Perceived Use of Scaffolding Techniques on the Academic Performance in Physics Among Grade 12 STEM

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Abstract

Physics remains a challenge in the Philippine education system, where students consistently underperform in both national and international assessments. Even with the demonstrated promise of the scaffolding technique as an instructional strategy, limited research has examined how students' perceptions of teachers' use of scaffolding relate to their academic performance in Physics, particularly in senior high school. This study utilized a descriptive-correlational design to investigate the relationship between Grade 12 STEM students' perceived use of scaffolding techniques by their Physics teacher and their academic performance in General Physics 2. Anchored in Vygotsky's Sociocultural Theory, a researcher-made, content-validated survey questionnaire measured four scaffolding dimensions: teacher guidance, questioning, feedback, and gradual release. The instrument was validated by three Science Education experts and pilot-tested on 30 students. A total of 66 Grade 12 STEM students from one of the public schools in Tacloban City were included via total sampling. Results showed that students perceived their teacher as consistently applying scaffolding, with teacher guidance rated highest ($M = 4.74$) and gradual release as the lowest ($M = 4.13$). Students' mean GWA was Very Satisfactory ($M = 89.9$). Among all the dimensions, only feedback demonstrated a statistically significant positive correlation with academic performance ($\rho = 0.427$, $p < .001$). These findings highlight the importance of constructive and timely feedback in students' performance in Physics. Teachers, curriculum planners, and school administrators may use these results to strengthen feedback-oriented teaching practices. This study contributes to the literature on scaffolding in the Philippine senior high school education system.

Keywords: Academic performance; descriptive-correlational; grade 12 STEM students; scaffolding techniques; sociocultural theory

1. Introduction

Physics is one of the branches of science often perceived as one of the most challenging subjects by students in secondary schools and universities (Tindan & Arthur, 2024). In the Programme for International Student Assessment (PISA) 2022 assessment, the Philippines ranked 3rd from the bottom among 81 participating countries, where 23% of Filipino students reached level 2 performance, and no Filipinos attained level 5 or 6, which are the top proficiency levels (OECD, 2023). In the year 2018, the mean percentage score (MPS) of STEM students in General Physics 2 was only 64.18% and 58.15% in the succeeding year (Falcunaya et al., 2020). The result did not meet the 75% passing requirement of the Department of Education (DepEd). These existing challenges call for an urgent need to examine how teaching strategies relate to students' performance in Physics, particularly from the perspective of those who directly experience the instruction in the classroom.

Scaffolding, as a pedagogical approach rooted in guided and structured teacher support, has been widely studied in relation to student learning and academic outcomes across various disciplines. In Physics specifically, students' difficulties have been found to correlate with their achievement, suggesting that the manner in which teachers provide support during instruction carries meaningful implications for student performance (Pardo, 2017). Studies such as that of Alanazi et al. (2025) found that students who received scaffolding alongside guided discovery approaches performed better in higher-order thinking skills tests compared to those who experienced conventional instruction, pointing to a notable association between scaffolded teaching and student outcomes. In the Philippine context, Esparcia et al. (2024) examined the relationship between students' perceived advantages of scaffolding and academic performance in Mathematics, finding that learners held very high perceptions of the scaffolding technique, while Sun et al. (2021) further demonstrated that students' perceptions of both whole-class and one-to-one scaffolding were associated with their knowledge and skills. However, studies that focus specifically on students' perceptions of their Physics teacher's use of scaffolding techniques, and how these perceptions relate to academic performance, remain limited in the Philippine senior high school context.

