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IMPLEMENTATION OF THE 7E LEARNING CYCLE IN MATHEMATICS INSTRUCTION IN ECHAGUE PUBLIC SECONDARY SCHOOLS

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Abstract

This study examined the perceived level of implementation of the 7E Learning Cycle in Mathematics instruction among public secondary school teachers in Echague, Isabela. Specifically, it described the profile of the respondents in terms of age, sex, highest educational attainment, years of teaching experience, and relevant trainings and seminars attended. It also examined the perceived level of implementation across the seven phases: Elicit, Engage, Explore, Explain, Elaborate, Evaluate, and Extend, and determined whether overall implementation differed when grouped according to respondents' profiles. A descriptive-comparative research design was utilized, involving 47 Mathematics teachers. Data were gathered using an adapted survey questionnaire and analyzed using frequency, percentage, weighted mean, independent samples t-test, and one-way Analysis of Variance (ANOVA). Findings revealed that the 7E Learning Cycle was perceived as very highly implemented across all phases. Overall scale-level comparisons showed no significant differences when grouped according to age, sex, highest educational attainment, years of teaching experience, and relevant trainings and seminars attended. However, selected item-level indicators showed differences, suggesting that while the overall pattern of implementation was generally consistent, some specific teaching practices may still need focused support. The study concludes that teachers perceived themselves as consistently implementing the 7E Learning Cycle in Mathematics instruction. It is recommended that teachers sustain the use of the model and further strengthen strategies that promote exploration, questioning, higher-order thinking, and student engagement.

INTRODUCTION

In the ever-evolving landscape of education, the need for innovative, learner-centered teaching approaches has become increasingly urgent, particularly in Mathematics, where students often struggle to connect abstract concepts with real-world understanding. Mathematics remains a core subject in secondary education, playing a critical role in developing students’ logical reasoning, problem-solving skills, and conceptual understanding. In recent years, teaching approaches have shifted from rote memorization toward strategies that prioritize comprehension, application, and reflection on concepts and processes (Hernández Gómez & Hernández Castillo, 2026).

Over the past decade, education scholars and practitioners have advocated for constructivist pedagogies that position learners as active participants in constructing knowledge. Constructivist frameworks emphasize that learners build meaning by linking new experiences to prior knowledge, negotiating understanding through exploration, and reflecting on outcomes. Traditional lecture-centered instruction often fails to provide these opportunities, which are crucial for deep understanding and transfer of knowledge, particularly in Mathematics (Amirova, 2025).

Instructional models derived from constructivist theory, such as the 7E Learning Cycle, have gained prominence because they provide a structured yet flexible blueprint for lesson design, promoting inquiry, reasoning, and meaningful application of concepts (Mekonnen, 2024). The 7E Learning Cycle includes seven phases: Elicit, Engage, Explore, Explain, Elaborate, Evaluate, and Extend, each designed to scaffold students' conceptual understanding and engagement. Empirical studies have shown that lessons sequenced according to this model can improve conceptual understanding, reduce misconceptions, and enhance student motivation when implemented with fidelity.

The Department of Education (DepEd) continuously promotes learner-centered and inquiry-based instructional practices to enhance the quality of teaching and learning in the K to 12 Basic Education Program. While there is no specific DepEd memorandum that mandates the use of the 7E Learning Cycle, its principles are aligned with DepEd policies that encourage active learner engagement, meaningful learning experiences, and the development of higher-order thinking skills. In particular, DepEd Order No. 42, s. 2016 emphasizes effective instructional planning that supports interactive and student-centered teaching strategies, while DepEd Order No. 21, s. 2019 highlights the importance of using varied and innovative approaches responsive to learners' needs.

Classroom engagement is multi-dimensional, comprising cognitive, behavioral, affective, and social aspects (Pedler et al., 2020; Skilling et al., 2021). In this study, implementation is operationally defined as the mathematics teachers' self-reported extent of using the seven phases of the 7E Learning Cycle in lesson delivery. Thus, implementation in the present research refers to teachers' perceived practice across the phases rather than direct classroom observation of fidelity or measured instructional effectiveness. This distinction is important because implementation, teaching engagement, and instructional practice are related but not identical constructs.

While international and local studies have reported positive outcomes using the 7E Learning Cycle, many of these studies focused on student outcomes or general effectiveness. Limited empirical work has examined the extent to which Mathematics teachers in Philippine public secondary schools perceive themselves as implementing each phase of the 7E Learning Cycle in actual classroom practice. This is the primary research gap addressed in the study. In addition, evidence on teachers' phase-by-phase implementation can guide school-based Learning Action Cell (SLAC) lesson exemplar development, instructional supervision, and professional development for Mathematics teachers.

