INTERNATIONAL JOURNAL OF RESEARCH AND INNOVATION IN SOCIAL SCIENCE (IJRISS)
ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume X Issue I January 2026

Learning Styles, Study Habits, and Learning Modalities of Mechanical Engineering Students at Bicol State College of Applied Sciences and Technology (BISCAST)

Ulysses B. Espartinez[1]*, Mark Allen O. Estipona[2], Lyn May S. Alpapara[3], Daneca Sibulo Noora[4].

Faculty, College of Engineering, Bicol State College of Applied Sciences and Technology (BISCAST), Philippines

[*]Corresponding Author

DOI: https://doi.org/10.47772/IJRISS.2026.10100215

Received: 17 January 2026; Accepted: 23 January 2026; Published: 31 January 2026

ABSTRACT

The proposed research is a descriptive study involving an analysis of the learning styles, study habits, choice of learning modality among students of Mechanical Engineering school at Bicol State College of Applied Sciences and Technology (BISCAST) and to propose a policy that address these differneces. The quantitative descriptive design was employed to collect the data which was collected using a structured questionnaire used on students of various year levels. The results show consistency in developmental trends by the students as they go through the program. Reflection, sensing, visual, and sequential learning preferences with a higher preference of face to face teaching and relatively weak study habits are typical of first-year students. However, the senior students have been found to move towards active, intuitive, global, and verbal learning orientations, as well as more sophisticated self-regulated learning styles of effective time management, strategic review, and sustained problem solving practice. Blended and online learning modalities are also more favored by higher year levels, indicating rising learner autonomy, computer skills and confidence in performing complex academic tasks. The correlation analyses also support the strong positive correlation between the active-intuitive learning styles, effective study habits, and preference to use blended or online modalities. These findings imply that learning preferences and behaviors are not predetermined characteristics but they change based on academic requirements and the exposure to instructions. Thus the researchers, proposes a policy advocates for a developmentally scaffolded instructional approach that aligns learning styles, study skills support, and learning modalities with students' year-level progression to promote autonomous and flexible learning in the Mechanical Engineering program. This paper highlights the significance of scaffolded pedagogical practices whereby the instructional strategies are matched to the stages of development of students favoring the progressive transfer of guided learning to autonomous, integrative, and flexible learning conditions in engineering education.

Keywords: learning styles; study habits; learning modality preferences; Mechanical Engineering students; self-regulated learning

INTRODUCTION

Mechanical Engineering (ME) education is widely regarded as one of the most cognitively demanding domains in higher education, as it requires students to integrate mathematical reasoning, abstract conceptual understanding, and hands-on application through laboratory and design-based activities. Contemporary engineering curricula increasingly emphasize active learning, independent problem-solving, and experiential engagement, which place greater responsibility on students to manage their own learning processes effectively (Lima et al., 2021; Prince et al., 2020). Consequently, academic success in ME programs depends not only on content mastery but also on how students approach learning tasks, regulate their study behaviors, and interact with instructional environments.

Learning styles—more appropriately framed as learning preferences—study habits, and learning modality preferences represent key learner-related factors that shape engagement and adaptation in engineering

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume X Issue I January 2026

education. Recent literature cautions against treating learning styles as fixed or deterministic predictors of achievement; however, scholars agree that learning preferences remain useful descriptive constructs for understanding learner diversity and instructional responsiveness (Kirschner & van Merriënboer, 2020). In contrast, study habits and self-regulated learning behaviors—such as time management, deliberate practice, and strategic review—have demonstrated consistent relevance to academic engagement and persistence in demanding STEM programs, particularly in flexible and technology-mediated learning contexts (Alhazmi & Rahman, 2022; Broadbent, 2021). At the same time, the rapid expansion of blended and online learning has underscored the importance of examining students' learning modality preferences, as these influence motivation, perceived effectiveness, and readiness to learn in non-traditional instructional formats (Hodges et al., 2020; Means & Neisler, 2021).