This study is anchored on three complementary theoretical frameworks that together explain why students' perceptions of scaffolding are meaningful and how they may be associated with academic performance in Physics. Vygotsky's Sociocultural Theory (1978) serves as the primary foundation, establishing that learning is most productive when teachers, as More Knowledgeable Others (MKO), provide support within the learner's Zone of Proximal Development (ZPD), the space between what students can do independently and what they can accomplish with guidance. Bruner's Theory of Instruction (1966) complements this by emphasizing that knowledge should be delivered in sequence, moving from concrete to abstract understanding, so that learners can progressively build on prior knowledge, a process closely mirrored by scaffolding dimensions such as teacher guidance and gradual release. Sweller's Cognitive Load Theory (1988) further supports the framework by explaining that when teachers break down complex tasks and provide timely feedback, the mental burden placed on students' working memory is reduced, allowing them to focus on understanding rather than struggling with the difficulty of the task alone. Taken together, these three theories provide a coherent rationale for why the manner in which students perceive their teacher's use of scaffolding techniques may carry a meaningful association with how they perform academically in General Physics 2.

Despite the theoretical grounding and existing literature on scaffolding, there remains a limited understanding of how Grade 12 STEM students in the Philippine context perceive the extent to which their Physics teacher applies scaffolding techniques, and whether these perceptions are significantly related to their academic performance in the subject. Specifically, this study investigated the following: (1) to what extent do Grade 12 STEM students perceive their Physics teacher as using scaffolding techniques in terms of teacher guidance, questioning, feedback, and gradual release during the School Year 2025-2026; (2) the academic performance of Grade 12 STEM students in General Physics 2; and (3) whether a significant relationship exists between students' perceived use of scaffolding and their academic performance in Physics. The study does not measure the effectiveness of scaffolding, but rather examines the degree to which students recognize its presence in their classroom and whether that recognition is associated with their academic standing in Physics.

The findings of this study carry important implications for various stakeholders in the Philippine senior high school education system, particularly those involved in Physics instruction. For Physics teachers, the results may serve as a basis for reflecting on how their instructional practices are perceived by students and which scaffolding dimensions: teacher guidance, questioning, feedback, or gradual release, are most closely associated with students' academic performance. For curriculum planners and school administrators, the study provides information that may inform decisions on instructional design, teacher support programs, and the integration of student-centered approaches in Physics education. For students, understanding that their perceptions of teaching support may be related to their academic performance encourages them to be more attentive and reflective participants in the learning process. Furthermore, this study contributes to the growing body of research on scaffolding in the Philippine senior high school setting and provides a reference point for future researchers who wish to further examine the relationship between students' perceived use of scaffolding techniques and their academic performance in science.

Hypotheses of the Study

Below are the hypotheses of the study:

1. H_0: There is no significant relationship between students’ perceived use of scaffolding techniques in terms of teacher guidance and their academic performance in General Physics 2.
2. H_0: There is no significant relationship between students’ perceived use of scaffolding techniques in terms of questioning and their academic performance in General Physics 2.
3. H_0: There is no significant relationship between students’ perceived use of scaffolding techniques in terms of feedback and their academic performance in General Physics 2.
4. H_0: There is no significant relationship between students’ perceived use of scaffolding techniques in terms of gradual release and their academic performance in General Physics 2.

2. Methodology

This section presents the research design, locale, respondents, instrument, data gathering procedures, data analysis, and ethical considerations of the study.

2.1 Research Design

The study was in a quantitative form, particularly in a descriptive-correlational research design. The design allows researchers to describe the characteristics of a population and determine the relationship between two or more variables, without undergoing manipulation. According to Creswell & Creswell (2018), correlational research designs are quantitative in nature and are used to determine the relation of two or more variables. This study aimed to describe the extent to which students perceive their physics teachers as using scaffolding techniques and to determine the relationship between perceived use of scaffolding techniques and academic performance in Physics.

2.2 Research Locale

The study was conducted in one of the public schools in Tacloban City, Leyte, over a period from March to April 2026. The study was conducted at the chosen school, as it offers a STEM strand, and the General Physics 2 subject is handled by one Physics teacher only. To maintain internal consistency of the result, the researcher limited it to one Physics teacher, as different teachers may result in different perceptions from the students. In addition, the said locale was suitable and accessible to the researcher. The data collection was conducted using Google Forms, where respondents answered the survey questionnaire at their most convenient time.

