ENHANCING STUDENTS' ENGAGEMENT IN MATHEMATICS LEARNING THROUGH EXPLICIT INSTRUCTION

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ABSTRACT**:** *In this study, researchers aimed to investigate the effectiveness of explicit instruction in enhancing students' engagement in mathematics. The study was conducted at Misamis Oriental General Comprehensive High School and involved a total of 69 students from grade 10 Science Class as participants. One group of students, with 34 students, was taught using explicit instruction, while the other group, with 35 students, was taught using conventional instruction. This study utilized a quasi-experimental research design, specifically a pretest-posttest control group design. The instrument utilized to measure the level of students' engagement in mathematics was the 5-point Likert scale questionnaire, adopted from Cambayan and Tan (2022). The statistical tool used to determine the effectiveness of the instruction in the lessons presented was One-Way ANCOVA. The results from this study revealed that students who were taught using explicit instruction had significantly improved their engagement compared to those who were exposed to conventional instruction.*

Key Words : Explicit Instruction, Engagement, Mathematics

1.INTRODUCTION

In the realm of mathematics education, one of the key challenges faced by educators is enhancing students' engagement. One approach gaining attention for its potential to address these challenges is explicit instruction.

Although its meaning varies in the research literature, most would agree that explicit math instruction involves a series of teaching behaviors that include (a) the teacher modeling a new concept or skill, (b) the teacher providing guided practice opportunities, (c) the teacher checking for student understanding, (d) the teacher providing academic feedback, and (e) the students engaging in independent practice. **[1]**

While the potential of explicit instruction is recognized, it is important to acknowledge its limitations. Mathematics is often perceived as difficult and uninteresting, posing challenges in teaching and learning **[2].** Many students develop math anxiety, which hinders their ability to maintain interest and actively participate in mathematics lessons. Consequently, students may become disengaged, leading to limited progress in developing their problem-solving abilities **[3].**

Student engagement, as defined by **[4],** refers to the willingness and effort of students to actively participate in school activities, leading to successful outcomes. It is measured across three domains: cognitive engagement, affective engagement, and behavioral engagement **[5].** Cognitive engagement reflects students' willingness and effort in tackling learning tasks, indicating their active involvement and mental investment in the learning process **.** Behavioral engagement encompasses actions such as attention, participation, and completion of assigned work. Affective engagement relates to students' emotional connection and interest in the subject matter **[5,4].**

A significant challenge faced by teachers is the lack of student engagement in mathematics. This is often attributed to the perception that mathematics is inherently complicated, leading to a widespread phobia among students towards the subject **[6].**Consequently, students become less participative in mathematics classrooms, resulting in poor achievement outcomes and difficulty in comprehending even simple mathematical problems. They may also exhibit hesitancy to actively participate in math activities

These limitations highlight the need for further investigation into the effectiveness of explicit instruction in enhancing students' engagement and problem-solving skills in mathematics learning. By conducting this research, we seek to contribute valuable insights to the field of mathematics education and address the existing gaps and limitations of this approach.

2. METHODOLOGY

2.1 Research Design

This study utilized quasi-experimental research design specifically pretest-posttest control group design. The design required two sections that were randomly assigned, one was designated as an experimental group while the other was the control group. The experimental group received explicit instruction in mathematics, while the control group received conventional instructions following the standard K-12 curriculum. The research was designed to investigate the effectiveness of explicit instruction in enhancing students' engagement in mathematics learning and used quantitative data analysis for data collection

2.2 The Instruments

The 5-point Likert scale for student engagement questionnaire adopted from [5]. The evaluation of the students' engagement was determined using the 5-point Likert scale adopted from [5]. It is a 26- item Likert scale with answers on five-point scale, from strongly agree to strongly disagree. This adopted student engagement questionnaire also measures cognitive, affective and behavioral learning development. The scale underwent a reliability test. Cronbach's alpha coefficient for cognitive, behavioral, and effective engagement scales were 0.76, 0.82 and 0.80, respectively.

2.3The Participants

The participants of the study were 69 Grade 10 Science Class students of Misamis Oriental General Comprehensive High School for the school year 2023-2024. They belonged to two intact classes. These two intact sections were randomly assigned as the experimental and control groups.

2.4Data-Gathering Procedure

The study involved two sections, which were randomly assigned as the experimental group and control group during the First Quarter of the 2023-2024 school year. The first section served as the experimental group, with 34 students being taught using explicit instruction. The second section served as the control group, with 35 students being taught using conventional instruction.

Before the start of classes, a pretest was administered personally by the teacher to both groups, while the researchers observed. They were given a validated teacher-

made pretest and the Engagement Scale Questionnaire, with the instructions explained by the teacher. This pretest aimed to assess their background on certain topics and check their level of engagement in the subject before the instruction. It consisted of a 27-item teacher-made test with 24 multiple-choice items and 3 problem-solving items. The respondents were given ample time to complete the pretest. The researchers collected the answered test papers on the same day and recorded the results.