The present study seeks to address this gap by focusing on the perceived implementation of the 7E Learning Cycle in Mathematics instruction among teachers in Echague Public Secondary Schools. It aims to determine teachers' perceived levels of implementation across the seven phases, examine whether overall implementation differs according to teacher profile, and identify item-level areas that may need further instructional support. By documenting teachers' self-reported practices, the study aspires to inform targeted interventions, improve instructional quality, and enhance professional development programs.

The primary emphasis of this research is on Mathematics teachers, as they play a central role in delivering meaningful learning experiences. The findings will serve as a benchmark for strengthening instructional skills, providing evidence-based guidance for supervision, and supporting the design of contextually relevant SLAC lesson exemplars for Mathematics in Echague Public Secondary Schools.

Objectives of the Study

Generally, this study aimed to appraise the perceived implementation of the 7E Learning Cycle in Mathematics instruction in Echague Public Secondary Schools as a basis for developing SLAC lesson exemplars.

Specifically, it sought to answer the following research questions:

What is the demographic profile of the Mathematics teachers in Echague Public Secondary Schools in terms of: age, sex, highest educational attainment, years of teaching experience, and relevant trainings and seminars attended related to the 7E Learning Cycle?

What is the perceived level of implementation of the 7E Learning Cycle in Mathematics instruction as reported by the Mathematics teachers in terms of the following phases: Elicit, Engage, Explore, Explain, Elaborate, Evaluate, and Extend?

Is there a significant difference in the perceived level of implementation of the 7E Learning Cycle in Mathematics instruction when grouped according to teacher profile?

METHODS

Research Design

This study employed a descriptive-comparative research design to examine the perceived implementation of the 7E Learning Cycle in Mathematics instruction among teachers in Echague Public Secondary Schools. The descriptive component was used to determine the level of implementation of the 7E Learning Cycle across its seven phases as perceived by the Mathematics teachers. The comparative component was utilized to determine whether there is a significant difference in overall implementation when teachers are grouped according to their demographic profile. Since the results are based on survey responses, the findings describe teachers' self-reported practices rather than classroom-observed implementation quality.

Respondents and Locale of the Study

The respondents of the study were Junior High School (JHS) and Senior High School (SHS) Mathematics teachers from public secondary schools in Echague, Isabela, who were actively using the 7E Learning Cycle in their instruction. A total of 47 teachers participated in the study, drawn from nine identified schools, ensuring representation from both JHS and SHS levels. The study employed total enumeration as the sampling technique, focusing on all available teachers who met the criteria rather than selecting a subset. This approach was appropriate since the study specifically targeted teachers with direct experience in using the 7E Learning Cycle, allowing for more relevant and comprehensive data collection. The respondents came from Ugad High School, Don Mariano Marcos National High School, Echague National High School, Doña Magdalena H. Gaffud High School, Pangal Sur High School, Imelda R. Marcos High School - Main, Imelda R. Marcos High School - Annex, Highway Region National High School, and Babaran Integrated High School.

Research Instrument

Data were gathered using a researcher-made survey questionnaire. The instrument consisted of two parts. Part I collected the demographic profile of the respondents, including age, sex, highest educational attainment, teaching experience, and relevant training. Part II assessed teachers' perceived implementation across the seven phases of the 7E Learning Cycle. The indicators described practices such as eliciting prior knowledge, motivating learners, facilitating group exploration, guiding student explanations, providing application tasks, assessing understanding, and extending learning to real-life situations. Responses were measured using a four-point Likert scale ranging from Strongly Agree to Strongly Disagree, and the resulting means were interpreted using the following ranges: 3.26-4.00 = Very Highly Implemented, 2.51-3.25 = Highly Implemented, 1.76-2.50 = Moderately Implemented, and 1.00-1.75 = Less Implemented. Content validity was addressed through alignment with the source instrument and review for contextual appropriateness to Mathematics instruction. For final publication, the exact number of items per phase and the reliability coefficient from the validation or pretesting record should be inserted from the original instrument file.

