

Students' Perception on the Use of Modular-Based Approach (MBA) in Teaching Environmental Science in College during the Covid-19 Pandemic

Article History:

Received: 26 November 2024

First Decision: 28 November 2024

Published: 08 January 2025

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Abstract

Environmental Science is one of the general subjects in higher education. Students must have a better grasp of the competencies and skills necessary in promoting conservation and protection of the environment. The use of Modular-Based Approach (MBA) during the Covid-19 pandemic proved that there is still a better means to deliver learning even in these trying times. This study aims to explore the students' perception on the use of module for environmental science suited for the pandemic period. A semi-structured interview was conducted to extract perceptions of students taking up Environmental Science subject for the A.Y. 2021-2022 on the MBA. Results revealed the following themes which can be of great reference for future researchers and module writers. Theme 1 – The Modular Based Approach needs connectivity. Theme 2 – Learning opportunities and better understanding. Theme 3 – Communication is the key. Theme 4 – Learning outcomes take time. Theme 5 – Feedbacking is essential. The findings of this study can be a reference in considering the use of module not only in the Environmental Science course but also in other subjects in college during difficult times.

Keywords: Modular approach, Environmental Science, student perception, Covid-19 pandemic



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INTRODUCTION

There is no doubt that the Covid-19 pandemic has had a significant impact on different segments of society, and education is no exception. The teaching and learning process has been severely hampered, especially in the different State Universities and Colleges across the Philippines. Sudden university closures, exclusionary policies, and the need to adapt to distance and online learning pose enormous challenges for faculty and students.

During the Covid-19 pandemic, the education industry has faced many challenges to ensure that learning continues for students. As schools around the world have moved towards distance learning and blended learning models, educators need to adapt their teaching methods and strategies to meet the unique needs of students. To ensure that students continue to have comprehensive and engaging instruction in environmental science, educators have increasingly moved towards using a modular-based approach. A modular-based approach to teaching refers to dividing the curriculum into smaller, self-contained modules that can be completed independently or in rotation. These

modules typically have specific learning objectives, teaching materials, and assessment tasks, and allow students to progress at their own pace.

The study of To-Im and Klunklueng (2012) revealed that the effectiveness of the learning module was apparent among the student participants. The learners showed significantly higher scores, specifically in conceptual understanding and perceptions of subsequent participation in the learning module. After the students participated in the learning module, they manifested a transformation from poor to a very good level of understanding. The study further showed that the students were happy with the series of activities as well as the multitasking that the module offered.

Dejene and Chen (2019) argue that these days, a sudden shift to modular teaching and learning has drawn significant attention from a global perspective. Modularized pedagogy according to Dejene and Chen (2019) is founded on the standard of dividing the curriculum into small discrete modules that are independent and most of the time short when it comes to duration. In this type of strategy, students

accrue credits for modules which can eventually lead to the qualification for which a specified number of credit points is required.

It is perceptible that a modular-based approach in teaching Environmental Science is significant in the realization of competencies of teaching and learning, especially amidst a pandemic. However, the researchers intended to explore other issues and gaps in the use of a module-based approach in Environmental Science. Recognizing the value of a module-based approach, it is the purpose of this research to explore the students' perception on the use of a Modular-Based Approach in Environmental Science as well as to determine themes and recommendations on the modular approach in Environmental Science, through the experiences, perception, and behavior of the college students. It is imperative to explore the perceptions of students regarding the use of a modular-based approach in teaching environmental science and discuss the potential benefits and challenges associated with this innovative teaching method.

LITERATURES

According to Vasconcelos (2010), should the realization of the academic performance in science education be aimed then strategies suitable in teaching and learning must be identified.

Torrentira (2020) on the other hand elucidated that the subject of Environmental Science offers the foundation of knowledge about our world and how our world works from the perspective of the environment. Students should also be aware of the natural environmental systems, as well as physical and social issues pertaining to environmental problems along with the strategies to alleviate the risk factors or address the issues.

Alexandar and Poyyamoli (2014) provide that Environmental Education for Sustainable Development is perceived emerging as vital device towards transformation of students' commitment, persuasion, stewardship, behavior, as well as attitudes. Accordingly,

traditional classroom-based teaching and learning is not sufficient and has limited effectiveness, most predominantly in aiding the students in the process of transferring of information and knowledge, as well as in solving problems. Most importantly, learning by way of experiences has both processes as well as outcome dimensions, including the fundamental content mastery that is incorporated alongside with opportunities in managing multifaceted projects, application of critical thinking, and enhancement skills.