The intervention lasted for two weeks, held in the class during their regular class schedule. The teacher used explicit instruction to teach the experimental group. Meanwhile, the control group received lectures and discussions on the same topics as the experimental group but using conventional instructions. Both sections were provided with the same instructional materials, such as PowerPoint presentations and other visual aids. The researchers were present to monitor the class during the intervention. The table shown below described in detail on how the conventional and explicit instruction implemented in the study

After two weeks of intervention using explicit and conventional instruction in the experimental and control groups, a post-test was administered. The students in both sections completed Engagement Scale questionnaires and a validated teacher-made test with the same questions as the pretest. They were given the same amount of time to answer the questions, and the scoring process was consistent with the pretest.

3. RESULTS AND DISCUSSIONS

Table 1: Mean and Standard Deviation of Students' Level of Engagement in Mathematics Learning.

	Control Group		Experimental Group	
	n=35		n=34	
	Pretest	Posttest	Pretest	Posttest
Mean	3.52	3.88	3.39	4.06
SD	0.30	0.21	0.44	0.19
Level	High engagement	High engagement	Slightly high engagement	High engagement

Table 1 presents the mean score, standard deviation, and students' level of engagement in the pretest and posttest of the two groups in mathematics learning. It can be observed in the table that the control group, using conventional instruction, exhibited a high level of engagement with a mean score of 3.52, compared to the experimental group, which gained a mean score of 3.39, interpreted as 'slightly high engagement' before the intervention. Additionally, the table shows that the experimental group in the pretest indicated more varied results compared to the control group based on their standard deviation. After the treatment, the control group demonstrated a comparable level of engagement as 'High engagement' with a mean score of 3.88, while the experimental group displayed a high level of engagement with a mean score of 4.06, which is 0.18 higher than the posttest mean score of the control group. It is worth noting that the experimental group increased their engagement in mathematics, influenced by explicit instruction. The results support the study of **[7]** who stated that explicit instruction offers an engaging and effective learning experience. Furthermore, the experimental group in the posttest showed less dispersed scores, with a standard deviation of 0.19, than the control group with a standard deviation of 0.21.

To test whether there is a significant difference in the level of students' engagement in mathematics learning, further analysis was conducted using One-Way Analysis of Covariance (ANCOVA).

Table 2. Summary Table of One-Way ANCOVA of Students' Engagement in their Mathematics Learning

Source of Variation	Adjusted Sum of Squares	df	Mean Squares	F-ratio	Prob.
Adjusted Means	0.68	1	0.68	17.15	0.000*
Adjusted Error	2.62	66	0.04		
Adjusted Total	3.3	67			

*Significant at 0.05 level

Table 2 shows the summary of the analysis of covariance of students' engagement scores. The analysis yielded an F-ratio of 17.15 with a probability value of 0.000* less than the critical value of the 0.05 level of significance. This means that there is a significant difference in the students' engagement as influenced by explicit instruction with the experimental group mean of 4.06 which is higher than the control group mean score of 3.88. This implies that explicit instruction significantly enhances students' engagement compared to the conventional instruction used in the control group. This further implies that students respond more positively and are more engaged when explicit instruction is employed. This could be attributed to the nature of explicit instruction, which incorporates clear, direct, and procedural delivery of content. The finding aligns with the study of **[8].**who asserted that explicit instruction is described as a group of research-supported instructional behaviors used to design and reduce cognitive load, and promoting active student engagement. This finding also agrees with the recommendations from the Ceedar Center and NCSI, suggesting that providing struggling students with high-leverage practices, such as explicit instruction, can improve engagement. This finding contradicts the study published in the **[9].**. that passive learning approaches, such as lectures, led to decreased attention and reduced information retention among students. Therefore, explicit instruction can enhance student engagement and learning in the mathematics classroom.

4. CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the statistical analysis. There is a significant difference in students' engagement in mathematics between the experimental group and the control group. It can be concluded that the explicit instruction employed in the experimental group is more effective than the conventional instruction used in the control group in enhancing students' engagement in mathematics learning. The increase in the level of students' engagement in mathematics through explicit instruction indicates that the intervention brought positive effects or benefits to the students.

As a recommendation, Mathematics teachers are encouraged to incorporate explicit instruction as an approach in teaching Mathematics to effectively achieve instructional objectives and improve learners' problem solving skills and engagement. Future researchers may endeavor to explore instructional strategies apart from explicit instruction that work best in enhancing students' problem-solving skills and engagement. While the use of

explicit instruction is highly encouraged, future researchers might consider employing a combination of strategies to more effectively improve students' problem-solving skills and class participation. They may conduct their studies with a wider scope, involving different populations, settings, and time frames.

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