Data Gathering Procedure and Analysis

Data were gathered through the survey questionnaire administered to the teacher-respondents. Frequency counts and percentages were used to describe the profile of the respondents, while the weighted mean was used to determine the perceived level of implementation of the 7E Learning Cycle across the Elicit, Engage, Explore, Explain, Elaborate, Evaluate, and Extend phases. To test for significant differences in implementation when grouped according to profile variables, the independent samples t-test was used for sex, while one-way Analysis of Variance (ANOVA) was used for age, highest educational attainment, years of teaching experience, and trainings or seminars attended. These statistical methods supported the interpretation of both descriptive and comparative findings.

Ethical Considerations

The conduct of the study observed ethical research practices by treating the responses of the teacher-respondents with confidentiality and using the gathered data only for academic purposes. Participation was voluntary, and respondents were informed of the purpose of the study before answering the questionnaire. Anonymity was observed in reporting the results, and participants were given the right to withdraw from the study without penalty. Permission and approval from the concerned school authorities were also secured before data gathering. Results were reported in aggregate form to protect the identity of the participants and their schools.

RESULTS AND DISCUSSION

The respondents were Junior High School and Senior High School Mathematics teachers from public secondary schools in Echague, Isabela, who were using the 7E Learning Cycle in their instructional practices. The study included 47 teacher-respondents from nine school entries, with 33 JHS teachers and 14 SHS teachers.

Table 1. Distribution of Respondents According to School.

School	JHS	SHS	Total	Percentage (%)
1. Ugad High School	5	2	7	14.89
2. Don Mariano Marcos National High School	5	2	7	14.89
3. Echague National High School	8	2	10	21.28
4. Doña Magdalena H. Gaffud High School	3	2	5	10.64
5. Pangal Sur High School	2	2	4	8.51
6. Imelda R. Marcos High School – Main	4	2	6	12.77
7. Imelda R. Marcos High School – Annex	1	0	1	2.13
8. Highway Region National High School	3	2	5	10.64
9. Babaran Integrated High School	2	0	2	4.26
Total	**33**	**14**	**47**	**100.00**

Most respondents were 30-39 years old (44.7%), followed by those aged 40-49 (21.3%), 20-29 (19.1%), and 50 years old and above (14.9%). Female teachers comprised 59.6% of the respondents, while male teachers comprised 40.4%. The largest group had master's units (40.4%), followed by those with completed master's degrees (31.9%). In terms of experience, the largest group had 6-10 years of teaching experience (29.8%). Most respondents had attended district-level (31.9%) and division-level (27.7%) trainings related to the 7E Learning Cycle. This profile suggests that many respondents had both classroom experience and continuing professional exposure, which may have supported their familiarity with learner-centered instructional practices.

Table 2. Profile of the Teacher-Respondents.

Variables	Frequency (n=47)	Percent
Age		
20-29	9	19.1
30-39	21	44.7
40-49	10	21.3
50 and above	7	14.9
Sex		
Male	19	40.4
Female	28	59.6
Highest Educational Attainment		
Bachelor's	4	8.5
With Master's Units	19	40.4
Master's	15	31.9
With Doctoral Units	5	10.6
Doctorate	4	8.5
Years of Teaching Experience		
1-5	12	25.5
6-10	14	29.8
11-15	9	19.1
16 and above	12	25.5

Variables	Frequency (n=47)	Percent
Trainings/Seminars Related to the 7E Learning Cycle		
None	3	6.4
School	9	19.1
District	15	31.9
Division	13	27.7
Regional/National	7	14.9

The perceived level of implementation of the 7E Learning Cycle was consistently interpreted as Very Highly Implemented across all seven phases. The highest phase mean was recorded in Elaborate (3.80), followed by Elicit (3.74), Engage (3.71), Extend (3.69), Evaluate (3.68), Explore (3.66), and Explain (3.66). The relatively higher score for Elaborate may indicate that teachers commonly provide practice exercises, application tasks, and follow-up questions after introducing mathematical concepts. Meanwhile, the slightly lower but still very high scores for Explore and Explain suggest that inquiry-based investigation and student-generated explanation may require sustained support, especially in classes with varied learner readiness, time constraints, and limited instructional resources.

Table 3. Summary of the Level of Implementation of the 7E Learning Cycle.

