INSTABRIGHT e-GAZETTE
ISSN: 2704-3010
Volume VII, Issue III
February 2026
Available online at https://www.instabrightgazette.com

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LECTURE METHOD AND REFINE (READ, EXAMINE, FRAME, IDENTIFY, NAVIGATE, EXECUTE) INSTRUCTIONAL APPROACH: THEIR EFFECTS ON LEARNERS' PROBLEM-SOLVING SKILLS

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ABSTRACT

The study evaluated the effectiveness of the REFINE Instructional Approach versus the lecture method in improving Grade 8 Physics problem-solving skills using a quasi-experimental pretest-post test design. It was found that the pretest performance of learners in both the Lecture Method and REFINE Instructional Approach was Fairly Satisfactory. There was no significant difference in the pretest performance of learners between the two groups. The post-test performance of learners in the Lecture Method was Satisfactory, while the REFINE Instructional Approach achieved Very Satisfactory. There was a significant difference in the post-test performance between the two groups, with the REFINE Instructional Approach performing significantly better than the Lecture Method group. There was a significant improvement in the pretest and post-test scores of learners taught using the Lecture Method and REFINE Instructional Approach. There was a significant difference in the mean gain scores between the two groups, with the REFINE Instructional Approach group obtaining significantly higher gains than the Lecture Method group.

Keywords: *Lecture Method, REFINE (Read, Examine, Frame, Identify, Navigate, Execute) Instructional Approach, Effects, Learners, Problem Solving Skills*

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INSTABRIGHT e-GAZETTE
ISSN: 2704-3010
Volume VII, Issue III
February 2026
Available online at https://www.instabrightgazette.com

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INTRODUCTION

Problem-solving skills are essential 21st-century competencies that enable learners to identify problems, analyze situations, generate solutions, and evaluate outcomes. These higher-order cognitive skills allow students to apply knowledge in real-life contexts, making their development a key objective of modern educational curricula (Rahmaoui, 2023).

The growing demands of the global workforce have highlighted the need for students to develop problem-solving skills, enabling them to apply knowledge to real-world challenges. These skills not only enhance academic performance, especially in mathematics and science, but are also closely connected to critical thinking, creativity, and collaboration, which are essential for lifelong learning (Sinaga et al., 2023).

Despite their importance, many students still struggle to develop effective problem-solving skills. Research indicates that learners often face difficulties in applying appropriate strategies, organizing information, and reflecting on their solutions (Satidgosol & Art-in, 2024; Sauro, 2024). These challenges highlight the need for instructional approaches that actively engage learners in problem-solving processes.

The lecture method can support the development of problem-solving skills by providing structured knowledge and foundational understanding, especially when combined with clear explanations, demonstrations, and guided examples. However, while effective for initial learning, lectures are generally less effective than active learning approaches for developing higher-order problem-solving skills, though they can still enhance conceptual understanding

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ISSN: 2704-3010
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Available online at https://www.instabrightgazette.com

when paired with guided instruction (Luke et al., 2021; Ridwan et al., 2021; Ssemugenyi, 2023).

The REFINE instructional approach can be an effective method to improve learners' problem-solving skills because it provides a structured and systematic framework for tackling problems. By guiding learners to Read the problem carefully, Examine key details, Frame or illustrate the situation, Identify the Given and Asked, Navigate the appropriate formula, and Execute the solution, the approach helps students break down complex problems into manageable steps. This not only strengthens their analytical and critical thinking abilities but also promotes accuracy, logical reasoning, and confidence in solving problems. Research suggests that structured problem-solving frameworks like REFINE enhance learners' ability to apply concepts systematically and improve overall problem-solving performance (Alturki & Aldraiweesh, 2023; Ridwan et al., 2021).

While the lecture method has traditionally been used to deliver structured knowledge and build foundational understanding, its effectiveness in developing higher-order problem-solving skills may be limited compared to more interactive approaches (Luke et al., 2021; Ssemugenyi, 2023). On the other hand, structured instructional frameworks such as the REFINE approach provide learners with a systematic method to analyze, plan, and execute solutions, promoting analytical thinking, accuracy, and confidence in problem-solving (Alturki & Aldraiweesh, 2023; Ridwan et al., 2021). Given these considerations, the researcher seeks to investigate which of the two instructional strategies—traditional lecture or the REFINE approach—better enhances learners' problem-solving skills. Therefore, this study is conducted

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ISSN: 2704-3010
Volume VII, Issue III
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to compare the effectiveness of the lecture method and the REFINE instructional approach in improving students' ability to solve problems.