2.3 Research Respondents

The respondents of this study were the Grade 12 STEM students who were taking General Physics 2 under the STEM strand during the School Year 2025 – 2026. Since the study was conducted in one school and in Grade 12 STEM students only, with 66 population, a total population sampling was utilized. Since the size of the population is small and easily accessible, a census sampling or total population sampling is appropriate to use (Etikan et al., 2016). Meanwhile, the respondents were selected using the following criteria: (1) they were grade 12 students taking the STEM strand; (2) they were currently enrolled in General Physics 2 handled by the same Physics teacher; (3) they belonged to the age group 17 years old and above, and parental or guardian consent was provided for those who were 17 years old; lastly (4) respondents were willing to participate. The study also included students of all genders, as gender is not a factor in determining the respondents.

2.4 Research Instrument

The study utilized a researcher-made survey questionnaire to measure the extent to which students perceive their physics teachers as using scaffolding techniques. It underwent content validation with 3 research experts in the Science Education, and was analyzed using the Content Validity Index. To ensure the reliability of the instrument, a pilot test was done on 30 Grade 12 STEM students, separate from the total sample in the study. It is stated in the study of Bujang et al. (2024) that a sample size of 30 is enough to test the reliability of the questionnaire, and it was analyzed using Cronbach's alpha with a confidence interval of 95% for Teacher Guidance ($\alpha = 0.937$); Questioning ($\alpha = 0.948$); Feedback ($\alpha = 0.952$); and Gradual Release ($\alpha = 0.862$). Their General Weighted Average in General Physics 2 was retrieved from their school's records and the school's head approval, and has served as a basis for measuring their academic performance.

2.5 Data Gathering Procedure

Before the collection of data, approval from the Ethics Review Committee and the school concerned was prioritized. Upon approval, the researcher coordinated with the school's head and the Grade 12 STEM Physics teacher to accommodate the availability of the respondents. The researcher conducted an online orientation to explain the purpose of the study, research procedures, potential risks and benefits, and the rights of the respondents, including voluntary participation and confidentiality of responses. An informed consent section was included in the Google Form, and respondents are required to provide their consent before answering the survey questionnaire. For respondents who are minors, a student assent section was included along with the parental or guardian consent prior to answering the survey questionnaire.

Since the study utilized a total population sampling, the list of the sections from grade 12 STEM students was obtained, and those who fit the inclusion criteria were selected as respondents. Respondents were asked to complete a researcher-made survey questionnaire that focuses on their perceptions of scaffolding techniques used in their Physics classes. Academic performance data were collected in aggregate form, with the school's approval and with the aid of the Physics teacher. The data was stored in a password-protected Google Drive account, anonymized, and accessed only by the researcher to ensure confidentiality. After data collection, the responses were systematically analyzed for research purposes only.

2.6 Data Analysis

The mean and standard deviation were utilized to measure the extent to which students perceive their physics teachers as using scaffolding techniques, and academic performance in Physics. The study utilized a five-point Likert scale to measure students' perceptions of scaffolding techniques in Physics consistent with established practices in educational research (Likert, 1932; Creswell, 2014). The academic performance of the students was measured using their General Weighted Average (GWA) in General Physics 2 during the second semester of School Year 2025–2026, when the subject was offered, following the Department of Education's grading scale and descriptive rating as stipulated in DepEd Order No. 8, s. 2015. Upon testing the variables for normality using the Shapiro-Wilk test, the data were not normally distributed. Thus, the researcher utilized Spearman's rho correlation, a non-parametric statistical tool, to determine the relationship between the variables, guided by Schober et al. (2018) for the verbal description of the correlation.