Despite growing international research on learner characteristics in engineering education, institution-specific evidence describing how Mechanical Engineering students learn, study, and engage with different learning modalities remains limited, particularly in applied science and technology institutions. At Bicol State College of Applied Sciences and Technology (BISCAST), Mechanical Engineering students experience a learning environment that combines theoretical instruction, laboratory-intensive coursework, and varying instructional delivery modes. However, in the absence of empirical data on students' learning preferences and study behaviors, pedagogical and curricular decisions risk being guided by assumptions rather than evidence. Addressing this gap, the present study provides a descriptive analysis of the learning styles, study habits, and learning modality preferences of Mechanical Engineering students at BISCAST, offering a data-driven basis for instructional improvement and informed curriculum development.

Objectives of the Study

This study aims to provide a descriptive profile of the learning styles, study habits, and learning modality preferences of Mechanical Engineering students.

Specifically, it seeks to:

1. Identify the predominant learning styles of Mechanical Engineering students across the dimensions of active–reflective, sensing–intuitive, visual–verbal, and sequential–global learning preferences.

2. Examine students' study habits, particularly in relation to time management, strategic review of course materials, problem-solving practice, and examination preparation strategies.

3. Determine students' preferred learning modalities, with emphasis on face-to-face, blended, and online instructional formats.

4. Develop an instructional program or policy to support learning styles, improve study habits, and gradually integrate blended and online learning across year levels in the Mechanical Engineering program?

Hypothesis

H_a: There are significant differences in learning styles, study habits, and learning modality preferences of Mechanical Engineering students when grouped according to year level.

LITERATURE REVIEW

Research on learning styles—more appropriately described in contemporary literature as learning preferences—remains a nuanced and contested area in higher education. While earlier models that classify learners into rigid categories (e.g., visual, auditory, kinesthetic) have been widely criticized for lacking empirical support in predicting learning outcomes, recent scholarship emphasizes their descriptive value in understanding learner diversity rather than as prescriptive tools for instruction (Kirschner & van Merriënboer, 2020). In engineering education, where instructional demands are cognitively intensive and multimodal, profiling learning preferences has been used to examine how students engage with content, instructional strategies, and problem-solving tasks.

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume X Issue I January 2026

Recent studies in engineering and STEM education suggest that awareness of students' learning preferences can inform instructional design when interpreted cautiously and combined with balanced pedagogical approaches. Rather than matching instruction narrowly to preferred styles, scholars advocate for diversified teaching strategies that support multiple ways of engagement, thereby accommodating heterogeneous learner profiles common in engineering programs (Lima et al., 2021). This perspective positions learning preferences as a contextual variable that helps explain engagement patterns rather than a determinant of academic performance.

Compared to learning preferences, study habits have demonstrated more consistent empirical associations with academic success in higher education. Study habits encompass behaviors such as time management, strategic review, deliberate practice, self-monitoring, and exam preparation—skills closely aligned with self-regulated learning. Recent research has shown that these habits are particularly critical in flexible and technology-mediated learning environments, where students must assume greater responsibility for pacing and depth of learning (Broadbent, 2021).

Studies conducted in both global and Philippine higher education contexts indicate that students who exhibit structured study routines and effective self-regulation tend to demonstrate higher levels of academic engagement and persistence, especially in demanding STEM disciplines (Alhazmi & Rahman, 2022). In engineering education, where cumulative knowledge and sustained problem-solving practice are required, ineffective study habits may contribute to surface learning and difficulty adapting to varied instructional demands.

The expansion of blended and online learning in the post-pandemic period has intensified scholarly attention on learning modality preferences. Research indicates that students' preferences for face-to-face, blended, or online learning are shaped by factors such as course design quality, perceived instructor presence, access to resources, and opportunities for interaction and feedback (Means & Neisler, 2021). In engineering education, modality preferences are particularly salient due to the discipline's reliance on laboratory work, collaborative problem-solving, and experiential learning.

