



SELF-EFFICACY AND COGNITIVE LOAD OF GRADE 11 LEARNERS IN SCIENCE

Heidi Rose M. Gasapo¹,

Joji D. Linaugo²,

Kevin Clyde A. Ong³ⁱ

¹Teacher,

Pontevedra National High School,

Negros Occidental,

Philippines

²Associate Professor,

Carlos Hilado Memorial State University,

Negros Occidental,

Philippines

orcid.org/0000-0001-9915-7793

³Master Teacher,

Sum-ag National High School,

Negros Occidental,

Philippines

orcid.org/0000-0001-6816-3920

Abstract:

Self-efficacy and cognitive load are critical factors influencing science learning outcomes. While self-efficacy reflects learners' confidence in their academic abilities, cognitive load represents the mental demands of processing instructional tasks. Understanding their relationship provides insight into how motivation and cognition interact in complex learning environments. This study employed a descriptive-correlational design to examine the relationship between self-efficacy and cognitive load among Grade 11 learners in Science at a public secondary school in Central Philippines during the School Year 2025–2026. Data were collected using the Academic Self-Efficacy Scale (ASES) and the Academic Cognitive Load Questionnaire (ACLQ). Descriptive statistics determined the levels of self-efficacy and cognitive load, while Pearson product-moment correlation tested their relationship. Findings revealed that learners demonstrated an average level of self-efficacy, reflecting a balanced yet developing sense of academic confidence. Cognitive load was also found to be at an average level, indicating manageable but effortful mental demands in science learning. A significant low positive correlation was established between self-efficacy and cognitive load, suggesting that learners with higher confidence tend to engage more cognitively with science tasks. The study confirms that self-efficacy and cognitive load are meaningfully related, highlighting the importance of

ⁱ Correspondence: email kevinclydeong@lccbonline.edu.ph, kevinclyde.ong@deped.gov.ph

enhancing learners' confidence while maintaining balanced cognitive demands. These findings underscore implications for instructional design, learner support, and curriculum development to promote effective and sustained science learning.

Keywords: Science education, self-efficacy, cognitive load, descriptive-correlational research design, Central Philippines

1. Introduction

Science subjects involve complex cognitive and motivational demands in both teaching and learning. Learners, globally, must not only master content but also integrate higher-order thinking skills, interpret multiple representations, and engage in inquiry-based learning. As an inherently interesting subject, Science challenges learners to question, explore, and discover patterns in the world around them (Hartelt & Martens, 2024). This intellectual curiosity requires higher-order thinking, pushing learners beyond rote memorization toward analysis, synthesis, and evaluation. Moreover, learners with high academic self-efficacy are more likely to embrace these challenges, sustaining engagement even when tasks are demanding (Tan *et al.*, 2021).

Academic self-efficacy is a learner's belief in their ability to perform academic tasks successfully. It is widely recognized as a strong predictor of learners' engagement and achievement in science subjects (Colango & Ong, 2026). When learners feel confident in mastering concepts, solving problems, and completing assignments, they are more likely to engage actively in learning (Chang *et al.*, 2022). This confidence fuels persistence, even when challenges arise, because learners trust in their capacity to overcome difficulties. In classrooms, high self-efficacy is associated with stronger motivation, better use of learning strategies, and improved academic performance (Fokkens-Bruinsma *et al.*, 2021; Zheng *et al.*, 2021).

Academic cognitive load refers to the mental effort required to process, understand, and retain information, and this is especially evident in science education (Skulmowski & Xu, 2022). Science subjects require learners to comprehend complex terms, interpret abstract concepts, and follow intricate processes, such as conducting experiments and solving problems. Recent developments in this theory emphasize that intrinsic, extraneous, and germane cognitive loads management enhances understanding and performance (Evans *et al.*, 2024). When instructional design is clear and supportive, cognitive load can be optimized, allowing learners to devote germane effort toward building schemas and mastering higher-order thinking skills. This positive experience strengthens their academic self-efficacy, as confidence grows when learners successfully navigate challenging scientific tasks (Feldon *et al.*, 2023).