Smith (2010) on the other hand suggests that a module-based approach is considered to enhance undergraduate science courses. Modules that are focused on key environmental concerns are seen as an effective approach in teaching non-science students, especially matters that deal with ecology and its role in addressing problems pertaining to the environment.

Conversely, Watson (2019) provides that higher-order thinking Skills (HOTS) recognize critical thinking skills, which comprise synthesizing, reasoning, analyzing, comprehension, and learning application, alongside evaluation. Accordingly, HOTS is founded from a range of taxonomies of learning, one of which was the one conceptualized by Benjamin Bloom. The HOTS are manifested by the leading three levels in Bloom's Taxonomy, which encompass analysis, synthesis, and evaluation.

However, the study of Smith (2010) revealed that the majority of the participants of the conducted research agreed that utilizing modules in teaching and learning also has advantages and disadvantages. Most of the respondents also agreed that it is not important to use a standardized module for a particular subject. Rather, they believe that what is important are the materials that are needed and vital to perform the activities such as experiments. Nevertheless, almost all the participants believed that modules are useful in learning. It was furthermore considered that modules are indeed beneficial for teachers as modules serve as their resource book however, teachers are observed to become reliant on them.

The literature focuses on the essence of modules as a pedagogical approach to teaching and learning, particularly in Environmental Science. Several research has substantiated the importance and various benefits of utilizing modules, especially in teaching Environmental Science. Although not every student appreciates the imperative part that modules in Environmental Science play, nevertheless majority has shown interest in their significance as a pedagogical approach.

METHODOLOGY

This study aimed to establish a basis on teaching and learning effectiveness using a module-based Environmental Science pedagogy. To address the purpose of the research, the qualitative research design was employed of which gathering students' experiences, observations, views, as well as behavior pertaining to the use of the modular-based approach in Environmental Science (MST 100) subject were conducted.

Research Design. This study adopted the qualitative descriptive research design, allowing the student-participants to explain how, why, and what they were thinking, their feelings, and experiences, over a particular period or event of interest, of which in this present study is the Modular Based Approach in Environmental Science (MST 100) subject. Thematic analysis was done to extract emergent themes from the participants' experiences.

According to Tenny, et.al (2021), a qualitative research design is a research approach that explores and provides deeper insights into real-world problems. Moreover, qualitative research gathers participants' behavior, encounters, as well as their perceptions. Moreover, the qualitative descriptive method drew emphasis on naturalistic inquiry, which levels the students' experiences in their natural state.

Thus, it is deemed that the qualitative research design would address the objectives of this study to substantiate the experiences of the

students in the use of the Modular-Based Approach during the Covid-19 pandemic.

Data Collection, Ethical Considerations and Sampling Procedure. The researchers conducted the study in a way that protected the anonymity of the participants. To protect their confidentiality, participants were not named, and their identity was hidden amid the data presentation of the study. As agreed upon, the student participants were interviewed utilizing Google Meet with audio-recording devices (e.g., cell phone or video recorder) and they were required to open their cameras. All the participants were informed of the objective of the interview before the actual data gathering and that they were free to agree or refuse to participate in the study.

The permission to gather the needed information from the respondents was obtained from the Bulacan Agricultural State College in San Ildefonso, Bulacan. Subsequent to the acquisition of consent, the researcher uploaded the duly authorized questionnaire via Google format for review and reference of the participants. This is in consideration of the Covid-19 pandemic at the time this research was being conducted.

Open coding and interpretation of data were done thereafter. The respondents of the study were 20 selected students of BSABEN, BSFT, VETMED, HORTI, BSED, and BSAM of Bulacan Agricultural State College. The respondents were chosen using the simple random sampling technique. A simple random sample is technically a set of "n" objects in a population of "N" objects, wherein all members of the population are possible samples and likely and equally to take place. In utilizing the simple random sampling technique, the selection of items completely depends on chance or by probability (Glen, 2014).

RESULTS AND DISCUSSIONS

Results about the ages of the respondents show that the majority of respondents, N=14 (69%) belong to the age group of 18 to 24 years old. It is then followed by N=3 (19%) belonging to the

age group of 25 years old and above. Moreover, N=3 (12%) of the respondents were those in the age group below 18 years old.