2.7 Ethical Considerations

This study was conducted following formal ethical approval from the designated Research Ethics Committee (REC), with data collection commencing only upon receipt of written approval and submission of all required documentation, including informed consent forms and study instruments. Participation was entirely voluntary, and respondents were informed of their right to withdraw at any time or skip any question without academic consequence, with minors required to submit both student assent and parental consent forms prior to participation. All responses were anonymized and stored in a password-protected Google Drive account accessible only to the researcher, in compliance with the Data Privacy Act of 2012 (Republic Act No. 10173), Republic of the Philippines (2012), and all records will be retained for three to five years before secure disposal. Minimal risks identified in the study, such as temporary psychological discomfort and time inconvenience, were mitigated through voluntary participation, confidentiality assurances, and access to school guidance counselors through a referral system should any distress arise. Respondents received a simple token of appreciation for their participation, and findings will be disseminated in aggregate form to school administrators and published in academic journals without disclosing any individual or institutional identity.

3. Results and Discussion

This chapter presents the results and discussion of the findings. Statistical tables are presented in accordance with the statement of the problem.

Extent of Physics Teacher's Use of Scaffolding Techniques

This section presents the extent to which students perceived their Physics teacher as using scaffolding techniques. The techniques are based on teacher guidance, questioning, feedback, and gradual release. The data are presented in a tabular format, and indicators are also presented along with the mean, standard deviation, and verbal interpretation.

Table 1

Grade 12 STEM Students' Perceived Use of Scaffolding Techniques in Terms of Teacher Guidance

	Indicators	Mean	SD	Verbal Interpretation
1.	My Physics teacher gives clear step-by-step explanations when lessons are difficult.	4.67	0.66	Always
2.	My Physics teacher provides examples before asking us to solve problems.	4.74	0.64	Always
3.	My Physics teacher explains the key concepts during activities.	4.74	0.61	Always
4.	My Physics teacher gives additional information when I do not understand the lesson.	4.79	0.51	Always
5.	My Physics teacher adjusts the explanation or activities to help students who are having difficulty.	4.77	0.52	Always
OVERALL		4.74	0.51	Always

Note: 4.21–5.00 (Always); 3.41–4.20 (Often); 2.61–3.40 (Sometimes); 1.81–2.60 (Rarely), 1.00–1.80 (Never)

Teacher guidance as a scaffolding technique was consistently perceived by Grade 12 STEM students in their General Physics 2 class, as reflected in the overall mean score (M = 4.74, SD = 0.511), interpreted as Always. The low standard deviation entails that students uniformly perceived their physics teacher as consistently providing guidance throughout the instruction. The findings imply that the teacher regularly applies teacher guidance as a scaffolding technique, suggesting that students are consistently supported in understanding Physics concepts. This result is consistent with the study of Sasse et al. (2024), who emphasized that teacher guidance in an inquiry-based science classroom was regularly observed and recognized as a strategy in the science instructions. In addition, the study of Esparcia et al. (2024) revealed that students reported very high perceptions of teacher-directed scaffolding practices in Mathematics, including teacher demonstration and guided instruction, which reflects with the high mean scores observed for teacher guidance in the present study. In the Philippine context, teacher guidance as part of scaffolded instruction has been identified as a commonly utilized and recognized strategy by students, particularly in STEM-related subjects where concept complexity needs structured teacher support (Abuda et al., 2025). The consistent pattern of high perceptions across all five indicators of teacher guidance in this study reflects a classroom environment where the Physics teacher is seen as regularly assuming the role of a More Knowledgeable Other, providing step-by-step explanations, worked examples, and adjusted instruction in ways that are visible and recognizable to students.