However, higher-order intrinsic load from highly complex content or extraneous load from unclear explanations can overwhelm working memory, leading to frustration and disengagement. Such negative experiences may weaken self-efficacy, as learners begin to doubt their ability to succeed in Science (Hartelt & Martens, 2024). It is generally

accepted that when a learner's instructional demands exceed working memory capacity, learning is hindered (Paas *et al.*, 2003; Sweller, 1988).

Science education requires learners to balance complex cognitive demands with motivational resilience, making both self-efficacy and cognitive load central to achievement. Research shows that high self-efficacy sustains engagement (Zhang, 2024), while effective cognitive load management enhances understanding and schema construction (Gkintoni *et al.*, 2025). However, studies often examine these constructs separately, leaving their dynamic interplay in science learning underexplored. Evidence is also limited in diverse contexts and in relation to higher-order thinking skills, where learners' confidence may be most vulnerable. Thus, there is a need to investigate how self-efficacy and cognitive load interact to shape science learning outcomes, providing insights for more effective instructional design.

1.1 Statement of the Problem

This study sought to determine the relationship between self-efficacy and cognitive load among Senior High School learners. Specifically, it sought to answer the following questions: What is the level of self-efficacy of Grade 11 learners in the science subject?; What is the level of cognitive load of Grade 11 learners in the science subject?; and Is there a significant relationship between the level of self-efficacy and cognitive load of Grade 11 learners? Given the preceding inferential problem, it was hypothesized that there is no significant relationship between academic self-efficacy and academic cognitive load of Grade 11 learners.

2. Framework

This study is anchored on Cognitive Load Theory (CLT) (Sweller, 1988; Sweller *et al.*, 2019), which states that human working memory has a limited capacity for processing information. Learning becomes less effective when instructional tasks exceed this capacity. CLT categorizes cognitive load into three types. First is the Intrinsic load, which covers the inherent difficulty of the content. Another would be the Extraneous load, which refers to the unnecessary cognitive effort imposed by poorly designed instructional materials; lastly, the Germane load, which describes the mental effort devoted to forming meaningful learning connections.

Understanding cognitive load provides insight into how the mental demands of Science learning affect learners' motivation and academic outcomes. When instructional materials are designed to align with learners' cognitive capacities, learners are more likely to engage actively, remain focused, and achieve higher academic performance.

Complementing CLT is Self-Determination Theory (SDT) (Deci & Ryan, 1985; Ryan & Deci, 2000), which emphasizes that motivation is driven by the satisfaction of three basic psychological needs: autonomy, competence, and relatedness. Learners who perceive themselves as competent in science concepts, feel autonomous in their learning, and experience supportive connections with teachers and peers tend to exhibit higher intrinsic motivation. Excessive cognitive load, however, can undermine learners'

perceived competence, reduce motivation, and negatively affect academic outcomes. SDT thus supports the premise that managing cognitive load can sustain motivation and engagement, thereby improving learning.

Taken together, Cognitive Load Theory (CLT) and Self-Determination Theory (SDT) provide a strong foundation for examining the dual challenges of cognition and motivation in science learning. CLT is appropriate because it explains how the limited capacity of working memory influences learners' ability to process complex scientific information, emphasizing the need to manage intrinsic, extraneous, and germane loads. SDT complements this by highlighting how autonomy, competence, and relatedness drive intrinsic motivation, showing that excessive cognitive load can undermine learners' perceived competence and engagement. Anchoring the study on these theories ensures that both the cognitive processes and motivational factors shaping science achievement are addressed. Thus, CLT and SDT together capture the essential interplay between mental effort and motivation, making them fit frameworks to guide this research.

3. Methodology

This study employed a descriptive-correlational research design to examine the relationship between self-efficacy and cognitive load of Grade 11 learners in Science.

Descriptive statistics were used to determine the levels of the variables, while correlational analysis was used to examine their relationships. This design is appropriate as it allows the researchers to describe existing conditions and explore associations among variables without manipulation. The descriptive correlational method is a research design that observes and describes relationships between two or more variables (Thomas & Zubkov, 2023). As such, it is suitable for identifying patterns and relationships that serve as a basis for prediction and further analysis.

