INTERNATIONAL JOURNAL OF STUDENT PERFORMANCE
AND EDUCATIONAL RESEARCH
https://ijois.com/index.php/ijsper
ISSN: 1595-7918

EFFECTIVENESS OF USING FLIPPED LEARNING IN TEACHING PHYSICAL SCIENCE

JASMIN EUNICE V. OGARIO
jasmineunice.ogario@deped.gov.ph Teacher II
Quinapondan National High School
D.O.I: 10.5281/zenodo.16919866

ARTICLE INFORMATION

Received: 18th April, 2025
Accepted: 22nd May, 2025
Published: 23rd June, 2025

KEYWORDS: Effectiveness, Flipped Learning, Teaching, Physical Science

PUBLISHER: Empirical Research Institute of Nigeria

ABSTRACT

This study investigated the effectiveness of flipped learning in enhancing student achievement in Physical Science among Grade 12 students of Quinapondan National High School, Eastern Samar, Philippines, during the School Year 2024–2025. A quasi-experimental design was employed, utilizing intact classes divided into an experimental group and a control group. The experimental group was taught through flipped learning, while the control group received instruction using conventional methods. Both groups completed a pre-test and a post-test to measure learning outcomes. Findings revealed that students exposed to flipped learning demonstrated significantly greater improvement in their achievement compared to those taught using traditional lecture-based instruction. Results confirmed that flipped learning provides a more engaging and impactful approach to teaching Physical Science, offering evidence of its superiority over conventional teaching methods.The study concludes that flipped learning is an effective pedagogical strategy that enhances student performance in Physical Science. It is recommended that teachers adopt this approach to address diverse learner needs, while school heads and administrators provide support and professional development to equip teachers with the skills needed for its integration. Furthermore, future research should explore the long-term effects of flipped learning across various subjects and grade levels to strengthen its application in different educational contexts.

1. INTRODUCTION

The low performance of Filipino learners in international large-scale assessments highlights the urgent need to strengthen science education in the country. The Programme for International Student Assessment) revealed that the Philippines ranked lowest in reading, mathematics, and science, while the Trends in International Mathematics and Science Study (TIMSS) reported that Filipino students scored significantly below the international average in science. These findings underscore the persistent struggle of learners in developing higher-order thinking skills necessary for global competitiveness. Several factors contribute to this learning gap. Bernard (2015) noted that classroom instruction in the Philippines remains largely teacher-centered, restricting opportunities for student participation and active learning. This further emphasized that

insufficient learning resources and an overloaded curriculum hinder mastery of essential competencies. These barriers necessitate the adoption of innovative, learner-centered approaches that can enhance engagement and improve academic performance in science.

Flipped learning, an instructional model introduced by Bergmann and Sams (2012), has emerged as a promising strategy. In this model, students first engage with learning materials such as videos or modules outside the classroom, and class time is dedicated to interactive activities, problem-solving, and discussions. DepEd also advocates learner-centered pedagogies that emphasize active participation, collaboration, and critical thinking, aligning with the principles of flipped instruction.

Given these perspectives, this study aims to determine the effectiveness of flipped learning in teaching Physical Science among Grade 12 students of Quinapondan National High School. By examining its influence on learners' engagement and academic performance, this research seeks to provide evidence on how flipped instruction can address the challenges in science education revealed by both local and international assessments.

Statement of the Problem

This study aimed to assess the effectiveness of flipped learning in teaching Physical Science among the Grade 12 students in Quinapondan National High School, S.Y. 2024-2025.

Specifically, it sought to answer the following questions:

1. What are the pre-test results of the control and experimental groups?

2. What are the post-test results of the control and experimental groups?

3. Is there a significant difference between the pre-test and post-test results of the control and experimental groups?

4. Is there a significant difference in the learning gains in Physical Science between the control and experimental groups?

METHODOLOGY

This study employed a quasi-experimental research design to evaluate the effectiveness of flipped learning in teaching Physical Science among Grade 12 students. Intact classes were utilized to avoid disruption of the normal schedule, and the intervention was assigned randomly between groups. The control group was taught using the conventional method, while the experimental group was instructed through flipped learning. Both groups received a pre-test and a post-test to measure learning outcomes.

The study was conducted at Quinapondan National High School, Eastern Samar, during the School Year 2024–2025. A total of 54 Senior High School Grade 12 students participated, distributed into two intact classes: Peach (27) and Apricot (27). Using simple random sampling (Singh, 2003, as cited in Noor, Tajik, & Golzar, 2022; Thomas, 2020), students were selected to ensure equal representation and fairness in the sample. To minimize teacher variability, the same Science

teacher handled both the experimental and control groups, but only the experimental group experienced the flipped learning intervention.

The instrument used was a 20-item test questionnaire adapted from the Department of Education's Science modules, aligned with the Curriculum Guide (CG) and the Most Essential Learning Competencies (MELCs). The questionnaire assessed conceptual understanding, analytical thinking, and application of scientific principles. It was validated by subject experts and pilot-tested before implementation. Data were gathered through pre-tests and post-tests administered to both groups, with results tabulated and analyzed using an independent samples t-test at a 0.05 level of significance to determine whether flipped learning had a significant effect on students' performance.

RESULTS AND DISCUSSION

Pre-test Mean Scores of Students in Both the Flipped Learning and Conventional Method

Table 1 presents the pre-test mean scores of students in both the flipped learning group and the conventional method group. The flipped learning group obtained a pre-test mean score of 14.07, while the conventional method group had a mean score of 12.33. This indicates that the pre-test mean scores of students in both groups were comparable at baseline.