Table 2
Grade 12 STEM Students' Perceived Use of Scaffolding Techniques in Terms of Questioning

	Indicators	Mean	SD	Verbal Interpretation
1.	My Physics teacher asks guiding questions that help me understand the topic better.	4.59	0.76	Always
2.	My Physics teacher asks me to explain how I got my answers.	4.44	0.86	Always
3.	My Physics teacher asks follow-up questions when my answers are incomplete.	4.41	0.85	Always
4.	My Physics teacher encourages me to analyze deeply through questions.	4.56	0.80	Always
5.	My Physics teacher asks questions that connect previous lessons and new topics to provide a more clear statement.	4.73	0.75	Always
OVERALL		4.55	0.71	Always

Note: 4.21–5.00 (Always); 3.41–4.20 (Often); 2.61–3.40 (Sometimes); 1.81–2.60 (Rarely), 1.00–1.80 (Never)

Questioning as a scaffolding technique was consistently perceived by Grade 12 STEM students in their Physics class, as reflected in the overall mean score (M = 4.55, SD = 0.712), interpreted as Always. The low standard deviation indicates that students uniformly recognized this strategy as a regular technique in the Physics teacher's classroom instruction. This implies that questioning is regularly integrated into teaching, reflecting a stable pattern of scaffolding practice in the Physics classroom. In particular, Wang et al. (2023) noted that questioning chains, or sequences of teacher-initiated questions, play as an important instructional strategy that supports students' knowledge construction in inquiry-oriented science teaching. This mirrors the pattern described by the high-scoring indicators in this dimension, particularly the item on connecting previous lessons to new topics (M = 4.73), as such questioning sequences help students to link prior with new knowledge. Furthermore, the study of Sun et al. (2021) on students' perceptions of scaffolding in digital game-based learning in Mathematics similarly found that teacher scaffolding strategies in digital game-based Mathematics learning influenced students' learning activities and perceptions, highlighting the role of structured teacher support in facilitating learning. The consistent perception of questioning in the present study suggests that the Physics teacher regularly utilizes questioning as a means of guiding students' engagement with content, reflecting a practice commonly associated with scaffolded instruction in science classrooms.

Table 3
Grade 12 STEM Students' Perceived Use of Scaffolding Techniques in Terms of Feedback

	Indicators	Mean	SD	Verbal Interpretation
1.	My Physics teacher gives timely feedback on my work.	4.12	1.02	Often
2.	My Physics teacher corrects my mistakes in a helpful way.	4.45	0.84	Always
3.	My Physics teacher explains why my answers are right or wrong.	4.42	0.91	Always
4.	My Physics teacher helps me understand how to improve my performance.	4.47	0.89	Always
5.	My Physics teacher encourages me when I have difficulty understanding the Physics lesson.	4.52	0.88	Always
OVERALL		4.40	0.80	Always

Note: 4.21–5.00 (Always); 3.41–4.20 (Often); 2.61–3.40 (Sometimes); 1.81–2.60 (Rarely), 1.00–1.80 (Never)

Overall, the findings indicate that the Physics teacher practices feedback as a strategy in the classroom (M = 4.40, SD = 0.800), interpreted as Always. This indicates a consistent perception of students on the use of feedback strategies in the classroom. The low standard deviation indicates consistent perceptions on the use of feedback strategies in the classroom. Four out of five indicators were perceived as Always, while one of the indicators was perceived as Often. Particularly, the lowest indicator is on the timely feedback (M = 4.12, SD = 1.02). This suggests that even though the students consistently provide feedback as a scaffolding practice, the timeliness of its delivery may become an area for further improvement. Brandmo and Gamlem (2025) reported that timely and action-oriented teacher feedback is characterized by providing students with clear guidance that helps them identify aspects of their work that require further attention, while also supporting their engagement with learning tasks and their understanding of task expectations, which aligns with the findings of the study. Similarly, Paurillo (2025) documented that teacher feedback, as perceived by students, is associated with their motivation, self-esteem, and overall academic standing, suggesting that students' recognition of feedback as a classroom practice carries meaningful implications for how they engage with learning. The high mean scores across the four remaining feedback indicators, including the correction of mistakes, explanation of right and wrong answers, and encouragement during difficulty, suggest that while the Physics teacher is consistently perceived as practicing feedback, its delivery may need further reflection.