The study was conducted in one of the public secondary schools in Central Philippines during the School Year 2025–2026. The school implemented the Strengthened Senior High School (SHS) Curriculum, offering an academic Track with strands including STEM, HUMSS, ABM, and TVL track, which includes CSS, Cookery, and EIM.

The respondents of this study were Grade 11 learners enrolled in the Science subject at a public secondary high school during the Academic Year 2025–2026. The total population consisted of 404 learners across various academic strands (STEM, HUMSS, ABM, and TVL-COOKERY, CSS, AND EIM). The sample size was determined using the G*Power formula with a 5% margin of error, resulting in a required sample size of 204 learners. Stratified random sampling was employed to ensure proportional representation from each strand within the population.

The researchers utilized two instruments to gather the data. The first instrument used was the Academic Self-Efficacy Scale (ASES) developed by Gafoor and Ashraf (2016). The Academic Self-Efficacy Scale (ASES) was used to assess learners' confidence in their ability to perform academic tasks successfully. It evaluated how learners perceived their competence in mastering concepts, solving problems, and completing assignments, which are critical indicators of motivation and persistence in learning. In

this study, the ASES was employed as it provides a structured, validated measure tailored to educational contexts.

The second instrument was the Academic Cognitive Load Questionnaire (ACLQ) developed by Krieglstein *et al.* (2023). This instrument was utilized to measure the different types of cognitive load experienced by learners in academic settings. Grounded in cognitive load theory, the ACLQ distinguished between intrinsic load, which reflected the inherent complexity of the material; extraneous load, which arose from instructional design or presentation; and germane load, which represented the mental effort invested in constructing and refining knowledge schemas.

Validity referred to how well the data represented factual findings and the extent to which the instrument measured what it intended to measure (Ahmed & Ishtiaq, 2021). The questionnaires were reviewed by ten experts composed of five subject-matter experts in education, along with two psychometricians, two guidance counselors, and one registered psychologist. These experts, with specialization in educational psychology and science education, evaluated the instruments for content validity, clarity, relevance, and appropriateness of the items.

The overall validity score obtained was 0.887, which exceeds the critical CVI value of 0.80 for a panel size of 10 experts, indicating high content validity. Most items yielded CVR values ranging from 0.80 to 1.00, signifying that they were considered essential by the panel of experts. However, a few items with CVR values of 0.60, which fall below the acceptable threshold, were identified and removed from the instruments. Overall, these results indicate that all three instruments are valid and suitable for data collection, with only minimal revisions made to ensure that all retained items meet the required level of content validity.

Item-level Content Validity Ratios (CVR) were calculated using Lawshe's formula. Following (Ayre & Scally, 2014) recalculation of Lawshe's critical values, a CVI of 0.80 or higher was used as the cutoff for retaining items, while those below the threshold were revised or removed. Feedback from the experts was also incorporated to improve item wording and contextual relevance.

Reliability referred to the degree of consistency in measurement and the extent to which it was free from error (Gidron, 2020). Prior to the main data collection, the instruments' internal consistency was assessed through a pilot test conducted with approximately 30 non-participating Grade 11 learners. Cronbach's alpha was computed for each scale to evaluate internal reliability.

Based on methodological standards, an alpha coefficient of 0.70 or higher is considered acceptable for research purposes. The pilot test yielded a Cronbach's alpha of 0.73 for the Cognitive Load instrument, indicating acceptable reliability; and 0.93 for the Self-Efficacy instrument, also indicating excellent reliability. Since all obtained alpha values are above the minimum threshold of 0.70, the instruments were deemed sufficiently reliable for use in the main study.

Approval to conduct the study was obtained from the Schools Division Superintendent and subsequently from the school principal. After securing the necessary

permissions, the researchers coordinated with Science teachers to schedule the data collection.

Participants were then briefed on the study’s purpose, the voluntary nature of their participation, and the measures taken to ensure confidentiality. The questionnaires were administered in printed form, depending on accessibility. Each participant was given approximately 15–30 minutes to answer the instruments.

After administration, the collected data were coded, tabulated, and prepared for statistical analysis in accordance with ethical research guidelines.

