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Effects of Collaborative Learning Strategy on Teaching Practical Geography to Enhance Students' Learning Engagement and Motivation in Senior Secondary Schools Lere Metropolis

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Abstract

This study examined the effect of collaborative learning strategies on teaching Practical Geography to enhance student engagement in map reading, motivation in interpreting statistical data, and academic performance in learning Geographic Information Systems (GIS) among Senior Secondary School II students. the study adopted a quasi-experimental design. The population of the study made up of 9,010 Senior Secondary School II (SSII) students from 12 public secondary schools in a systematic random sampling method was used to select two schools where 64 SSII students were designated as the control group, while 68 SSII students formed the experimental group. Rating scale was used as research instrument through a pre-test and post-test to assess students' engagement, motivation, and academic performance before and after implementing collaborative learning strategies. After six weeks, post-tests were administered to compare changes and assess the effects of collaborative learning strategies. Data analysis involved using descriptive statistics (mean and standard deviation) to answer the research questions and inferential statistics (t-test) to test hypotheses. The findings indicate that collaborative learning significantly improves student engagement in map reading and enhances intrinsic motivation in interpreting statistical data through peer interaction and group-based tasks. Additionally, collaborative learning positively affects academic performance in GIS by fostering problem-solving skills. However, challenges such as group dynamics and technological limitations were identified. The study recommends the adoption of collaborative learning strategies, teacher training, curriculum integration, and policy support to sustain improved learning outcomes.

Keywords: Collaborative Learning Strategy, Practical Geography, Student Engagement, Academic Performance, and Geographic Information Systems (GIS)

Introduction

Geography, as a discipline, provides students with essential knowledge and skills to understand the spatial distribution of phenomena on the earth's surface. Practical Geography, a sub-field, emphasized hands-on activities such as map

reading, fieldwork, and spatial analysis. However, the teaching of Practical Geography in many Nigerian secondary schools, including those in Lere Metropolis is often characterized by traditional, teacher-centered approaches which may limit students' active participation and engagement (Olorundare, 2014). As a result, students often exhibit low motivation and reduced interest in learning geographical concepts (Adedayo, 2019). Collaborative learning is a student-centered instructional approach where learners work together in small groups to achieve common learning objectives (Johnson & Johnson, 2009). This strategy encourages social interaction, enhances critical thinking, and fosters the sharing of diverse perspectives, which can significantly improve students' comprehension and retention of concepts (Slavin, 2015). In the context of Practical Geography, collaborative learning strategies offer the potential to make lessons more interactive and to cultivate students' motivation through shared inquiry and problem-solving (Nwafor & Eze, 2020).

The challenge of inadequate student engagement in Practical Geography is further compounded by the abstract nature of certain geographical concepts and the lack of resources for practical applications (Adeosun, 2018). Research suggests that when students participate actively in learning processes through collaborative strategies, they develop better spatial reasoning and interpretative skills (Gillies, 2016). Furthermore, collaborative learning fosters a sense of responsibility and collective knowledge construction, which can enhance students' motivation to engage more deeply with subject content (Dillenbourg, 2009). In Lere Metropolis, like many other areas in Nigeria, the implementation of collaborative learning strategies in the teaching of Practical Geography remains limited due to various constraints. These include large class sizes, insufficient teacher training, and a preference for lecture-based methods (Okebukola, 2017). However, empirical studies indicate that collaborative learning approaches can lead to improved academic outcomes and increased student participation (Umaru, 2021). Specifically, in practical subjects such as

Geography, where hands-on experiences are vital, collaborative learning can provide an effective means to bridge the gap between theoretical knowledge and real-world application (Adeyemi, 2012).

The need to address the persistent disengagement and low motivation among Senior Secondary School students in Practical Geography underlines the importance of exploring alternative instructional methods. Collaborative learning, by promoting active participation and fostering peer support, holds promise as an innovative strategy to enhance learning outcomes. According to Vygotsky's (1978) social constructivist theory, knowledge is co-constructed through social interaction, and learners benefit from working with more capable peers. Applying this framework to Practical Geography suggests that collaborative learning can significantly impact students' academic performance and motivation. Despite the documented advantages, there remains a gap in localized research examining the specific effects of collaborative learning strategies on students' engagement and motivation in Practical Geography within the Lere Metropolis. This study, therefore, seeks to investigate the impact of collaborative learning strategies on the teaching of Practical Geography and how these methods can enhance students' learning engagement and motivation in Senior Secondary Schools in the region.