Table 1. **Pre-test Mean Scores of Students in Both the Flipped Learning and Conventional Method**

Method	Mean Scores
Conventional	12.33
Flipped Learning	14.07

Post-test Mean Scores of Students in Both the Flipped Learning and Conventional Method

Table 2 presents the post-test mean scores of students in both the flipped learning group and the conventional method group. The post-test mean score of the flipped learning group was 17.00, while the conventional method group obtained a post-test mean score of 14.07. This suggests that although both groups showed improvement after their respective interventions, the increase in the conventional method group was smaller compared to the flipped learning group. The greater gain in the flipped learning group indicates that this approach may be more effective in enhancing students' understanding and retention of concepts. This result highlights the potential of flipped learning as a more engaging and impactful instructional strategy in teaching Physical Science.

Table 2. **Post-test Mean Scores of Students in Both the Flipped Learning and Conventional Method**

Method	Mean Scores
Conventional	14.67
Flipped Learning	17.00

Pre-test and Post-test Mean Scores of Students in Both the Flipped Learning and Conventional Method

Table 3 presents the pre-test and post-test mean scores of students in both the flipped learning group and the conventional method group. For the flipped learning group, the mean difference between the pre-test and post-test scores was 2.93, with a t-value of 8.261 and a p-value of .000. This indicates a statistically highly significant improvement in test scores following the flipped learning intervention. Similarly, the conventional method group showed a mean difference of 2.34, with a t-value of 6.97 and a p-value of .000, also indicating a statistically highly significant improvement in test scores after the conventional method intervention.

Table 3. Pre-test and Post-test Mean Scores of Students in Both the Flipped Learning and Conventional Method

Method	Tests (Mean Scores)		t-test	p-value	Interpretation
	Pre-test	Post-test			
Conventional	12.33	14.67	8.261	.000	Highly Significant Difference
Flipped Learning	14.07	17.00	6.97	.000	Highly Significant Difference

Difference between the Mean Scores of Students in Both the Flipped Learning and Conventional Method

Table 4 presents the difference between the post-test mean scores of students in both the flipped learning and conventional method groups. The post-test mean score for the flipped learning group was 17.00, compared to 14.67 for the conventional method group. The t-value was 4.950, and the p-value was .000, indicating a statistically highly significant difference in post-test scores. This result shows that the flipped learning group performed significantly better than the conventional method group.

Table 4. Difference between the Mean Scores of Conventional Method and Flipped learning

Method	Mean	t-test	p-value	Interpretation
Conventional	14.67	4.950	.000	Highly Significant Difference
Flipped Learning	17.00			

These findings demonstrate that employing flipped learning in the classroom is an effective strategy for achieving better student outcomes. Students in flipped classrooms achieved higher academic performance and reported greater satisfaction with their learning experience compared to those in traditional lecture-based settings (O'Flaherty & Phillips, 2015). Another study highlighted that flipped classrooms improved students' critical thinking skills and engagement (Kalyani & Murugan, 2021). Overall, various studies have shown that implementing the flipped learning model enhances the efficiency of the learning process, leading to deeper and more meaningful learning (Pardosi & Ming, 2021).

Conclusion and Recommendation

Based on the findings of the study, the following conclusions were drawn, and corresponding recommendations are provided to guide future practice and research:

1. The study concluded that flipped learning is more effective than conventional methods in enhancing student achievement. Therefore, it is recommended that classroom teachers adopt innovative strategies such as flipped learning to better address the diverse needs of learners.

2. Students taught through flipped learning demonstrated greater improvement in Physical Science compared to those taught using the conventional method. Hence, school heads are encouraged to provide technical assistance and support to teachers in enhancing their instructional approaches for improved student performance.

3. Flipped learning was found to provide a more impactful approach to teaching Physical Science than traditional lecture-based instruction. In this regard, schools should offer professional development programs that will equip teachers with the necessary skills to effectively integrate flipped learning into their lessons.

4. The results supported the hypothesis that there is a significant difference between the mean scores of students exposed to flipped learning and those taught through the conventional method. To further validate this finding, future research with a broader scope of experimentation should be conducted across various contexts.

5. While the study confirmed the effectiveness of flipped learning in Physical Science, it also suggests the need to explore its application beyond a single subject area. Thus, additional studies are recommended to examine the long-term effects of flipped learning across different subjects and grade levels.

REFERENCES

Bergmann, J., & Sams, A. (2012). Flip your classroom: Reach every student in every class every day. International Society for Technology in Education.

Bernard, J. S. (2015). The flipped classroom: Fertile ground for nursing education research. International Journal of Nursing Education Scholarship, 12(1), 99–109.

Haidov, R., & Bensen, H. (2021). Flipped learning in education: A content analysis. Sustainable Multilingualism, 18, Article 18. https://doi.org/10.2478/sm-2021-0006

Kalyani, V., & Murugan, K. R. (2021). Innovative methods and practices in conventional teaching methods. Psychology and Education, 58(2), 9004–9007.

Lo, C. K., & Hew, K. F. (2017). A critical review of flipped classroom challenges in K-12 education: Possible solutions and recommendations for future research. Research and Practice in Technology Enhanced Learning, 12, 4. https://doi.org/10.1186/s41039-016-0044-2

O'Flaherty, J., & Phillips, C. (2015). The use of flipped classrooms in higher education: A scoping review. The Internet and Higher Education, 25, 85–95. https://doi.org/10.1016/j.iheduc.2015.02.002

Pardosi, A. S., & Ming, L. Y. (2021). Flipping the classroom to promote higher-order thinking skill: A case of Chinese undergraduate students. Journal of Educational Management and Instruction, 1(2), 65–74. https://doi.org/10.29408/veles%20journal.v5i1.3258