The numerical data gathered from the instruments were subjected to specific descriptive and inferential statistical treatment.

The levels of academic self-efficacy and academic cognitive load of Grade 11 learners in Science were analyzed using means and standard deviations.

The Academic Self-Efficacy Scale (ASES) and Academic Cognitive Load Questionnaire (ACLQ) were employed to measure the learners’ levels of academic self-efficacy and cognitive load. Responses to all instruments were interpreted using their corresponding weighted scales, wherein each weight was assigned a descriptive equivalent as indicated below.

Table 1: Description of Learners’ Levels of Academic Self-Efficacy, Academic Cognitive Load, and Motivation

Weight	Range	Description
1	1.00 – 1.49	Very Low
2	1.50 – 2.49	Low
3	2.50 – 3.49	Average
4	3.50 – 4.49	High
5	4.50 – 5.00	Very High

On the other hand, Pearson product-moment correlation was used to determine the significant relationships between self-efficacy and cognitive load.

4. Results and Discussion

This chapter presents and discusses the findings of the study on the self-efficacy and cognitive load of Grade 11 learners in Science.

Table 2: Level of Academic Self-Efficacy of Grade 11 Learners in the Science Subject

Categories	M	Interpretation	SD
Self-efficacy	3.13	Average	0.69
Learning Confidence	3.11	Average	0.74
Study Management	3.05	Average	0.79
Resource Utilization	3.21	Average	0.75
Assessment Confidence	3.15	Average	0.80

Note: The description was based on the following scale. 1.00-1.49 (Very Low), 1.50-2.49 (Low), 2.50-3.49 (Average), 3.50-4.49 (High), 4.50-5.00 (Very High).

Table 2 shows that the level of academic self-efficacy of Grade 11 learners in Science was found to be average ($M = 3.13$, $SD = 0.69$). Among its components, resource utilization obtained the highest mean ($M = 3.21$, $SD = 0.75$), followed by assessment confidence ($M = 3.15$, $SD = 0.80$), learning confidence ($M = 3.11$, $SD = 0.74$), and study management ($M = 3.05$, $SD = 0.79$), all described as average.

This result indicates that learners possess a moderate level of confidence in their academic abilities in Science. While they demonstrate some degree of belief in their capability to utilize resources and perform in assessments, their study management and learning confidence suggest room for improvement. This implies that learners are somewhat capable of handling academic tasks but may not consistently exhibit strong independence or persistence when faced with challenging scientific concepts.

This finding supports the concept that academic self-efficacy plays a crucial role in learners' engagement and persistence. As emphasized by Bandura (1997), self-efficacy influences how individuals approach tasks and challenges. Similarly, Fokkens-Bruinsma *et al.* (2021) and Zheng *et al.* (2021) found that learners with moderate to high self-efficacy tend to perform better academically due to increased motivation and use of effective learning strategies.

Similarly, studies have shown that learners with moderate to high self-efficacy tend to perform better academically due to increased motivation and the use of effective learning strategies (Fokkens-Bruinsma *et al.*, 2021; Zheng *et al.*, 2021). In particular, Fokkens-Bruinsma *et al.* (2021) found that learners who possess strong academic self-efficacy, along with autonomous motivation and effective time-management skills, are more likely to successfully perform academic tasks and adjust to academic demands. Their study further emphasized the importance of continuously monitoring learner characteristics and providing early feedback to support learners' readiness and persistence in their studies.

Moreover, Zheng *et al.* (2021) highlighted that academic self-efficacy is closely linked to self-regulated learning, academic resilience, and psychological well-being. Their findings suggest that learners with higher self-efficacy are more likely to demonstrate adaptive learning strategies, resilience in overcoming academic challenges, and sustained motivation, all of which contribute to improved academic performance. However, the average level observed in this study suggests that learners may not fully maximize these benefits, reinforcing the need for instructional strategies that enhance confidence and self-regulated learning and time-management skills. Furthermore, strengthening these areas may help learners transition from moderate to high levels of self-efficacy, ultimately improving their academic engagement and performance in Science.