Phase	Mean	Description
Elicit	3.74	Very Highly Implemented
Engage	3.71	Very Highly Implemented
Explore	3.66	Very Highly Implemented
Explain	3.66	Very Highly Implemented
Elaborate	3.80	Very Highly Implemented
Evaluate	3.68	Very Highly Implemented
Extend	3.69	Very Highly Implemented
Grand Mean	3.71	Very Highly Implemented

In the Elicit phase, teachers gave strong attention to drawing out students' prior knowledge before introducing new mathematical ideas. In the Engage phase, the respondents emphasized active student participation through individual and group work, sharing of outputs, and interactive discussion. In the Explore and Explain phases, students were encouraged to work together, discover solutions, explain ideas, and clarify concepts. These practices are important in Mathematics because they help learners connect procedures with meaning rather than simply memorizing steps. In the Elaborate phase, teachers provided opportunities for independent practice, questioning, and application of concepts, which may explain why this phase obtained the highest mean. In the Evaluate and Extend phases, teachers used quizzes, performance tasks, and activities that connected learning to real-life situations, supporting both formative assessment and transfer of learning.

At the overall scale level, the comparative analysis showed that the perceived implementation of the 7E Learning Cycle did not significantly differ when respondents were grouped according to age, sex, highest educational attainment, years of teaching experience, and training or seminars attended. This means that the overall level of implementation was generally consistent across teacher profiles. However, selected item-level differences were noted in specific indicators involving exploration, questioning, whole-class sharing, and higher-order thinking. This distinction clarifies that the overall comparison was not significant, while a few individual practices may still vary across groups.

Table 4. Summary of Differences in the Level of Implementation by Profile Variable.

Profile Variable	Test Statistic	p-value	Decision
Age	F = 0.584	.819	Not Significant
Sex	t = 1.477	.147	Not Significant
Highest Educational Attainment	F = 1.112	.365	Not Significant
Years of Teaching Experience	F = 0.967	.417	Not Significant
Trainings/Seminars	F = 0.967	.417	Not Significant

Although the overall scale results were not significant, selected item-level indicators point to teaching practices that may benefit from additional support. Age-related differences appeared in items involving student exploration and interpretation through observation and analysis. Sex-related differences appeared in whole-class sharing of outputs and activities that connect learning beyond the topic. Highest educational attainment showed a difference in one exploratory practice, while trainings and seminars showed differences in motivating students to share prior learning, entertaining questions for clearer understanding, and asking relevant questions of various levels. These item-level findings do not contradict the overall non-significant results; rather, they suggest that professional development may be strengthened through focused training on exploration, questioning, discussion facilitation, and higher-order thinking. For final reporting, the duplicated ANOVA values and group means should be verified from the raw statistical output.

CONCLUSION AND FUTURE WORKS

The Mathematics teachers in Echague Public Secondary Schools were mostly within the 30-39 age group, predominantly female, and largely engaged in graduate studies, particularly those with master's units and completed master's degrees. In terms of experience, the group reflects a balanced mix of early-career and experienced teachers, with most having 6-10 years of teaching. In addition, the majority have attended district- and division-level trainings related to the 7E Learning Cycle, indicating exposure to professional development opportunities.

The 7E Learning Cycle was perceived by Mathematics teachers as very highly implemented across all phases: Elicit, Engage, Explore, Explain, Elaborate, Evaluate, and Extend. Teachers reported practices such as activating prior knowledge, promoting collaboration, encouraging exploration, facilitating explanation, extending learning, and assessing student understanding. Since the study relied on teacher self-reports, the findings should be interpreted as perceived implementation rather than direct evidence of classroom-observed implementation quality or instructional effectiveness.

There is generally no significant difference in the perceived implementation of the 7E Learning Cycle when teachers are grouped according to age, sex, highest educational attainment, years of teaching experience, and relevant trainings and seminars attended. This suggests that teachers across different profiles reported comparable overall use of the model. However, selected item-level differences in exploration, questioning, and higher-order thinking indicate that some aspects of teaching practice may still be influenced by experience, training, or professional exposure.

Future work may focus on developing, implementing, and evaluating SLAC lesson exemplars anchored on the 7E Learning Cycle. Instructional supervision may use the findings to provide coaching on the phases that require stronger facilitation, especially Explore, Explain, Evaluate, and Extend. Teacher training may also include practical demonstrations of questioning techniques, learner-led investigation, formative assessment, and real-life application tasks. Further studies may examine classroom observations and student outcomes to determine how the 7E Learning Cycle influences Mathematics achievement, problem-solving skills, motivation, and higher-order thinking.

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CONFLICT OF INTEREST

The authors declare no conflict of interest related to the conduct, analysis, and reporting of this study.

DECLARATION OF AI USE

Generative AI assistance was used only to help revise, adapt, and format the manuscript according to peer-review comments and the journal template. The authors remain responsible for the accuracy, integrity, statistical verification, and final content of the article.

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