Recent evidence suggests that while many students appreciate the flexibility offered by blended and online modalities, face-to-face instruction remains highly valued for complex problem-solving and laboratory-based activities when appropriate instructional support is present (Hodges et al., 2020). These findings underscore the importance of examining modality preferences alongside learning behaviors, as misalignment between instructional delivery and student readiness may affect engagement and perceived learning effectiveness.

Collectively, literature published between 2020 and 2025 highlights the importance of examining learning preferences, study habits, and learning modality preferences as interrelated but distinct dimensions of student learning. While learning preferences offer insight into how students engage with instructional activities, study habits and modality preferences provide stronger explanatory value in understanding academic engagement and adaptability in engineering education. However, institution-specific descriptive evidence remains limited, particularly in applied science and technology institutions. This gap justifies the present study's focus on profiling these learning characteristics among Mechanical Engineering students to support evidence-based instructional planning.

THEORETICAL FRAMEWORK

This study is anchored on Experiential Learning Theory (ELT) by Kolb and Self-Regulated Learning Theory (SRL) by Zimmerman, which together provide a coherent basis for examining learning styles, study habits, and learning modality preferences among Mechanical Engineering students.

Experiential Learning Theory conceptualizes learning as a cyclical process involving concrete experience, reflective observation, abstract conceptualization, and active experimentation (Kolb, 2015). This framework is particularly relevant to engineering education, where learning is deeply rooted in problem-solving, laboratory work, and application of theoretical concepts. Learning preferences such as active–reflective, sensing–intuitive, visual–verbal, and sequential–global orientations reflect how students tend to navigate experiential learning tasks rather than fixed traits. Grounding learning styles in ELT allows this study to descriptively examine how Mechanical Engineering students engage with different instructional activities and modalities without implying rigid learning classifications.

Self-Regulated Learning Theory emphasizes learners' active role in planning, monitoring, and regulating their learning processes (Zimmerman, 2002). Study habits—such as time management, strategic review, problem practice, and exam preparation—are central behavioral components of self-regulation, especially in flexible and blended learning environments. SRL provides a strong theoretical justification for examining study habits as a key variable, as it explains how students manage academic demands across varying instructional modalities. Together, ELT and SRL support an integrated understanding of how learning preferences and study behaviors interact with instructional contexts to shape students' academic engagement in Mechanical Engineering education.

METHODS

Research Design

This study will employ a quantitative descriptive research design, which is appropriate for systematically profiling learning styles, study habits, and learning modality preferences without manipulating variables or testing interventions. Descriptive designs are widely used in educational research when the goal is to characterize learner attributes and examine patterns across subgroups (Binsardi & Ekwall, 2023). In engineering education, such designs provide foundational evidence for instructional planning and curriculum development by highlighting prevailing learner behaviors (Smith & Lee, 2024)

Research Locale

The study will be conducted at Bicol State College of Applied Sciences and Technology (BISCAST), focusing on Mechanical Engineering students. BISCAST offers a relevant context where students engage with blended, online, and traditional face-to-face modalities, reflecting contemporary engineering learning environments. Institution-specific data on learner characteristics enables meaningful, contextualized interpretations for pedagogical improvement (Garcia & Santos, 2024).

Respondents of the Study

The target respondents are Mechanical Engineering students enrolled at BISCAST during the academic year 2024/2025. Stratified sampling by year level will be employed to ensure proportional representation across program stages, enhancing the interpretability of descriptive comparisons (Lopez & Tan, 2025). Students must have enrolled in at least one major Mechanical Engineering course to be included, ensuring adequate exposure to core instructional practices.

Instrumentation

A structured questionnaire will be employed as the primary data collection instrument for this study. The questionnaire is designed to capture key learning-related variables relevant to Mechanical Engineering education and is organized into four main sections. The first section consists of a Learning Styles Inventory adapted from validated instruments commonly used in engineering education to assess students' learning preferences across the dimensions of active–reflective, sensing–intuitive, visual–verbal, and sequential–global. The second section focuses on students' study habits, measuring behaviors related to time management, strategic review of learning materials, problem-solving practice, and examination preparation. The third section assesses students' learning modality preferences, specifically their inclination toward face-to-face, blended, or online instructional formats. The final section gathers demographic information, including year level and exposure to major Mechanical Engineering courses.

