and achievement, leveraging the strengths of each method to create a more dynamic and effective learning environment.

Hypotheses Two: ANCOVA on the mean performance of male and female students taught Social Studies with teaching method

Tests of Between-Subjects Effects

Dependent Variable: PSCBLS

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	12.275 ^a	1	12.275	18.004	.000	.122
Intercept	3049.093	1	3049.093	4472.126	.000	.972
PS	13.369	3	3.323	11.311	.000	.259
CBLS	14.490	4	3.786	21.141	.000	.420
PS*CBLS*gender	12.275	1	12.275	18.004	.000	.122
Error	88.634	430	.682			
Total	3282.000	432				
Corrected Total	100.909	431				

a. R Squared = .122 (Adjusted R Squared = .115)

The ANCOVA results for the interaction effect of teaching methods and gender on the mean performance score in Social Studies reveal significant findings. The F-value for the interaction term between Problem-Solving Strategy (PS), computer-based learning strategy (CBLS), and gender (PSCBLS gender) is 18.004, with a significance level of .000. This low significance level indicates a statistically significant interaction effect, meaning that the combined influence of teaching methods and gender significantly impacts student performance. The partial eta squared value for this interaction term is 0.122, suggesting that approximately 12.2% of the variance in performance scores is attributed to the interaction effect, which represents a moderate effect size. The R squared value of .122 (with an adjusted R squared of .115) indicates that around 12.2% of the variance in the mean performance scores is explained by the model, reflecting a substantial but limited portion of the total variance. These results imply that the interaction between teaching methods and gender plays a significant role in influencing student performance, indicating that the effectiveness of teaching methods varies between male and female students. Therefore, it is crucial to consider both the teaching method and gender when evaluating performance outcomes in Social Studies.

Discussion of Findings

This findings show that, there is significant difference between the mean performances of students' taught Social Studies using problem-solving strategy versus computer-based learning strategy. Both teaching methods individually and in combination significantly affect students' academic performance in Social Studies.

There is significance difference between the mean performance of male and female students taught with problem-solving strategy with others taught with computer-based learning

strategy. Therefore, gender does have a significant effect on the academic performance of students taught with these strategies.

Conclusion

Bases on the findings, the study concludes that problem-solving and computer-based learning strategies are both highly effective methods for enhancing students' academic performance in Social Studies. These strategies also positively impact student interaction, although their combined use does not yield additional benefits in this regard. Gender differences should be considered when implementing these strategies, as they can influence how students respond to and benefit from instructional approaches in Social Studies. These conclusions support the integration of problem-solving and computer-based learning strategies into Social Studies education, tailored to consider gender-specific learning needs and preferences.

Recommendations

1. Offer ongoing professional development programs for teachers focused on effective implementation of problem-solving and computer-based learning strategies. Provide opportunities for educators to learn new instructional techniques, enhance technological proficiency, and share best practices.
2. Recognize and address gender differences in learning preferences and outcomes. Implement differentiated instruction strategies that cater to diverse learning styles and interests, ensuring equitable educational experiences for all students.
3. Emphasize the importance of technological literacy among students by integrating computer-based learning strategies into curriculum planning. Provide access to technology-rich environments that support interactive and collaborative learning experiences.
4. Educators should adopt inclusive teaching practices that consider both male and female students' strengths and preferences. This may involve offering varied learning activities, providing opportunities for collaborative learning, and using instructional technologies that appeal to different learning styles.

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