Table 4

Grade 12 STEM Students' Perceived Use of Scaffolding Techniques in Terms of Gradual Release

	Indicators	Mean	SD	Verbal Interpretation
1.	My Physics teacher slowly reduces help as I learn more.	3.74	1.18	Often
2.	My Physics teacher allows me to solve problems independently once I am ready.	4.47	0.86	Always
3.	My Physics teacher gives less guidance when I show improvement.	3.59	1.29	Often
4.	My Physics teacher trusts me to handle tasks on my own over time.	4.32	0.88	Always
5.	My Physics teacher helps me become an independent learner in Physics subject.	4.53	0.80	Always
OVERALL		4.13	0.76	Often

Note: 4.21–5.00 (Always); 3.41–4.20 (Often); 2.61–3.40 (Sometimes); 1.81–2.60 (Rarely), 1.00–1.80 (Never)

The result shows that the Physics teacher frequently practices gradual release as a scaffolding strategy in the classroom (M = 4.13, SD = 0.768), interpreted as Often. The low standard deviation indicates that students uniformly perceived gradual release as a scaffolding technique being practiced in a classroom. The mean scores revealed that students recognized the effort of their Physics teacher in helping them become independent learners. The Gradual Release obtained the lowest mean among the four dimensions of scaffolding techniques, which indicates that the technique is not as consistently perceived by the students, unlike Teacher Guidance, Questioning, and Feedback. This finding is consistent with Tiedra and Toraja (2025), who emphasized that instructional support is intentionally reduced as learners develop greater competence and independence. The gradual release model involves shifting responsibility from teacher-directed guidance toward student autonomy, making the fading of support a less observable instructional action compared to direct practices such as explanations, questioning, or feedback. Moreover, the two indicators that obtained the lowest mean scores in this dimension, the Physics teacher slowly reducing help as students learn more (M = 3.74) and giving less guidance when students show improvement (M = 3.59), both reflect a reduction in teacher intervention, which may be less noticeable to students who are exposed to more forms of support. Sun et al. (2021) found that teacher scaffolding strategies strongly influenced students' learning experiences and perceptions, as students often recognize observable forms of instructional assistance in the learning process. Despite obtaining the lowest mean among the four dimensions, the result still indicates that gradual release was perceived as frequently used. This suggests that the Physics teacher makes efforts to promote student independence and encourage learners to take greater responsibility for their own learning, even if the reduction of support may not be consistently recognized by students.

Grade 12 STEM Students' Academic Performance

This section presents the students' overall General Weighted Average in the second semester for the subject, General Physics 2.

Table 5

Grade 12 STEM Students' General Weighted Average (GWA) in General Physics 2

Variable	Mean	SD	Descriptive Rating
Grades	89.9	5.18	Very Satisfactory

Based on the data, the students obtained a mean grade and standard deviation (*M = 89.9, SD = 5.18*), interpreted as Very Satisfactory. This indicates that students generally achieved an excellent performance in General Physics 2. The mean score suggests that students performed well in the subject on average. The standard deviation indicates a moderate variation in students' grades. Under the Department of Education's grading scale (DepEd Order No. 8, s. 2015), a grade of 85–89 corresponds to a Very Satisfactory descriptive rating, which indicates that students are consistently meeting the expected competencies in the subject. This outcome is consistent with findings from local studies examining the academic performance of secondary students in science using the same DepEd grading framework. Sabanal et al. (2023), in a correlational study of 318 secondary students in Davao del Norte, Philippines, reported that students' academic performance in science was Very Satisfactory under the DepEd grading scale. This finding suggests that students generally demonstrate satisfactory to high levels of academic achievement in science-related subjects. In the context of the present study, Grade 12 STEM students, having selected a science-oriented academic strand, may be expected to demonstrate performance levels that meet or approach the standards established for their subject area, including General Physics 2. Furthermore, the moderate standard deviation indicates that although most students clustered within the Very Satisfactory range, variation in performance still exists, reflecting differences in students' academic readiness and learning characteristics within the same classroom context.