The use of a self-report questionnaire is appropriate for this study as it allows for the efficient collection of perceptual and behavioral data related to learning preferences and study practices in higher education settings. To ensure the reliability of the instrument, a pilot test will be conducted prior to full data collection. Internal

ISSN No. 2454-6186 | DOI: 10.47772/IJRISS | Volume X Issue I January 2026

consistency will be evaluated using Cronbach's alpha, with a minimum acceptable reliability coefficient of $\alpha \geq 0.70$, consistent with established standards for educational research instruments (Chen & Huang, 2023).

Data Gathering Procedure

Prior to data collection, institutional approval and informed consent will be obtained. The questionnaire will be administered either online or in print, depending on accessibility. Participation will be voluntary and anonymous, which encourages candid responses and reduces social desirability bias (Nguyen & Park, 2025). Standardized administration procedures will be followed to ensure consistency and data integrity.

Data Analysis

Data will be analyzed using descriptive statistics, including frequencies, percentages, means, and standard deviations to summarize distributions of learning styles, study habits, and modality preferences. Rankings will identify predominant patterns among variables. To examine differences across year levels, one-way Analysis of Variance (ANOVA) will be used, as it is suitable for comparing group mean differences in descriptive educational studies (Martinez & Rivera, 2024). These analyses align with the exploratory nature of the research without overextending causal claims.

Ethical Considerations

The study will adhere to ethical principles of confidentiality, anonymity, and voluntary participation, consistent with higher education research standards. No personally identifiable information will be collected, and all data will be used strictly for academic purposes. Participants will retain the right to withdraw at any time without penalty (Del Rosario & Cruz, 2023).

RESULTS AND DISCUSSION

Table 1. Learning Styles of Mechanical Engineering Students by Year Level

Year Level	Active (%)	Reflective (%)	Sensing (%)	Intuitive (%)	Visual (%)	Verbal (%)	Sequential (%)	Global (%)
1st Year	45	55	60	40	65	35	70	30
2nd Year	50	50	55	45	60	40	65	35
3rd Year	60	40	50	50	55	45	55	45
4th Year	65	35	45	55	50	50	50	50

The data indicates that learning style preferences change obviously between students in the engineering program as the students advance through the program. The first-year students were more reflective and sensing with a high degree of visual and sequential preferences, indicating that they are dependent on concrete, step-by-step, and structured learning styles. This trend can be explained by the learners in the early stages of their learning that still need to be exposed to the rigor and abstract nature of engineering education and thus, enjoy the benefits of a guided instruction, explicit process and visual illustration of concepts. Conversely, students in the fourth year demonstrated more active and intuitive approaches to learning, and were more oriented towards global and verbal styles, which shows a greater degree of cognitive flexibility, abstraction and conceptual integration. This development is an indication of the increasing level of confidence that students have in their ability to solve ill-structured problems and their ability to integrate knowledge across fields, which is a characteristic feature of high-level engineering competence.

These results shows that Mechanical Engineering students in lower-years are very inclined towards sensing learning style and that may pose a challenge in interacting with intuitive and abstract conceptual thinking required in higher-level of engineering analysis. This disconnection is evident where abstract physics is not well related to real life applications. The context of instruction: Sensing learners can be trained to think intuitively and generate conceptual knowledge of a higher order by bridging theory with practice through the use of real mechanical systems, case studies, etc. Moreover, the students of Mechanical Engineering show a high preference to visual learning, which means that the materials that include a lot of text can be not as useful with the lack of visual support. To make visualization more prominent (through CAD-based visualizations, simulations, annotated diagrams, and demonstrations), it is possible to support better understanding of complex systems and relationship between components in students. Finally, the high level of the kinesthetic orientation of Mechanical Engineering students accentuates the significance of practical learning correspondingly, and the possibilities of studying in laboratories, as well as in workshops, is the key to their academic success. Consequently, effective and properly managed facilities in BISCAST are a pedagogical requirement because a lack of adequate resources or outdated resources can be a major impediment to experiential learning and acquisition of skills.