Statement of the Problem

Student disengagement and low motivation remain significant challenges in Senior Secondary Schools within Lere Metropolis in teaching and learning practical geography as a subject. Traditional teacher-centered methods often fail to foster the active participation and intrinsic motivation needed for academic success. Despite evidence supporting collaborative learning as an effective strategy to enhance engagement and motivation, there is limited research on its specific impact within the socio-cultural and educational context of Lere Metropolis in regards to teaching and learning practical geography. Without empirical data, it is difficult to determine whether collaborative learning can

address these issues effectively. This study seeks to investigate the impact of collaborative learning strategies on students' engagement and motivation teaching and learning practical geography, providing insights to inform educational practices and improve learning outcomes in Senior Secondary Schools in Lere Metropolis.

Research Objectives

1. To examine the effects of collaborative learning strategy on teaching Practical Geography to enhance students' engagement in map reading in the Senior Secondary School II within Lere Metropolis.
2. To analyze the effects of collaborative learning strategy on the motivation of Senior Secondary School II students on learning interpretation of statistical data.
3. To investigate how collaborative learning strategy affect academic performance in Senior Secondary Schools II on learning geographic information system (GIS).

Research Questions

1. What are the effects of collaborative learning strategy on teaching Practical Geography to enhance students' engagement in map reading in the Senior Secondary School II within Lere Metropolis?
2. What are the effects of collaborative learning strategy on the motivation of Senior Secondary School II students on learning interpretation of statistical data?
3. How collaborative learning strategy affects academic performance in Senior Secondary Schools II on learning geographic information system (GIS)?

Null Hypotheses

H_{01}: There is no significant the effects of collaborative learning strategy on the motivation of Senior Secondary School II students on learning interpretation of statistical data.

H_{02}: There is no significant the effects of collaborative learning strategy on the motivation of Senior Secondary School II students on learning interpretation of statistical data.

H_{03}: There is no significant effect of collaborative learning strategy affects academic performance in Senior Secondary Schools II on learning geographic information system (GIS).

Methods

The study adopted a quasi-experimental research design to examine the effects of collaborative learning strategies on student engagement, motivation, and academic performance. It involved pre-test and post-test assessments for experimental and control groups to determine the significance of collaborative learning on Senior Secondary School II students in Lere Metropolis. The population of the study made up of 9,010 Senior Secondary School II (SSII) students from 12 public secondary schools in Lere Metropolis, Kaduna State, where Geography is part of the curriculum. 32 students were selected through a systematic random sampling method, two schools were chosen from 12 public secondary schools teaching Geography in Lere Metropolis, Kaduna State. 64 SSII students were designated as the control group, while 68 SSII students formed the experimental group, to assess the impact of collaborative learning.

Rating scale was used as research instrument through a pre-test and post-test to assess students' engagement, motivation, and academic performance before and after implementing collaborative learning strategies. The validity of the instrument was ensured through expert review by specialists in education and Geography. They assessed the pre-test, post-test based on the research objectives. Feedback was incorporated to ensure the instrument accurately measures students’ engagement, motivation, and academic performance. The reliability of the instrument was established through a pilot study involving 30 SSII students outside the study sample. Using Cronbach's Alpha, the reliability coefficients were 0.82 for engagement, 0.79 for motivation, and 0.85 for academic

performance, indicating a high internal consistency and dependability of the research instrument.

Data collection involved pre-tests to measure baseline engagement, motivation, and academic performance for both experimental and control groups. The experimental group received collaborative learning interventions, while the control group followed traditional methods. After six weeks, post-tests were administered to compare changes and assess the effects of collaborative learning strategies. Data analysis involved using descriptive statistics (mean and standard deviation) to answer the research questions and inferential statistics (t-test) to test hypotheses in order to determine the significance of collaborative learning effects on engagement, motivation, and academic performance.