In terms of sex, findings show that female respondents outnumbered males by 13 or 65% and 7 or 35% in number and percentage respectively.

Founded from the interviews conducted among the selected students of Bulacan Agricultural State College, the following themes were raised: In terms of the experience of students in modular education programs, particularly in Environmental Science, 1) the Modular Based Approach needs connectivity. On ways that the modular learning approach in Environmental Science serves students' educational needs, it was found that, 2) learning opportunities and better understanding. With regards to the students' feeling about the communication with the instructor and other students, 3) communication is the key. On learning outcomes, students think that 4) learning outcomes take time. With regards to students' perception of the feedback from the instructor, 5) feedbacking is essential.

Theme 1. The Modular Based Approach needs connectivity. The primary theme extracted from the responses of participants was that the Modular-Based Approach suggests that teaching environmental science requires internet connectivity or access to online resources to enhance the learning experience.

In today's digital age, the internet has become a powerful tool for accessing information, resources, and educational materials. When applied to environmental science education, the use of the internet and online resources can provide several benefits to enhance the modular-based approach. Environmental science is a dynamic field that is constantly evolving with new research, data, and findings. The internet provides access to a vast amount of up-to-date information on various environmental topics, such as climate change, biodiversity, and environmental policies. Integrating internet connectivity into the modular-based approach allows students to

access the latest information, stay updated with current environmental issues, and engage with the most recent research and data. The internet offers a wide range of multimedia resources, such as videos, infographics, interactive simulations, and virtual field trips, that can enhance the learning experience. These resources can provide visual and interactive representations of complex environmental concepts, making them more accessible and engaging for students. Incorporating internet connectivity into the modular-based approach allows educators to leverage multimedia resources to enhance the understanding and retention of environmental science concepts.

The modular-based approach combined with internet connectivity can also facilitate remote learning and collaboration among students. Online platforms, discussion forums, and collaborative tools can enable students to interact, share ideas, and collaborate on projects, regardless of their physical location. This can foster a sense of community and promote collaborative learning, critical thinking, and problem-solving skills among students. The modular-based approach combined with internet connectivity can also provide flexibility and customization in the learning experience. Online resources and materials can be easily curated and customized to align with specific learning objectives, student interests, and different learning styles. This allows educators to adapt the curriculum to the needs and preferences of individual students, promoting personalized and learner-centered instruction.

Similar findings were captured in the study of Castroverde and Acala (2021), which explained that incorporating internet connectivity into the modular-based approach during Covid-19 pandemic environmental can enhance the learning experience by providing access to up-to-date information, multimedia resources, opportunities for remote learning and collaboration, online tools, and applications, as well as flexibility and customization in learning experiences.

Internet connectivity can be a valuable resource for enriching environmental science education and preparing students for the digital age.

This theme reflects the responses of the students hereunder provided:

"It's really hard for us because we don't have stable internet connection at home that's why every time, we have activities etc. we are all struggling about connection problems."

"Online classes have saved time and money. Regarding in Environmental science, I can handle it because we have teacher who is guiding us to have better information but face to face classes giving us better experience."

"As a student, this new learning process which is modular educational programs really help students to continue the education even Pandemic, the traditional process of learning is different to the new learning process which is the modular educational programs but with the help of teachers especially in Environmental Science teacher the knowledge can easily get and understand."

Theme 2. Learning opportunities and better understanding. The succeeding theme focuses on the provision of further learning opportunities on modular approach that promotes better understanding. It suggests that utilizing a modular-based approach in teaching environmental science can provide opportunities for learning and foster a better understanding of the subject matter. A modular-based approach allows for flexibility in learning, as students can progress through the modules at their own pace and according to their individual needs. This flexibility accommodates different learning styles, interests, and abilities, enabling students to engage with the material in a way that best suits them. Students can also revisit previous modules or move ahead to more advanced modules based on their understanding, promoting a personalized and self-directed learning experience. By breaking down complex environmental science concepts into smaller modules, students can develop a better

understanding of the subject matter. Each module focuses on a specific aspect, allowing students to thoroughly comprehend the foundational concepts before moving on to more advanced topics. This sequential approach can help students build a solid foundation of knowledge and develop a deeper understanding of environmental science concepts, leading to better retention and application of the learned material. There is also an active engagement that can foster critical thinking, problem-solving, and decision-making skills, as well as promote a deeper connection with the subject matter.