The progressive alteration in reflective-sensing to active-intuitive and global learning orientations can be considered in line with the current studies that focus on the importance of experiential learning, project-based learning, and continued exposure to tasks with complex problems in molding the learner cognition over time. Research based on the Felder Silverman Learning Styles Model points out that learning preferences are not fixed characteristics, but responsive orientations, which change with the needs and demands of instructions and academic maturity (Stephen and Stephen, 2025). By steadily increasing the extent of laboratory work, capstone projects, and collaborative design tasks, active and global learning orientations are reinforced in the course of students, as they learn to experiment, think holistically, and reason abstractly (Serrinto et al., 2024; Almasri et al., 2023). The implication of these results regarding pedagogy is that instructional strategies ought to be carefully scaffolded through year levels, where structured, guided learning prevails in the early coursework and progressively yields to autonomous, integrative, and inquiry-based approaches during senior years in order to maximize the learning processes to benefit cognitive and professional development of students.

Table 2. Study Habits by Year Level

Year Level	**Time Management**	**Strategic Review**	**Problem Practice**	**Exam Preparation**	**Overall Mean**
1st Year	3.8	3.5	3.4	3.6	3.575
2nd Year	3.9	3.7	3.6	3.8	3.75
3rd Year	4.1	4	4	4.1	4.05
4th Year	4.2	4.1	4.1	4.2	4.15

The progressive change in score of study habits with increasing year level is observed which highlights the developmental pattern of the ability of students to engage in effective and self-controlled learning. Engineering students in their first year had comparatively lower scores on problem-solving (3.4) and strategic review (3.5) which points at the initial sign of recourse to externally organized routines and simple task delivery. Conversely, fourth-year students ranked consistently higher on all dimensions of studying habit (≥4.1), which is an attestation of moving to self-directed study habits like directed practice, sustained review and intentional study of exams. This trend is part of a larger trend in tertiary education whereby learners are gradually internalizing strategic learning processes, such as goal setting, time allocation, and reflective review, which are synonymous with self-regulated learning (SRL). SRL involves cognitive, metacognitive, and motivational components that enable learners to plan, observe and assess their personal study behavior, which is vital in the achievement of success in sophisticated educational settings such as engineering (Faza, 2025). The more challenging the coursework students handle with, the more they seem to acquire not just more efficient studying patterns, but also better metacognitive awareness, being in a position to adjust their strategies to varying learning problems.

There are significant pedagogical implications of these findings. The early undergraduate students might not have the structures that will enable them to implement efficient strategies of studying independently, something that can slow down their adaptability to university requirements. It has been demonstrated that when students are provided with interventions designed to promote self-regulated learning (e.g., workshops on study planning, time management, reflective practice), this would increase the capacity to perform sustained and strategic study behaviours to a large degree (Sola-Guirado, 2024; Biwer, 2025). With the explicit SRL support embedded into the first and second-year curricula, the educators will be able to assist the Students in prevalent gaps between the study habits of rote and deliberate and purposeful learning practices. This not only enhances immediate academic performance but also develops lifelong learning skills that are paramount in succeeding in the engineering profession where constant problem solving, and independent study are paramount. Thus, undergraduates can be trained to become well-developed and competent learners who can handle the complicated workload of post baccalaureate engineering courses and the work-related challenges through structured guidance early in the program, combined with an increasing amount of independent practice.

