

Assess-Practice-Present-Reflect (APPR) Mathematics Module Design: Teachers' Evaluation

Niño Richard R. Salingay^{1,*}, Laila S. Lomibao^{2,*}

¹Department of Education, Bukidnon National High School, Malaybalay City, Philippines

²University of Science and Technology of Southern Philippines, Lapasan Highway, Cagayan de Oro City, Philippines

*Corresponding author: salingayrichard21@gmail.com, laila_lomibao@ustp.edu.ph

Received July 12, 2021; Revised August 17, 2021; Accepted August 26, 2021

Abstract This study aimed to determine how mathematics experts and teachers assessed the designed APPR (Assess-Practice-Present-Reflect) module based on its Content, Language, and Layout. This was conducted in three divisions in the province of Bukidnon comprising 33 Grade 10 mathematics teachers and experts who are teaching for at least 3 years on the said grade level. The Department of Education LRM rubric was utilized as the primary research instrument. A mixed-method design was employed. Descriptive statistics and thematic analysis were used for the data processing. Analysis of the data revealed that the designed module passed DepEd set of criteria for learning resource materials. Mathematics experts and teacher participants found the designed modules aligned with all the required most essential learning competencies, it contains an essential instructional design that can contribute to achieving the learning objectives, the coherence and clarity of presentations were observed, and has a good physical attributes. Moreover, the interview conducted converged with the result from the instrument. The participants agreed that the APPR module can strongly motivate the learners to finish the module, it promotes grit, encourages independent learning, can cater to the diverse type of learners, and its level of complexity suites to the level of the students. Hence, APPR module is recommended to be used in long-distance learning. Further, a study of this design greatly encouraged especially on how it affects the performance of the learners.

Keywords: *module design evaluation, assess-practice-present-reflect module design, grit, independent learning, distance learning*

Cite This Article: Niño Richard R. Salingay, and Laila S. Lomibao, "Assess-Practice-Present-Reflect (APPR) Mathematics Module Design: Teachers' Evaluation." *American Journal of Educational Research*, vol. 9, no. 8 (2021): 549-554. doi: 10.12691/education-9-8-13.

1. Introduction

In the advent of the constantly evolving technology and ambiguous environmental and social landscape, the education sector is restructuring and innovating to adjust to the constant and current changes. Learning modalities become unconventional, adapting to the new innovative trends in technology and learners' diversified learning styles and landscapes to prepare every student for their future. Hence, it would be logical to equip learners with the skills needed in the future, such as creativity, critical thinking, complex problem solving, and emotional intelligence [1].

In delivering distance learning, teachers faced a lot of challenges in the learning process especially in the assessment of learning [19]. For the learners, in the absence of the teachers, independent learning is very essential for the learners to have good performance [23]. Moreover, learning independently is one of the challenges of the students faced by the learners during this new normal situation [24].

Mathematics as a discipline initiates ideas that would let people think logically [2]. It challenged the students to think rationally and become good problem solvers in the future [3] and hone students' creativity, critical thinking, and resilience. Most of the technologies are rooted in the concept of mathematics [4]. Mathematics is undeniably one of the most critical subjects in the curriculum [5]. It prepares students to think critically and creatively through its varied problem-solving tasks.

In enhancing the learners' problem-solving skills, productive failure is one of the emerging strategies that address this particular skill of the learners. It allows the learners to commit a mistake and learn something from them [6]. This kind of strategy was proven to be effective in developing the performance of the learners.

However, with the current situation, due to the onslaught of the COVID-19 virus, the government issued guidelines to minimize the spread of the virus and address the health, social and economic issues. With this, the Department of Education (DepEd) issued a (DepEd Memorandum No 42 S. 2020) to practice social distancing and suspend the conventional face-to-face instruction [7]. DepEd developed self-learning modules as the primary learning resources

for the home-based modality of learning to continue the learning-teaching process amidst the pandemic. At the same time, conventional face-to-face instruction is suspended.

Considering the current situation, the researcher developed a module design anchored on a productive failure approach. Assess-Practice-Present-Reflect (APPR) is a module design where the learning episode will start with assessment, followed by the time for the students to practice, presentation of the concept, and eventually the reflection. The assessment and practice part is given to the learners first. But, it is assumed that the learners will not automatically get the concept. Through these initial problems, they can integrate their previous learning, create some connections with it, and eventually, it would make their experience during the presentation of the lesson be more meaningful.