This theme is congruent in the study conducted by Barola (2023), which discusses a modular-based approach in teaching at university level can provide learning opportunities, foster better understanding of the subject matter, promote active engagement, highlight the interconnectedness of concepts, and allow for customization of learning experiences.

This approach can create a more effective and engaging learning environment for students, leading to enhanced learning outcomes in education.

The foregoing theme shows further responses from the students as provided hereunder:

"Through modules and other source where we get an idea where we better understand each question."

"The modular learning approach to Environmental Science can meet our educational needs by giving long hours when it comes to the various tasks, they bring down to us."

"The modular learning approach that can serve our educational needs is just by giving us useful and explicit presentations about the subject. And by giving us not much but only the necessary activities with allotted enough time. Overloading activities may lead us to cramming and stress since we have more subjects to worry."

Theme 3. Communication is the key. Communication is hard, considering connectivity problem and number of students in a class is the next theme that came up in the present study. It shall be noted that communication is indeed important even in distance learning, in fact one of the most essentials.

However, it shall be observed that students are facing communication problem in modular system of learning, especially of the environmental science subject, wherein internet connectivity is the primary cause. Communication plays a crucial role in this approach, facilitating the exchange of information, ideas, and feedback among educators and students throughout the learning process. Clear communication helps students understand the purpose, objectives, and expectations of each module, as well as the sequencing and connections between modules. This ensures that students are on the same page with educators and have a clear understanding of the learning goals and how to achieve them. Communication enables interactive discussions among students and educators, creating opportunities for questions, clarifications, and elaborations. Through discussions, students can engage in critical thinking, reflection, and debate, leading to a deeper understanding of the subject matter. Educators can also use discussions as a way to assess student understanding, provide feedback, and address misconceptions, promoting a more effective learning process. Communication facilitates collaborative learning, where students can work together in groups or pairs to complete module activities or projects. Collaborative learning promotes active engagement, peer-to-peer learning, and the development of teamwork and communication skills. It also encourages students to express their ideas, perspectives, and solutions, fostering a sense of ownership and empowerment in their learning process. As presented in the study of Tupaz (2021), effective communication is a key component of a contextualized modular-worktext approach in teaching mathematics. Clear instruction and guidance, interactive discussions, collaborative

learning, feedback and assessment, and development of real-world communication skills are important aspects of communication in this context.

Incorporating communication skills in the modular-based approach can enhance student learning outcomes, promote active engagement, and prepare students for effective communication in real-world environmental science contexts.

Hereunder are responses of the students that further narrate the generated theme.

"It's not easy to communicate with other instructor maybe it's because they handle so many students and some of them are parents too, maybe that's why. And for some students or my classmate its easy sometimes I don't reply because I'm busy."

"As a student, I am excited about the communication between me and the instructor and between me and the other students because apart from learning we also have a connection with each other through online."

"As a student, I feel like the communication between myself, and my instructor is fine since we have a group chat regarding the subjects. There, we can ask questions to my instructor about the subject at the same time communicate with my classmates."

Theme 4. Learning outcomes take time. The following theme reflects that learning outcomes in modular could be achievable depending on students, connectivity, time, and provision of learning. This means that the student's perseverance and attentiveness is of paramount importance in modular system, however, the issue of internet connectivity highlighted the primary concern. Furthermore, mastering the content and achieving the desired learning outcomes may not happen instantly, and it may take time for students to fully grasp and apply the knowledge and skills being taught.

A modular-based approach provides the opportunity to build a strong foundation by breaking down complex concepts into smaller, manageable modules. However, acquiring a solid understanding of these foundational concepts may take time, as students need to engage with the content, reflect, and integrate their learning over time. MBA can provide opportunities for students to develop and apply these skills through module activities, discussions, and assessments. Yet, mastering these skills may require time and practice, as students need to develop their analytical and problem-solving abilities through repeated exposure to different environmental issues and challenges. MBA often require students to take responsibility for their own learning, as they progress through modules at their own pace and engage in self-directed learning activities. But, developing effective self-directed learning skills, such as time management, organization, and self-motivation, can take time and effort. Students may need guidance and support from educators to develop these skills and achieve optimal learning outcomes. Students have diverse learning needs, interests, and backgrounds. MBA can accommodate these differences by allowing students to progress at their own pace and explore topics that interest them the most. Though, accommodating individual differences in learning styles, abilities, and interests may require additional time and effort, as students may need personalized support to fully grasp the content and achieve the desired learning outcomes.