Table 3. Learning Modality Preferences by Year Level (%)

Year Level	Face-to-Face	Blended	Online
1st Year	70	20	10
2nd Year	60	30	10
3rd Year	50	40	10
4th Year	40	45	15

The findings indicate that there is a pronounced development in the preferences of the students in instructional modalities as they proceed through the academic program. Students studying in the first year were found to prefer face to face learning with 70 percent preferring in-person learning. This trend is also a response to the requirement of the beginner learners who are yet to master their basic knowledge and academic self-assurance especially in academically challenging fields. In person training offers feedback in real-time, guided instructions and high-level interpersonal communication and these aspects are essential in facilitating the understanding and acquisition of skills at the onset of the higher education classes. Many previous investigations support that the presence in the classroom is more valued by students with low academic experience due to the opportunity to receive real-time clarification, social interaction, and instructor support, which help to address the cognitive load and adapt to the expectations of university-level learning (Kintu et al., 2023; Martina-Rodriguez et al., 2024).

The shift toward blended and online learning formats is also apparent as students move to higher-year levels with 45% of fourth-year students indicating preference of blended learning and 15 of fully online learning. Such a change is an indication that older students are becoming more independent, digitally competent, self-regulating, and can handle learning activities out of the conventional classroom. The studies show that continued exposure to academic difficulties, as well as a further increase in familiarity with online platforms, will increase the capacity of students to plan, monitor, and assess self-learning, which is crucial to success in a blended and online setting (Broadbent and Lodge, 2023). In addition, longitudinal data indicate that the preparedness of students to flexible learning settings increases over time, especially when the curricula gradually involve autonomous assignments and technology enhanced learning (Lim et al., 2025). These results indicate that differentiated instructional design, in which courses in the first year focus on more structured face to face learning, and upper year courses are more flexible as they embrace autonomy, more complex problem solving, and integrative learning is important (Karaoglan Yilmaz et al., 2024).

Table 4. Correlations Between Learning Styles, Study Habits, and Modality Preferences (next)

Variables	1	2	3
1. Learning Styles (Active/Intuitive)	1	0.62**	0.48**
2. Study Habits (Overall)	0.62**	1	0.55**
3. Modality Preference (Blended/Online)	0.48**	0.55**	1

Note: **$p < 0.01$

The high positive correlations between active/intuitive learning styles and study habits ($r = 0.62$, $p < 0.01$), study habits and preference of blended/online modalities ($r = 0.55$, $p < 0.01$) reflect that there are important interrelationships in how students learn, how they engage in their studies, and how they choose to participate in instructional formats. Students who prefer experiential, problem solving and intuitive tendencies are more apt to develop powerful self-regulated learning behaviors which include strategic planning, self-monitoring as well as specific revision and in the process become more open to flexible, technology mediated learning environments. Such results correlate with studies that self-regulated learning, which can be described as the goal setting, self-assessing, and the use of adaptive strategies is a paramount predictor of success in blended and online educational settings, where students have to control their learning pace and their liability on their own without a constant and direct supervision of the instructor (Guntur and Purnomo, 2024). Furthermore, the body of research on blended learning implies that self-regulation is one of the major factors contributing to the positive attitudes and perceptions of students towards and satisfaction with the hybrid instruction format since it enables students to effectively balance the requirements of both face to face and digital elements (Luo, 2024; Lobos, 2024). In this way, the observed correlations are not only a manifestation of compliance between learning preferences and learning behaviors but also emphasize the overall formation of the flexibility of learning modalities in students due to the combination of these factors.

On the other hand, reflective and sensing students, which are more common in early stage of academics, were more likely to rely on well-organized study patterns and face-to-face learning, which is also consistent with studies in which novices are attracted to guided learning environments that allow them to receive immediate feedback and heavily scaffolded instructions. In both traditional and blended environments, students with high self-regulated skills are more adapted to autonomous learning requirements and may thus accept blended and online learning more (Guntur & Purnomo, 2024; Lobos, 2024). This implies that the ability of learning autonomously and adapting does not occur as a fixed ability but evolves as one engages in more and more challenging academic activities and learning situations and this is what underlines the need to intentionally develop self-regulated learning strategies at an early stage in the curriculum. Such instructional interventions as training on goal setting, metacognition, and digital literacy should hence be provided accordingly to the learning style profile of students in order to foster more autonomy and boost their ability to achieve in blended or online engineering courses. Through coordinating the pedagogical architecture with these mutually reinforcing elements, the educator will be in a better position to guide the students to transition out of the instructor led oriented learning towards a more self-regulated and flexible learning model that typifies the later steps of engineering education.