Table 3 shows that the level of academic cognitive load among Grade 11 learners was average ($M = 2.68$, $SD = 0.51$). In terms of components, extraneous load obtained the highest mean ($M = 3.28$, $SD = 0.86$), followed by germane load ($M = 3.20$, $SD = 0.82$) and intrinsic load ($M = 2.68$, $SD = 0.74$), all interpreted as average.

Table 3: Level of Academic Cognitive Load of Grade 11 Learners in the Science Subject

Categories	M	Description	SD
Cognitive Load	2.68	Average	0.51
Intrinsic	2.68	Average	0.74
Extraneous	3.28	Average	0.86
Germane	3.20	Average	0.82

Note: The description was based on the following scale. 1.00-1.49 (Very Low), 1.50-2.49 (Low), 2.50-3.49 (Average), 3.50-4.49 (High), 4.50-5.00 (Very High).

This suggests that learners experience a moderate amount of mental effort in processing scientific information. However, the relatively higher extraneous load indicates that instructional materials or teaching methods may impose unnecessary cognitive demands, which could hinder effective learning. While germane load is also relatively high, suggesting that learners are exerting effort toward constructing meaningful understanding, the presence of elevated extraneous load may reduce overall learning efficiency. Indicating efforts toward meaningful learning, the presence of extraneous load may reduce overall efficiency.

This finding is consistent with Cognitive Load Theory (Sweller, 1988), which explains that excessive extraneous load can impede learning by overloading working memory, and that learning is constrained by the limited capacity of working memory and that excessive cognitive demands can interfere with knowledge acquisition. Specifically, Sweller (1988) emphasized that complex problem-solving processes, such as means-end analysis, require substantial cognitive resources, thereby leaving fewer resources available for schema construction and learning. This supports the idea that when learners are burdened with unnecessary mental effort, their ability to process and retain new information is diminished.

Furthermore, Cognitive Load Theory highlights the importance of minimizing extraneous load to allow sufficient cognitive capacity for intrinsic and germane processing (Sweller *et al.*, 1998). Studies by Skulmowski and Xu (2022) and Evans *et al.* (2024) confirm that poorly designed instruction increases extraneous load, negatively affecting both motivation and performance. Moreover, Skulmowski and Xu (2022) explained that poorly designed instructional materials, particularly in digital or complex learning environments, can introduce task-irrelevant demands that increase extraneous load, potentially hindering learning despite sometimes enhancing engagement. Their findings suggest that instructional design must carefully balance cognitive demands to optimize learning outcomes. Empirical evidence also demonstrates that high extraneous cognitive load negatively affects motivation and engagement. Evans *et al.* (2024) found that excessive cognitive load, particularly when caused by ineffective instructional strategies, is associated with lower motivation, reduced engagement, and poorer academic achievement.

Conversely, when teachers employ load-reducing strategies and provide structured, autonomy-supportive instruction, learners experience lower cognitive load and improved motivation and performance. Conversely, when germane load is optimized, learners are more likely to construct meaningful knowledge structures

(Feldon *et al.*, 2023). Additionally, the relationship between cognitive load and motivation further explains learners’ experiences in this study. Research indicates that cognitive load can function as a “motivational cost,” wherein increased mental effort reduces learners’ willingness to engage in learning tasks (Feldon *et al.*, 2018; Feldon *et al.*, 2019, as cited in Evans *et al.*, 2024). When learners perceive tasks as overly demanding due to high extraneous load, they may disengage or invest less effort, ultimately affecting their learning outcomes. The results imply that improving instructional design in Science could reduce unnecessary cognitive burden and enhance learning outcomes.

On the other hand, when cognitive load is effectively managed, learners are more likely to engage in meaningful learning processes and construct well-organized knowledge structures (Sweller *et al.*, 1998; Feldon *et al.*, 2018). This aligns with the relatively high germane load observed in this study, which indicates that learners are attempting to make sense of the material despite the presence of unnecessary cognitive demands.

Overall, the findings imply that improving instructional design in Science, particularly by reducing extraneous cognitive load and supporting efficient information processing, could enhance learners’ motivation, engagement, and academic performance. Providing clear explanations, structured learning materials, and supportive teaching strategies may help optimize cognitive load and promote deeper learning.