However, before a designed module can be used as the main instructional material, it would be better if it has undergone evaluations by the experts and teachers. This is necessary to strengthen the module's validity, check errors, and identify parts that need more improvement. Hence, the conduct of this study is crucial.

2. Theoretical Framework

The present study is anchored on a productive failure approach. The strategy allows the learners to fail and make their learning more meaningful by giving assessments or problems in the first part of the lesson [6]. The assessment part must connect the previous knowledge of the learners to the new lesson to help the learners construct their knowledge with the new lesson based on their past experiences [8]. Giving enough problems to practice which another main part of the module provides enough time to practice in which it is anchored on the law of exercise [9]. But to provide the last option for the learners who fail to connect their previous knowledge to the problem and to answer the practice part, a presentation of the lesson is provided which serves as information to learn [10]. Moreover, the presentation part utilized a process-oriented guided inquiry learning approach to allow the learners to engage themselves as they acquire the new set of knowledge [11]. Eventually, a reflection which is an integral part of the learning process was the last part of the module [12].

Several modules were introduced for improving the performance of the students in mathematics. Some of it is guided-inquiry approach was introduced in learning linear algebra [13]; A triangle congruence module for Open High School [14] and Posing-Exploring-Doing-Evaluating (PEDE) productive failure model in developing mathematical creative thinking of the learners [15]. All of it passed in the module evaluation with their chosen instrument. The difference of this module design is that it focuses on the order of these parts; assessment, practice, presentation of the lesson, and reflection.

A module design needs to promote independent learning through its exemplar illustration and enrich instructional design [20,22]. A module that motivates and lets the learners enjoy answering it most likely provides a significant impact on the performance of the learners [21]. The content, format, accuracy, presentation, and organization are very essential in a module design [22].

3. Methodology

A mixed-method research design was used in this study. The module evaluation instrument adopted from the Department of Education is composed of a rating scale. Moreover, some participants had undergone quick interviews based on their evaluation from the module. The rating scale was used for the quantitative part of the study and the interview for the qualitative component.

A purposive sampling procedure was utilized. Thirty-three (33) mathematics experts and teachers coming from divisions of Bukidnon, Malaybalay City, and Valencia City who are teaching mathematics 10 for at least three years were purposively chosen as study participants.

The module evaluation tool adopted from the DepEd is composed of three parts. The evaluation rating tool for content, language, and layout. It has a 5-point Likert scale. Space was also provided for teachers' comments and corrections on the module.

Before the distribution of the module, the researcher asked permission from the division superintendents of the three divisions. After that, the conduct of the study was approved, the distribution of the modules and evaluation form followed. All teachers were given enough time to thoroughly evaluate the module. They were not forced to finish it quickly to have a reliable and valid result. Quantitative data uses descriptive statistics, thematic analysis for qualitative data.

4. Results and Discussion

Table 1 shows the descriptive statistics of the teachers' evaluation of the APPR module in terms of the content. The overall rating passed about the criteria set by DepEd. The module content was validated to be aligned with the Most Essential Learning Competencies (MELCs). It covers all of the content found in the MELCs. The evaluated module also uses self-directed techniques, learning tasks, and formative assessment that could help the learners finish answering the module. The module also contains essential instruction designs that contribute to achieving the learning objectives. It possesses motivational strategies to engage the learners. The evaluated module also integrates desirable values and traits. It contains free from computational errors. The assessment also of the module has sufficient assessment activities to help the learners track their progress and be engaged with it. It contains an answer key also to guide the learners. Moreover, the topics and ideas are presented with coherence and it is integrated. All of these were the salient points highly observed by the experts and teachers.

This descriptive result of the evaluation of the teachers coincides with the qualitative result of the study. The thematic analysis of the interview responses of the mathematics teachers resulted in several cluster themes as displayed in Figure 1. Twelve (12) theme clusters were formulated, namely: can cater to diverse types of learners; all competencies were covered; the module is comprehensive; it is detailed and simplified; the contents are flawless; it is motivating; the experts and teachers were impressed with the design; competencies are parallel to the activities and assessment; it promotes grit; it

promotes independent learning; it contains strategic design; the number of activities is enough and suitable for the learners. Further analysis of the formulated clusters themes, and finding its congruence with the literature reviewed, the formulated cluster themes described the

whole context of the APPR module in terms of its content alignment with the MELCS and its importance and relevance with the existing curriculum and learning modality. It shows the strengths of the APPR module and its detailed importance and relevance.