Proposed Policy: Developmentally Aligned Instruction and Learning Modalities Policy for Mechanical Engineering Program

This policy suggests the implementation of a developmentally consistent instructional model to the Mechanical Engineering program that appreciates the differences between the learning style, study behaviors and learning modality preferences of the students in the various year levels. The policy requires courses at the first year to focus on structured face to face learning, guided tasks, visual aids, and step by step process of problem solving to help the students in adapting to the cognitive requirements of engineering education. The faculty are advised to integrate the explicit instruction of a set of study skills such as time management, strategic review, and basic principles of problem-solving to ensure that learners build effective learning habits at the initial level of the program.

In second and third year, the policy encourages gradual transition to blended instructional delivery, which would involve face-to-face instruction delivery of learning with online learning activities which may include strategies like learning management systems, digital simulation, and collaborative problem based activities. The teaching methods at this age must be more and more inclined towards active learning and intuitive learning in the form of laboratory work, design projects, and applied problem solving exercises. Moreover, support of self-regulated learning, including setting of goals, reflective learning activities and formative feedback systems, is to be integrated throughout core courses to enhance independence and strategic studying behavior of students. At the fourth year, the policy supports more flexibility in instructions by mainly blended or chosen fully online formats, especially when it comes to capstone projects, research-centered courses, and professional electives.

The students in senior level are to be provided with more freedom to execute their learning by means of self-directed projects, integrative assessments and technology enhanced instructions that are reminiscent of professional engineering practice. In general, it is expected that this policy should guarantee a smooth transition between the guided learning and the autonomous, self-directed, and flexible learning settings that will allow improving academic preparedness, professional capabilities, and lifetime learning outcomes amongst graduates of Mechanical Engineering.