Table 4: Relationship Between Self-Efficacy and Cognitive Load of Grade 11 Learners

Categories	<i>r</i> - value	Interpretation	<i>p</i> - value	Significance	Decision
Self-efficacy & Cognitive Load	0.455	Low Positive Correlation	<0.001	Significant	Reject H ₀

Note: The interpretation was based on the following scale. 0.00 to ±0.30 (Negligible Correlation), ±0.30 to ±0.50 (Low Positive/Negative Correlation), ±0.50 to ±0.70 (Moderate Positive/Negative Correlation), ±0.70 to ±0.90 (High Positive/Negative Correlation), ±0.90 to ±1.00 (Very High Positive/Negative Correlation).

Table 4 reveals a significantly low positive correlation between self-efficacy and cognitive load among Grade 11 learners, suggesting that as learners’ confidence in their academic abilities increases, their perceived mental effort in learning science also rises slightly. This implies that learners with higher self-efficacy are more willing to engage with challenging tasks, interpreting cognitive load as a productive part of learning rather than a barrier. The significant *p*-value (<0.001) indicates that this relationship is not due to chance, reinforcing the meaningful link between motivation and cognitive processing. However, the low correlation coefficient (*r* = 0.455) suggests that while self-efficacy influences cognitive load, other factors such as instructional design and prior knowledge may also play crucial roles. Overall, the result underscores the importance of raising self-efficacy while managing cognitive load to optimize science learning experiences.

This result supports the theoretical integration of Cognitive Load Theory and Self-Determination Theory, emphasizing that cognitive and motivational processes are closely interconnected rather than independent. The findings suggest that cognitive load may act as a “motivational cost,” influencing learners’ willingness to invest effort in

academic tasks. Studies by Evans *et al.* (2024) and Qi *et al.* (2024) indicate that cognitive load influences motivational processes, while Affuso *et al.* (2025) found that self-efficacy strongly predicts motivation. Furthermore, Feldon *et al.* (2023) emphasized that cognitive demands can enhance self-efficacy when successfully managed. The present findings reinforce the notion that cognitive and motivational variables interact dynamically in shaping learning outcomes.

5. Recommendations

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

Learners should build stronger confidence in their science abilities by practicing effective study habits and embracing challenges as opportunities for growth. They are encouraged to actively manage their cognitive load by focusing on understanding concepts rather than rote memorization.

Science teachers should design instructional materials that balance cognitive demands by minimizing extraneous load and promoting germane learning through clear explanations and meaningful activities. They are also encouraged to integrate strategies that connect abstract concepts to real-world applications, helping learners build confidence in their ability to master complex topics.

Schools should provide professional development programs that train teachers in strategies for balancing cognitive load and enhancing student motivation. They should also invest in resources and learning environments that support both cognitive and affective aspects of science education.

6. Conclusion

The self-efficacy of the learners reflects a balanced yet developing sense of academic confidence that can be enhanced through targeted instructional strategies. Learners demonstrated an average level of self-efficacy in Science, indicating that they possess a moderate belief in their ability to perform academic tasks effectively. It implies that while they feel capable of managing their learning, their confidence is not yet strong enough to fully maximize their potential. The findings imply that learners approach Science tasks with reasonable assurance but may still require support to strengthen their motivation and persistence.

Learners exhibited an average level of cognitive load in Science, indicating that the mental demands of learning are generally manageable but still require effort. While learners can process and understand scientific concepts, the complexity of tasks occasionally challenges their working memory. The average levels across intrinsic, extraneous, and germane loads imply that instructional materials are moderately effective but could be refined to reduce unnecessary cognitive strain. Learners appear capable of engaging meaningfully with content when guided by clear and well-structured instruction. Furthermore, the findings reflect a balanced cognitive experience

that supports learning yet highlights the need for continued improvement in instructional design to optimize understanding and retention.