Relationship Between Grade 12 STEM Students' Perceived Use of Scaffolding Techniques and Academic Performance

This section presents the relationship between perceived use of scaffolding techniques and the academic performance of Grade 12 STEM students in General Physics 2.

Table 6

Test of Significance Between Students' Perceived Use of Scaffolding Technique and Academic Performance

Spearman's rho Correlation

		GWA in General Physics 2	Verbal Description	Interpretation
Teacher Guidance	**Spearman's rho**	0.145	Negligible Correlation	No Significant Relationship
	p-value	0.244		
Questioning	**Spearman's rho**	0.123	Negligible Correlation	No Significant Relationship
	p-value	0.324		
Feedback	**Spearman's rho**	0.427***	Moderate Correlation	Significant Relationship
	p-value	<.001		
Gradual Release	**Spearman's rho**	0.030	Negligible Correlation	No Significant Relationship
	p-value	0.814		

Note. * $p < .05$, ** $p < .01$, *** $p < .001$

Table 6 presents the Spearman's rho correlation between the perceived use of scaffolding techniques: teacher guidance, questioning, feedback, and gradual release, and the students' General Weighted Average (GWA) in General Physics 2.

Among the four scaffolding techniques, only *Feedback* showed a Moderate Correlation with students' academic performance ($\rho = 0.427$, $p <.001$), thereby leading to rejection of the null hypothesis. This finding implies that students' perception of their Physics teacher's use of feedback in the classroom is positively associated or has significant relationship with their academic performance in General Physics 2. This finding is consistent with the study of Paurillo (2025), which found that teacher feedback is associated with students' motivation, self-esteem, and overall academic performance. Similarly, Abaniel (2021) noted that immediate feedback is linked to the validation of students' learning and the addressing of misconceptions during the learning process, which corresponds to the positive association observed in the present study. Therefore, the positive association observed in the present study suggests that students who perceive feedback as consistently practiced in the classroom also tend to demonstrate higher levels of academic performance in General Physics 2.

Teacher Guidance showed no or Negligible Correlation with academic performance ($\rho = 0.145$, $p = 0.244$), thereby retaining the null hypothesis. This implies that students' perception of their Physics teacher as using teacher guidance is not associated with or has no significant relationship with their academic performance. This finding is consistent with that of Abuda et al. (2025), whose study found no significant relationship between teacher support and learners' academic performance across English, Mathematics, and Science, suggesting that the presence of teacher guidance alone may not be directly associated with student academic outcomes. This shows that teacher guidance, though consistently perceived by the students as present in the science classroom, does not consistently carry a positive or direct relationship towards their academic performance.

In addition, Questioning showed a no or Negligible Correlation with academic performance ($\rho = 0.123$, $p = 0.324$), thereby retaining the null hypothesis. This finding suggests that students' perception of their teacher's use of questioning was not significantly associated with or had no relationship with their academic performance in General Physics 2. This may be related to the nature of classroom questioning, which students in the present study may perceive primarily as an instructional strategy for engaging with lesson content rather than as a classroom practice associated with academic outcomes. The finding is consistent with the study Calanoga et al. (2019), which likewise reported no significant relationship between teachers' questioning practices and students' academic performance. This similarity suggests that although questioning may play an important role in classroom interaction and was consistently perceived by the students, its perceived use may not necessarily correspond with students' academic performance.

Furthermore, the Gradual Release showed no or Negligible Correlation with students' academic performance in General Physics 2 ($\rho = 0.030$, $p = 0.814$), thereby retaining the null hypothesis. This finding implies that students' perception of their teacher's use of gradual release of responsibility is not directly associated with or has no significant relationship with their academic performance in General Physics 2. This is consistent with the findings of Tiedra and Toraja (2025), who examined the Gradual Release of Responsibility Instructional Model among Grade 9 students in Mathematics and found no significant difference in academic performance between students exposed to GRRIM and those taught through traditional methods. This shows that gradual release of responsibility, whether as a perceived instructional dimension or as an applied model, does not consistently carry a direct relationship with academic performance.