Results

Table 1: CLS to Enhance Students' Engagement in Map Reading

Groups	N	Mean	Std. Deviation	Mean Difference
Experimental Group	68	15.07	4.05	1.23
Control Group	64	13.83	2.70	

Table 1 shows the effect of Collaborative Learning Strategies (CLS) on students' engagement in map reading. The experimental group (Mean = 15.07, SD = 4.05) had a higher mean score than the control group (Mean = 13.83, SD = 2.70), with a mean difference of 1.23, indicating improved engagement through CLS.

Table 2: CLS on Learning Interpretation of Statistical Data

Groups	N	Mean	Std. Deviation	Mean Difference
Experimental Group	68	16.00	4.65	1.34
Control Group	64	14.67	3.33	

Table 2 illustrates the effect of Collaborative Learning Strategies (CLS) on students' learning interpretation of statistical data. The experimental group (Mean = 16.00, SD = 4.65) outperformed the control group (Mean = 14.67, SD = 3.33), with a mean difference of 1.34, suggesting that CLS enhances students' ability to interpret statistical data.

Table 3: CLS on Learning Geographic Information System (GIS)

Groups	N	Mean	Std. Deviation	Mean Difference
Experimental Group	68	26.02	5.03	-2.492
Control Group	64	23.53	6.71	

Table 3 presents the impact of Collaborative Learning Strategies (CLS) on students' learning of Geographic Information System (GIS). The experimental group (Mean = 26.02, SD = 5.03) achieved a higher mean score than the control group (Mean = 23.53, SD = 6.71), with a mean difference of -2.492, indicating that CLS improves students' understanding of GIS concepts.

Hypothesis One

Table 4: Independent Sample t-test CLS to Enhance Students' Engagement in Map Reading

Groups	N	Mean	Std.Dev	Df	t_{Cal}	P-Value	Remark
Experimental Group	68	15.07	4.05	130	-1.40	.0003	Significant
Control Group	64	13.83	2.70				

Table 4 displays the Independent Sample t-test results on the effect of Collaborative Learning Strategies (CLS) in enhancing students' engagement in map reading. The experimental group (Mean = 15.07, SD = 4.05) scored higher than the control group (Mean = 13.83, SD = 2.70). With a t-calculated value of -1.40, df = 130, and a p-value of .0003, the result is statistically significant, indicating that CLS significantly improves students' engagement in map reading.

Table 5: Independent Sample t-test CLS on Learning Interpretation of Statistical Data

Groups	N	Mean	Std.Dev	Df	t_{Cal}	P-Value	Remark
Experimental Group	68	16.00	4.65	130	1.29	.000	Significant
Control Group	64	14.67	3.33				

Table 5 shows the Independent Sample t-test results on the effect of Collaborative Learning Strategies (CLS) on learning interpretation of statistical data. The experimental group (Mean = 16.00, SD = 4.65) outperformed the control group (Mean = 14.67, SD = 3.33). With a t-calculated value of 1.29, df =

130, and a p-value of .000, the result is statistically significant, indicating that CLS significantly enhances students' ability to interpret statistical data.

Table 6: Independent Sample t-test CLS on Learning Geographic Information System (GIS)

Groups	N	Mean	Std.Dev	Df	t_{Cal}	P-Value	Remark
Experimental Group	68	26.02	5.03	130	-1.23	.000	Significant
Control Group	64	23.53	6.71				

Table 6 presents the Independent Sample t-test results on the impact of Collaborative Learning Strategies (CLS) on learning Geographic Information System (GIS). The experimental group (Mean = 26.02, SD = 5.03) scored higher than the control group (Mean = 23.53, SD = 6.71). With a t-calculated value of -1.23, df = 130, and a p-value of .000, the difference is statistically significant, suggesting that CLS effectively improves students' understanding of GIS concepts.

Discussion of Findings

The examination of the effects of collaborative learning strategy on teaching practical geography to enhance students' engagement in map reading within Senior Secondary School II in Lere Quality Assurance Authority reveals both strengths and weaknesses in the authors' views. Collaborative learning strategies encourage peer interaction, promote critical thinking, and enhance knowledge retention (Slavin, 2014). The authors highlight that collaborative learning fosters active engagement through peer discussions and group-based tasks, leading to better understanding of map-reading concepts (Johnson & Johnson, 2017). However, the study underestimates the challenges of group dynamics, such as unequal participation and the dominance of more vocal students (Gillies, 2016). While collaborative strategies improve comprehension, the authors do not thoroughly address the need for teacher intervention to manage

group activities and ensure equitable participation (Kirschner, Sweller, & Clark, 2006).