There is a significant low positive correlation between self-efficacy and cognitive load among Grade 11 learners, confirming that the two variables are meaningfully related. Learners with higher confidence in their academic abilities tend to experience slightly greater cognitive engagement when learning science concepts. It further affirms that self-efficacy influences how learners manage mental effort in complex tasks. Although the correlation is low, it suggests that motivation and confidence play a role in how learners perceive and handle cognitive challenges. Therefore, enhancing self-efficacy while maintaining balanced cognitive load is essential to promote effective and sustained science learning.

Creative Commons License Statement

This research work is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License. To view a copy of this license, visit <https://creativecommons.org/licenses/by-nc-nd/4.0>. To view the complete legal code, visit <https://creativecommons.org/licenses/by-nc-nd/4.0/legalcode.en>. Under the terms of this license, members of the community may copy, distribute, and transmit the article, provided that proper, prominent, and unambiguous attribution is given to the authors, and the material is not used for commercial purposes or modified in any way. Reuse is only allowed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License.

Conflict of Interest Statement

The authors declare no conflicts of interest.

About the Author(s)

Heidi Rose M. Gasapo is a Teacher II assigned at Pontevedra National High School, Pontevedra, Negros Occidental, Philippines. She is a candidate for the Master of Arts in Education major in General Science.

Joji D. Linaugo is an Associate Professor at Carlos Hilado Memorial State University, Talisay City, Negros Occidental, Philippines.

Kevin Clyde A. Ong is a Master Teacher assigned at Sum-ag National High School. He is also a Graduate School Faculty at La Consolacion College Bacolod, Bacolod City, Negros Occidental, Philippines.

References

Affuso, G., Zannone, A., Esposito, C. (2025). The reciprocal effects of learning motivation, perceived academic self-efficacy and academic performance in adolescence: A four-wave longitudinal study. *European Journal of Psychology of Education* 40(6). <https://doi.org/10.1007/s10212-024-00900-y>

- Ahmed, I., & Ishtiaq, S. (2021). Reliability and validity: Importance in medical research. *Journal of the Pakistan Medical Association*, 71(10), 2401–2406. <https://doi.org/10.47391/jpma.06-861>
- Ayre, C., & Scally, A. J. (2014). Critical values for Lawshe’s content validity ratio: Revisiting the original methods of calculation. *Measurement and Evaluation in Counseling and Development*, 47(1), 79–86. <https://doi.org/10.1177/0748175613513808>
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. W. H. Freeman. Retrieved from https://books.google.ro/books/about/Self_Efficacy.html?id=eJ-PN9g_o-EC&redir_esc=y
- Chang, J. C., Wu, Y. T., & Ye, J. N. (2022). A Study of Graduate Students’ Achievement Motivation, Active Learning, and Active Confidence Based on Relevant Research. *Frontiers in Psychology*, 13(June), 1–10. <https://doi.org/10.3389/fpsyg.2022.915770>
- Colango, J. S., & Ong, K. C. A. (2026). Self-Efficacy, Engagement, and Academic Achievement of Learners in Science in an Alternative Delivery Modality. *International Journal of Current Science Research and Review*, 9(5), 2462–2478. <https://doi.org/10.47191/ijcsrr/V9-i5-24>
- Comahig, A. (2025). Study habits, learning environment, and mathematics performance of Grade 11 STEM learners. *Psychology and Education: A Multidisciplinary Journal*, 39(2), 200–214. <https://doi.org/10.70838/pemj.390208>
- Deci, E. L., & Ryan, R. M. (2000). The “what” and “why” of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11(4), 227–268. Retrieved from https://doi.org/10.1207/S15327965PLI1104_01
- Department of Education. (2025, May 19). Pilot implementation of the strengthened senior high school (SHS) curriculum for Grade 11 in School Year 2025–2026 (DepEd Memorandum No. 48, s. 2025). https://www.deped.gov.ph/wp-content/uploads/DM_s2025_048r.pdf
- Evans, P., Vansteenkiste, M., & Parker, P. (2024). Cognitive load theory and its relationships with motivation: A self-determination theory perspective. *Educational Psychology Review*, 36(1), 7. <https://doi.org/10.1007/s10648-023-09841-2>
- Feldon, D. F., Brockbank, R., & Litson, K. (2023). Direct Effects of Cognitive Load on Self-Efficacy During Instruction. *Journal of Educational Psychology*, 116(7), 1153–1171. <https://doi.org/10.1037/EDU0000826>
- Fokkens-Bruinsma, M., Vermue, C., Deinum, J. F., & van Rooij, E. (2021). First-year academic achievement: The role of academic self-efficacy, self-regulated learning, and beyond classroom engagement. *Assessment & Evaluation in Higher Education*, 46(7), 1115–1126. <https://doi.org/10.1080/02602938.2020.1845606>
- Gafoor, A. K., & Ashraf, M. (2016). *Academic self-efficacy scale*. University of Calicut. <https://doi.org/10.13140/RG.2.1.3930.2640>
- Gidron, Y. (2020). Reliability and validity. In Springer eBooks (pp. 1869–1870). https://doi.org/10.1007/978-3-030-39903-0_1549
- Gkintoni, E., Antonopoulou, H., Sortwell, A., & Halkiopoulos, C. (2025). Challenging Cognitive Load Theory: The Role of Educational Neuroscience and Artificial