MATERIALS AND METHODS

Research Methodology

This chapter presents the research method, research design, respondents of the study, sampling design, data gathering procedures, research instrument, data analysis, and statistical tools used in the study. The purpose of this study was to find out the effects of lecture method and REFINE Instructional Approach to learners' problem-solving skills in Physics.

Research Method

The study employed the experimental method as its research design. The experimental method is widely recognized as a scientific approach used to determine causal relationships between variables by systematically manipulating one or more independent variables and observing their effects on dependent variables under controlled conditions (Shaw et al., 2023).

In experimental research, the researcher actively manipulates the independent variable—such as a teaching method or instructional approach—and examines its influence on the dependent variable, such as learners' performance or problem-solving skills. At the same time, extraneous variables are controlled to ensure that any observed changes in the dependent variable can be attributed to the intervention rather than other factors (Skulmowski & Xu, 2021).

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Experimental research typically involves the use of at least two groups: an experimental group that receives the treatment and a control group that does not. The comparison between these groups allows researchers to determine whether the intervention produces a significant effect. Random assignment of participants is often employed to minimize bias and ensure equivalence between groups, thereby enhancing the internal validity of the study (Yadav, 2023).

Experimental designs are essential for evaluating innovations and interventions in education because they provide clear evidence of effectiveness. By isolating variables and controlling conditions, experimental research enables researchers to determine not only whether an instructional strategy works but also the extent of its impact on learning outcomes (Bevans, 2023). This makes the experimental method particularly suitable for studies that compare instructional approaches, such as traditional lecture methods and alternative strategies like the REFINE instructional approach.

Research Design

This study employed a quasi-experimental research design utilizing a pretest–posttest method. Quasi-experimental designs are widely used in educational research to examine cause-and-effect relationships when random assignment of participants is not feasible. This design involves the manipulation of an independent variable and the measurement of its effect on a dependent variable, but unlike true experimental designs, participants are not randomly assigned to groups (Thomas, 2021; Fabrigar & Wegener, 2022).

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Quasi-experimental research is particularly appropriate in real classroom settings where intact groups are used, such as existing classes in schools. According to Fabrigar and Wegener (2022), quasi-experimental designs aim to establish causal inferences by comparing outcomes between groups exposed to different treatments, while acknowledging limitations in randomization. Similarly, Thomas (2021) emphasized that quasi-experimental designs are effective in educational contexts because they allow researchers to implement interventions in natural settings while still maintaining a level of control over variables to examine treatment effects.

In this study, two groups were utilized: a control group and an experimental group. The control group was taught using the lecture method, while the experimental group was exposed to the REFINE (Read, Examine, Frame, Identify, Navigate, Execute) instructional approach. These instructional approaches serve as the independent variables, while the dependent variable was the learners' physics problem-solving skills. The use of two distinct instructional strategies enables a comparative analysis of their effectiveness in improving learners' academic performance.

Participants of the Study

The respondents of the study were the Grade 8 officially enrolled learners of Leonora S. Salapantan National High School, San Miguel, Iloilo, during the school year 2025–2026. A total of 60 students were taken heterogeneously with representative from other sections regardless of their general average.

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The learners were divided into two groups. One group composed of 30 learners was exposed to lecture method and the other group of 30 learners was exposed to REFINE Instructional approach.

Sampling Design

Purposive sampling design was used in selecting the respondents of the study. Purposive sampling will allow the researcher to exercise ease, homogeneity, and control during the study implementation. According to Nikolopoulo (2023), purposive sampling (sometimes called judgmental or selective sampling) is a non-probability sampling method in which researchers deliberately select participants (or units) based on specific characteristics relevant to the study.

Research Instrument

The researcher used a Division made Grade 8 Fourth Quarter Examination. The test was made by experts and already validated and tested its reliability. The same examination was also used all over the division of Iloilo specifically in the fourth quarter examination of grade 8 in Science subject.

The instrument was used for pre-test and posttest with 50 items test. A sample of the test is found in the Appendix page of the study.

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ISSN: 2704-3010
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Data Gathering Procedures

The researcher prepared a study plan that includes Lesson Matrix of Activities for both Lecture method and REFINE Instructional approach and came up with a classroom scheme that was strictly followed during the 20-day study implementation.