Conclusion

The Physics teacher was perceived by Grade 12 STEM students as consistently using scaffolding techniques in teaching General Physics 2, particularly teacher guidance, questioning, and feedback, indicating that these scaffolding dimensions are recognizable and commonly experienced by students inside the classroom. The Grade 12 STEM students demonstrated a very satisfactory level of academic performance in General Physics 2, suggesting that students generally perform well in the subject. Among the four scaffolding dimensions, only Feedback showed a statistically significant relationship with students' academic performance in General Physics 2, indicating that the extent to which students perceive their teacher as providing feedback is associated with their academic performance.

These findings can be understood through the aid of the three theoretical frameworks that anchor this study. Vygotsky's Sociocultural Theory (1978), which implies that learning is most productive when the teacher, as a More Knowledgeable Other, provides support within the learner's Zone of Proximal Development, is reflected in the consistently high perceptions of teacher guidance, questioning, and feedback across the study. The fact that students uniformly recognized their Physics teacher as regularly providing these forms of support aligns with sociocultural theory: that structured interaction between a more knowledgeable other or the teacher and students is a defining feature of effective instruction.

The significant relationship between feedback and academic performance corresponds with Vygotsky's view that timely and responsive feedback is what enables students to move toward independent mastery within their zone of proximal development. Bruner's Theory of Instruction (1966) further emphasizes the pattern observed in teacher guidance and questioning, both of which were perceived at the highest levels. Bruner emphasized that knowledge should be structured and sequenced in a way that allows learners to build understanding progressively, from concrete to abstract. The high perception of teacher guidance, particularly in providing step-by-step explanations, worked examples, and adjusted instruction, reflects this principle of structured, sequenced support. The somewhat lower perception of gradual release, meanwhile, is consistent with Bruner's scaffolding concept, wherein the transition from teacher-directed to student-independent learning is a gradual process that may not always be perceived by learners, especially in a subject as demanding as Physics.

Lastly, Sweller's Cognitive Load Theory (1988) explains why feedback emerged as the only dimension significantly associated with academic performance. By reducing unnecessary cognitive loads and helping students identify where their understanding is incorrect, feedback directly addresses the burden placed on working memory during Physics instruction. When students perceive their teacher as regularly correcting mistakes, explaining right and wrong answers, and providing encouragement during difficulty, they are receiving precisely the kind of targeted support that Cognitive Load Theory identifies as important for learning in cognitively demanding subjects like Physics. Thus, the findings suggest that students' perception of their teacher's scaffolding practices, especially those that support their learning needs, is meaningfully associated with their academic performance in General Physics 2.

Recommendations

Physics teachers may continue utilizing scaffolding techniques in teaching General Physics 2, particularly feedback strategies, as this dimension was found to have a statistically significant relationship with students' academic performance in the subject. Teachers may reflect on how their use of feedback is perceived by students and consider enhancing the timeliness, consistency, and clarity of feedback delivery, given that students' perception of feedback was found to be associated with their academic standing in General Physics 2. Teachers may revisit how gradual release strategies are communicated and carried out in the classroom, as students' perception of this dimension did not show a significant relationship with academic performance, suggesting a need to examine how this technique is recognized and experienced by learners. School administrators may provide professional development programs, seminars, or workshops that help Physics teachers understand how students perceive scaffolding techniques and how specific dimensions, particularly feedback, are associated with academic performance in science instruction. Students may take an active role in engaging with their teacher's feedback, questioning activities, and guided learning experiences, as their perception of these scaffolding techniques may be associated with how they perform academically in General Physics 2. Future researchers may conduct similar studies using larger samples, different Physics teachers, other science subject areas, additional scaffolding dimensions, or other forms of academic performance aside from grades to further examine the relationship between students' perceived use of scaffolding techniques and academic performance.

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