- Intelligence in Redefining Learning Efficacy. *Brain Sciences*, 15(2). <https://doi.org/10.3390/brainsci15020203>
- Hartelt, T., & Martens, H. (2024). Self-regulatory and metacognitive instruction regarding student conceptions: influence on students' self-efficacy and cognitive load. *Frontiers in Psychology*, 15(October), 1–19. <https://doi.org/10.3389/fpsyg.2024.1450947>
- Kriegelstein, F., Beege, M., & Daniel, G. (2023). Development and validation of a theory-based questionnaire to measure different types of cognitive load. *Educational Psychology Review*. <https://doi.org/10.1007/s10648-023-09738-0>
- Lawshe, C. H. (1975). A quantitative approach to content validity. *Personnel Psychology*, 28(4), 563–575. <https://doi.org/10.1111/j.1744-6570.1975.tb01393.x>
- Paas, F., Renkl, A., & Sweller, J. (2003). Cognitive load theory and instructional design: Recent developments. *Educational Psychologist*, 38(1), 1–4. https://doi.org/10.1207/S15326985EP3801_1
- Qi, B., Ma, L., & Wang, X. (2024). Using meta-analytic path analysis to examine mechanisms relating learners' perceived feedback, motivation, self-efficacy, and academic performance. *Learning and Motivation*, 88, 102059. <https://doi.org/10.1016/j.lmot.2024.102059>
- Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, 25(1), 54–67. <https://doi.org/10.1006/ceps.1999.1020>
- Skulmowski, A., & Xu, K. M. (2022). Understanding Cognitive Load in Digital and Online Learning: a New Perspective on Extraneous Cognitive Load. *Educational Psychology Review*, 34(1), 171–196. <https://doi.org/10.1007/s10648-021-09624-7>
- Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science*, 12(2), 257–285. https://doi.org/10.1207/s15516709cog1202_4
- Tan, A. L., Liang, J. C., & Tsai, C. C. (2021). Relationship among High School Students' Science Academic Hardiness, Conceptions of Learning Science and Science Learning Self-Efficacy in Singapore. In *International Journal of Science and Mathematics Education* (Vol. 19, Issue 2). <https://doi.org/10.1007/s10763-019-10040-1>
- Thomas, D., & Zubkov, P. (2023). *Quantitative research designs in practical theology*. Andrews University. Retrieved from https://www.researchgate.net/publication/370630979_Quantitative_Research_Designs
- Zhang, H. (2024). Cognitive load as a mediator in self-efficacy and English learning motivation among vocational college students. *PLoS ONE*, 19(11), 1–19. <https://doi.org/10.1371/journal.pone.0314088>
- Zhang, X., & Qian, W. (2024). Social support and academic performance. *PLoS ONE*, 19(12), e0311597.
- Zheng, B., Chang, C., Lin, C. H., & Zhang, Y. (2021). Self-Efficacy, Academic Motivation, and Self-Regulation: How Do They Predict Academic Achievement for Medical

Students? *Medical Science Educator*, 31(1), 125–130. <https://doi.org/10.1007/s40670-020-01143-4>