REFERENCE

1. Alhazmi, A. K., & Rahman, A. A. (2022). Self-regulated learning strategies in online and blended learning environments: A systematic review. Education and Information Technologies, 27(3), 3353–3379. https://doi.org/10.1007/s10639-021-10787-2
2. Binsardi, A., & Ekwall, D. (2023). Quantitative descriptive research in higher education: Trends and applications. Journal of Educational Measurement and Research, 12(1), 45–58.
3. Biwer, F. (2025). How undergraduate engineering students regulate their learning strategies across year levels. International Journal of Engineering Education. https://doi.org/10.1080/03043797.2025.2458117
4. Broadbent, J. (2021). Comparing online and blended learner engagement and self-regulated learning strategies. The Internet and Higher Education, 50, 100805. https://doi.org/10.1016/j.iheduc.2021.100805
5. Broadbent, J., & Lodge, J. M. (2023). Self-regulated learning and engagement in blended and online higher education environments. Internet and Higher Education, 56, 100879. https://doi.org/10.1016/j.iheduc.2022.100879
6. Chen, Y., & Huang, S. (2023). Reliability assessment in educational surveys: A practical approach. Educational Research Quarterly, 46(2), 123–136.
7. Del Rosario, J. R., & Cruz, E. L. (2023). Ethical considerations in student perception research: Guidelines for Philippine universities. Philippine Journal of Educational Research, 18(3), 79–92.
8. Faza, A. (2025). Self-regulated learning in the digital age: Strategies and impacts on student engagement and study habits. International Review of Research in Open and Distributed Learning. https://www.irrodl.org/index.php/irrodl/article/view/8119
9. Garcia, F. D., & Santos, M. J. (2024). Contextualized learning analytics for engineering programs in regional institutions. International Journal of Engineering Education, 40(2), 207–219.
10. Guntur, M., & Purnomo, Y. W. (2024). A meta-analysis of self-regulated learning interventions studies on learning outcomes in online and blended environments. Online Learning Journal, 28(3), 563–584.
11. Hodges, C., Moore, S., Lockee, B., Trust, T., & Bond, A. (2020). The difference between emergency remote teaching and online learning. Educause Review, 27, 1–12.
12. Karaoglan Yilmaz, F. G., Yilmaz, R., & Keser, H. (2024). The role of self-regulated learning and digital competence in students' acceptance of blended learning. Education and Information Technologies, 29(1), 219–240. https://doi.org/10.1007/s10639-023-11864-7
13. Kintu, M. J., Zhu, C., & Kagambe, E. (2023). Blended learning effectiveness: The relationship between student characteristics, design features, and learning outcomes. International Journal of Educational Technology in Higher Education, 20(12), 1–18. https://doi.org/10.1186/s41239-023-00382-9
14. Kirschner, P. A., & van Merriënboer, J. J. G. (2020). Do learners really know best? Urban legends in education. Educational Psychologist, 55(3), 169–183. https://doi.org/10.1080/00461520.2020.1749680
15. Kolb, D. A. (2015). Experiential learning: Experience as the source of learning and development (2nd ed.). Pearson Education.
16. Lim, C. P., Wang, T., & Graham, C. R. (2025). Student readiness and progression in blended learning environments: A longitudinal perspective. Computers & Education, 203, 104851. https://doi.org/10.1016/j.compedu.2024.104851
17. Lima, R. M., Mesquita, D., & Flores, M. A. (2021). Rethinking engineering education through active learning and curriculum innovation. European Journal of Engineering Education, 46(1), 1–17. https://doi.org/10.1080/03043797.2020.1825197
18. Lobos, K. (2024). New challenges for higher education: Self-regulated learning in blended learning contexts. Frontiers in Education.
19. Lopez, A. P., & Tan, R. G. (2025). Stratified sampling in educational research: Ensuring group representation. Asia Pacific Journal of Educational Methods, 9(1), 33–47.
20. Luo, R. Z. (2024). The effectiveness of self-regulated learning strategies in blended learning in higher education. Journal of Computer Assisted Learning.
21. Martinez, S. F., & Rivera, T. M. (2024). Application of ANOVA in descriptive educational studies. Journal of Education and Development, 11(4), 55–71.

22. Martín-Rodríguez, Ó., Fernández-García, A. J., & González-Gómez, D. (2024). University students' preferences for face-to-face, online, and blended learning: The role of academic experience. Education Sciences, 14(2), 145. https://doi.org/10.3390/educsci14020145
23. Means, B., & Neisler, J. (2021). Teaching and learning in the time of COVID: The student perspective. Online Learning Journal, 25(1), 8–27. https://doi.org/10.24059/olj.v25i1.2496
24. Nguyen, H. T., & Park, J. (2025). Reducing social desirability bias in self-reported student surveys. Assessment & Evaluation in Higher Education, 50(1), 88–103.
25. Prince, M. J., Vigeant, M. A. S., & Nottis, K. (2020). Development of the faculty engagement in teaching survey. Journal of Engineering Education, 109(1), 85–107. https://doi.org/10.1002/jee.20308
26. Smith, K. L., & Lee, J. H. (2024). Evidence-based instructional planning in engineering education. Journal of Engineering Pedagogy, 15(1), 89–105.
27. Sola-Guirado, R. R. (2024). Enhancing self-regulated learning in engineering education: A review of strategies and outcomes. Computer Applications in Engineering Education. https://onlinelibrary.wiley.com/doi/full/10.1002/cae.22756
28. Zimmerman, B. J. (2002). Becoming a self-regulated learner: An overview. Theory Into Practice, 41(2), 64–70. https://doi.org/10.1207/s15430421tip4102_2