The study implementation treatment was divided into three stages: The pre-experimentation stage that includes study material preparations, preparation of research instrument; the experimental stage with four week or 20 consecutive days of actual teaching using the REFINE Instructional approach for the experimental group and lecture method for the controlled group; and the post-experimental stage for the interpretation and analyses of the results.

Data Analyses

The research instrument was reproduced according to the number of participants of the study.

After retrieval of the accomplished questionnaires, the data were organized, computed and tabulated.

The data that were gathered in this research were subjected to certain computer-processed statistical tests using the Statistical Package for the Social Sciences (SPSS) software.

For the analysis, the researcher used the following scale of scores and interpretations adopted from the DepEd interpretation for learners' problem-solving skills in physics:

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Mean of Scores	Description
40.00 - 50.00	Outstanding (O)
30.00 – 39.99	Very Satisfactory (VS)
20.00 – 29.99	Satisfactory (S)
10.00 – 19.99	Fairly Satisfactory (FS)
0.00 – 9.99	Did not Meet Expectation (DNME)

RESULTS AND DISCUSSIONS

Summary

The study evaluated the effectiveness of the REFINE Instructional Approach versus the lecture method in improving Grade 8 Physics problem-solving skills using a quasi-experimental pretest-posttest design with 60 students (30 control, 30 experimental). Data were collected through a 30-item test and analyzed using descriptive statistics and Mann-Whitney U and Wilcoxon tests at a 0.05 significance level via SPSS. The study focused on selected Physics topics and short-term outcomes, without controlling external variables or comparing REFINE to other instructional strategies.

Based on the analysis and interpretation of the data, the following findings were obtained:

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The pre-test performance of the Grade 8 learners in both the Lecture Method group and the REFINE Instructional Approach group was Fairly Satisfactory, indicating that learners initially had limited mastery of Physics problem-solving skills.

There was no significant difference in the pre-test performance of learners between the two groups, indicating that both groups had comparable levels of prior knowledge before the intervention.

The post-test performance of learners in the Lecture Method group was Satisfactory, while the REFINE Instructional Approach group achieved a Very Satisfactory level of performance.

There was a significant difference in the post-test performance between the two groups, with the REFINE Instructional Approach group performing significantly better than the Lecture Method group.

There was a significant improvement in the pre-test and post-test scores of learners taught using the Lecture Method, indicating that the lecture method contributed to some improvement in learners' Physics problem-solving skills.

There was also a significant improvement in the pre-test and post-test scores of learners exposed to the REFINE Instructional Approach, with all learners demonstrating improvement.

There was a significant difference in the mean gain scores between the two groups, with the REFINE Instructional Approach group obtaining significantly higher gains than the Lecture Method group.

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CONCLUSIONS

Based on the findings of the study, the following conclusions were drawn:

Grade 8 learners initially demonstrated limited proficiency in Physics problem-solving skills before the implementation of the instructional interventions.

Both the Lecture Method and the REFINE Instructional Approach contributed to improving learners' Physics problem-solving performance.

The REFINE Instructional Approach was significantly more effective than the Lecture Method in enhancing learners' ability to analyze and solve Physics problems.

The structured step-by-step framework provided by the REFINE approach helped learners better understand problem conditions, identify given and unknown variables, select appropriate formulas, and execute accurate solutions.

Lecture method contributed to some improvement in learners' problem-solving skills in Physics.

REFINE Instructional Approach contributed much improvement in learners' problem-solving skills in Physics.

The use of scaffolded instructional approaches such as REFINE can significantly improve students' analytical thinking and problem-solving skills in Physics.

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RECOMMENDATIONS

Based on the findings and conclusions of the study, the following recommendations are proposed:

Teachers shall adopt the REFINE Instructional Approach in teaching Physics problem-solving tasks to help learners develop structured analytical thinking.

Science educators shall integrate structured problem-solving frameworks such as REFINE into classroom instruction to enhance learners' understanding of complex Physics concepts.

School heads shall encourage the use of innovative instructional strategies and provide professional development programs that train teachers in scaffolded problem-solving approaches.

Curriculum developers shall consider incorporating structured problem-solving models like REFINE into instructional materials and learning modules.

Future researchers shall conduct further studies on the effectiveness of the REFINE Instructional Approach across different grade levels, subject areas, or larger populations to validate and extend the findings of this study.

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