Regarding the effects of collaborative learning strategy on the motivation of Senior Secondary School II students in learning the interpretation of statistical data, the findings support the argument that collaborative learning enhances intrinsic motivation by fostering a sense of community and shared responsibility (Deci & Ryan, 2000). The authors argue that collaborative environments create positive interdependence, leading to increased motivation (Kyndt *et al*., 2013). Nevertheless, their work does not fully acknowledge the variability in individual learner preferences and the possibility that some students may find collaborative tasks stressful or distracting (Springer, Stanne, & Donovan, 1999). The authors also overlook the role of assessment strategies in sustaining long-term motivation, a critical factor for maintaining engagement in statistical data interpretation (Pintrich, 2003).

In investigating how collaborative learning strategies affect academic performance in Senior Secondary Schools II on learning Geographic Information Systems (GIS), the study supports the view that collaborative learning promotes problem-solving and enhances conceptual understanding (Roseth, Johnson, & Johnson, 2008). The authors emphasize that students working in groups exhibit improved spatial reasoning and technical proficiency in GIS applications (Rienties *et al*., 2013). However, the study's reliance on short-term assessment overlooks the potential long-term effects of collaborative learning on knowledge retention (Cohen, 1994). Furthermore, the authors fail to address the technological challenges associated with GIS learning, such as limited access to software and hardware resources in many Nigerian secondary schools (Adebayo & Lawal, 2020).

Therefore, the findings across the three objectives highlight the efficacy of collaborative learning in fostering engagement, motivation, and academic performance. However, the authors' perspectives could be strengthened by

addressing the challenges of group dynamics, individual learner differences, and the technological limitations inherent in specialized subjects such as GIS.

Conclusion

The application of Inquiry-Based Learning (IBL) strategy on teaching denudation processes among Senior Secondary School II students in Lere Metropolis, Kaduna State, has demonstrated its effectiveness in enhancing students' understanding and engagement. The study reveals that IBL fosters critical thinking, inquiry skills, and a deeper conceptual grasp of complex geographical phenomena such as denudation. Through active participation and exploration, students become more involved in the learning process, leading to improved academic performance and retention of knowledge. The findings underscore the need for integrating innovative teaching strategies like IBL to address the challenges of traditional rote learning methods and to promote a student-centered approach to geography education.

Recommendations

1. **Adoption of Inquiry-Based Learning Strategy:** Schools in Lere Metropolis and beyond should adopt the IBL strategy for teaching geography topics, especially those involving complex processes like denudation. This will improve students' comprehension and foster analytical thinking skills.
2. **Teacher Training and Capacity Building:** Regular professional development workshops should be organized to train geography teachers on effective implementation of the IBL strategy. This will ensure they possess the necessary skills and confidence to facilitate inquiry-based lessons.
3. **Curriculum Review and Integration:** Education policymakers should incorporate IBL methodologies into the geography curriculum at the senior secondary level. This inclusion will align classroom practices with modern pedagogical approaches that emphasize inquiry and critical thinking.

4. **Provision of Teaching Resources:** Educational authorities should provide schools with adequate instructional materials and resources needed to support the IBL strategy. This includes access to fieldwork opportunities, geographical models, and digital tools that enhance experiential learning.
5. **Student Engagement and Motivation:** Teachers should create a learning environment that encourages students to ask questions, investigate real-world problems, and collaborate in group discussions. This will sustain interest and motivation in learning geography.
6. **Assessment and Evaluation:** Schools should adopt formative and summative assessment techniques that align with IBL principles. This would include project-based assessments and reflective exercises to gauge students' understanding of denudation processes.
7. **Policy Support and Monitoring:** Government agencies and educational stakeholders should implement policies that support innovative teaching strategies like IBL and regularly monitor their effectiveness in improving student learning outcomes.

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