Ambayon (2020), also mentioned a similar result that achieving desired learning outcomes through a modular-based approach in teaching literature may take time. Building foundational knowledge, promoting critical thinking and problem-solving skills, facilitating self-directed learning, accommodating individual differences, and encouraging reflection and application of knowledge all require time and effort from both educators and students. Patience, persistence, and ongoing support from educators can help students achieve optimal learning outcomes in environmental science through a modular-based approach.

Other responses from students are herein presented to relate to the generated theme.

"For me, yes, I can achieve that because it's still up to me if I really want to learn and if you have a dream in life even though it's hard now to study online eh you will still persevere to learn and get done."

"It depends. There are many problems existing in modular learning approach. Some of the provided printed modular materials is limited. They only provided a little amount of information for the students. In the end, all the things that students have learned is also limited. It is recommended to have a virtual meeting for every subject even it is just once per week. It is necessary for students to have a teacher who can teach them or explain the things to them even in a virtual way."

"As a student, the new learning process really hard to access but with the help of teachers and cooperation of students the new learning process become easily adopt but this process can give a better action of students to do more efforts and actions to facilitate the good learning."

Theme 5. Feedbacking is essential. In this particularly important theme, it states that feedback from instructor is generally good, constructive, and timely, but relevance and sources of feedback are also needed to be indicated. This theme shows student' appreciation of the instructor's feedback, nonetheless other factors like sources of the feedback as well as its relevance should as well be considered. Feedback serves as a guiding tool for students to understand how they are performing in their learning journey. It helps them understand their strengths and weaknesses and provides direction on how to improve. In MBA, where students may be learning independently and at their own pace, feedback helps them stay on track and ensures they are meeting the learning objectives of each module. Feedback encourages students to reflect on their own learning and performance. It prompts them to think critically about their progress, achievements, and areas for

improvement. This self-reflective process helps students become more self-aware and take ownership of their learning. They can use the feedback to identify their strengths and weaknesses, set goals, and adjust their learning strategies accordingly. Feedback serves as a motivational tool for students, as it recognizes their achievements and encourages them to continue their efforts. It also helps to keep students engaged in the learning process by providing them with a sense of progress and accomplishment.

In the same manner, Zaky (2023), mentioned the importance of feedback in higher education to teaching and learning. Feedback serves as a guiding tool for students, encourages self-reflection, motivates, and engages students, fosters continuous improvement, and enhances teacher-student communication.

Providing timely and constructive feedback is essential in helping students achieve optimal learning outcomes and ensuring their success in the modular-based approach to education.

Other student responses are herein presented to further relate to the theme.

"My instructor is working hard to teach us, and I appreciate it. She/He is giving us knowledge although it's hard to explain some of the topic and lesson, she/he still gives it a try. She/He is very hardworking when it comes to teaching us. She is constructive, she's improving the lesson although it's in modular."

"I view it as my motivation to improve my work in the future. No matter how good or bad the feedback is, I always appreciate it. It just meant that they are appreciating my work and understand it critically. For example, I remember my teacher back in senior high school wherein she complimented my artwork. It improved and developed my self-esteem and to do better."

"Every instructor has his or her own teaching strategies, so you have to understand everything because we are all adjusting to modern teaching/ learning methods."

Conclusions. The modular system proved to be generally acceptable to the students. Although there are concerns such as communication and the need for teacher guidance, overall feedback from students has been positive. As technology continues to improve and connectivity issues are addressed, the modular system may become a more efficient and effective learning tool for students. It is important for teachers to be aware of these issues and provide the necessary support and guidance to ensure the success of the modular program in the classroom.

Feedback from teachers has generally been positive, indicating that they provide valuable insight and guidance to students. However, there is a need for a system to provide additional feedback to further enhance the learning experience. By incorporating a variety of feedback, such as peer assessment or self-assessment tools, students will be able to gain a more detailed understanding of their progress and areas for improvement

Students must take responsibility for their own learning in order to increase the efficiency and effectiveness of the modular system. Self-learning is essential to ensure knowledge is acquired and retained. Additionally, effective communication between students and teachers is essential to clarify doubts, change perspectives, and create a collaborative learning environment. Finally, valuing and managing time effectively will enable students to make the most of their modular learning experience.

Recommendations. Based on the results and conclusion, the following are the recommendations:

1. Use a blended learning approach. Along with online exercises and assignments, provide offline assignments and assignments for students to complete. This will help address the issue of lack of internet connectivity and ensure that all students can continue learning. Online activities include reading material, worksheets, practical exercises, or

group activities that can be completed offline.

2. Focus on behavior and impact. Instead of generalizing thoughts or issues, focus on those specific actions or behaviors that are causing anxiety or having a positive impact. This helps the recipient understand what needs to be changed or continued.
3. Deliver in a timely manner. Respond as soon as possible after observing a behavior or issue. This helps ensure that the feedback is still fresh in the recipient's mind and allows the results to be measured.
4. Use online collaboration tools. Encourage the use of platforms such as Google Classroom, Microsoft Teams, or Zoom for interactive discussions, virtual classrooms, and video conferences. These tools allow teachers to communicate with students in real time and engage them, enabling students to collaborate with each other.
5. Schedule a virtual office. Teachers can allocate specific hours during the week where students can schedule one-on-one virtual meetings or participate in open discussions. This gives students the opportunity to communicate directly with their teachers, ask questions, and seek guidance on assignments or course materials.
6. Examine existing modular systems. Start by reviewing the modular systems currently used in courses. Look at examples of educational institutions nationally and internationally. This will help in gathering insights on the different strategies and tactics.
7. Conduct case studies. Identify specific educational institutions or programs that have successfully implemented modular systems. Conduct in-depth case studies to understand their experiences, processes, and outcomes. This provides valuable insight into the actual implementation of modular systems and will help identify best practices.

REFERENCES

- Alexandar, R & Poyyamoli, G. (2014). The Effectiveness of Environmental Education for Sustainable Development Based on Active Teaching and Learning at High School Level: A Case Study from Puducherry and Cuddalore Regions, India. *Journal of Sustainability Education*.
<http://www.jsedimensions.org/wordpress/wp-content/uploads/2014/12/Alexandar-Poyyamoli-JSE-Vol-7-Dec2014.pdf>
- Ambayon, C. M. (2020). Modular-based approach and students' achievement in literature. *SSRN Electronic Journal*.
<https://doi.org/10.2139/ssrn.3723644>
- Barola, R. C. (2023). Effectiveness of modular approach in teaching primary grades amidst pandemic education. *Jurnal Pendidikan Progresif*, 13(2), 776-790.
<https://doi.org/10.23960/jpp.v13.i2.202348>
- Castroverde, F., & Acala, M. (2021). Modular distance learning modality: Challenges of teachers in teaching amid the COVID-19 pandemic. *International Journal of Research Studies in Education*, 10(8).
<https://doi.org/10.5861/ijrse.2021.602>
- Dejene, W. & Chen, D. (2019). The Practice of Modularized Curriculum in Higher Education Institution: Active Learning and Continuous Assessment in Focus. DOI: 10.1080/2331186X.2019.1611052
- Glen, S. (2014). Simple Random Sample: Definition and Examples.
<https://www.statisticshowto.com/simple-random-sample/>
- Smith, G. (2010). A Module-Based Environmental Science Course for Teaching Ecology to Non-Majors.
<https://files.eric.ed.gov/fulltext/EJ889711.pdf>

- To-Im, Jongdee & Klunklueng, Arunwan. A Firefly Learning Module for Environmental Sustainable Development in Samutsongkhram Province, Thailand. <https://dergipark.org.tr/tr/download/article-file/89001>
- Torrentira, M. (2020). Torrentira-Module for Environmental Science. https://www.researchgate.net/publication/343610035_Torrentira-Module_for_Environmental_Science
- Tupaz, A. (2021). Contextualized modular worktext: Its effect on the academic achievement of students' performance in mathematics 9. *Academia Letters*. <https://doi.org/10.20935/al2203>
- Vasconcelos, C. (2010). Teaching Environmental Education through PBL: Evaluation of a Teaching Intervention Program. *Research in Science Education*. 42. 219-232. <https://doi.org/10.1007/s11165-010-9192-3>.
- Watson, S. (2019). Higher Order Thinking Skills in Education. <https://www.thoughtco.com/higher-order-thinking-skills-hots-education-3111297>
- Zaky, H. (2023). Feedback effectiveness in higher education: Utilizing students' feedback to foster teaching and learning. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.4505733>