Table 1. Descriptive statistics of the Teachers' Evaluation on the APPR module in terms of Content

Factors (Assigned Weight)	Mean	Average Weighted Mean	SD
Factor I. Most Essential Learning Competencies (MELCs) 40%	5	40%	0
Factor II. Instructional Design and Organization (20%)	4.988	19.95%	0.33
Factor III. Instructional Quality of Text and Visuals (20%)	4.97	19.88%	0.48
Factor IV. Assessment (10%)	4.988	9.98%	0.24
Factor V. Readability (5%)	4.976	4.98%	0.42
Factor VI. Referencing and Source Citation (5%)	4.985	4.99%	0.17
Over-all Rating		99.78% (passed)	

Average Weighted Rating: 100% - Passed
 61%-99% - Conditionally Passed
 60% and below - Failed.

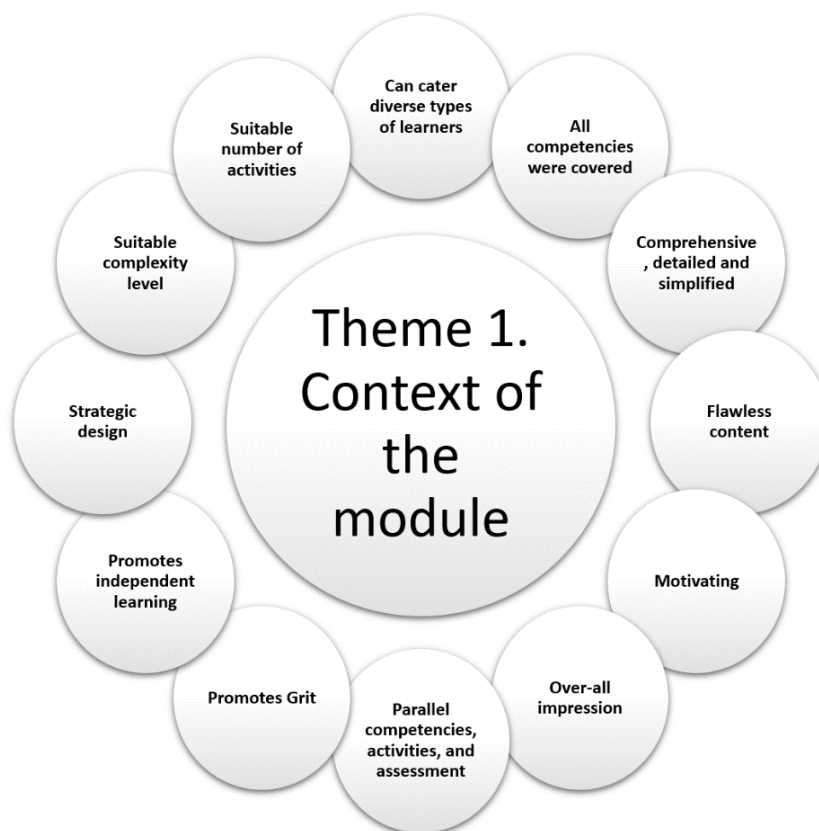


Figure 1. Conceptual Model Showing the Context of the Module on the interview of the teachers/experts after the evaluation of APPR Module design

During the interview, the participants highlighted some of the strengths of the module. All of the participants have positive views on the designed module. R18 and R15 have underscored the important parts of the module.

“Kanang ganahan ko kay simplified tapos kanang comprehensive sad siya. Ug na covered gyud tanan nga competencies... ang competencies ga jive sa activities ug na hit gyud ang mga skills ...nya kani siya, kung makuha nimo ni nga challenge ma skip nimo ni kay kanang parepareha ra ang following problems. Basta kanang ganahan ko kay simplified tapos kanang comprehensive sad siya.” [“I like the module because it is simplified and comprehensive. It covers all the competencies... the competencies, activities, and the focused skills are

aligned ...and this part, if you can answer this challenge item, you can skip the rest challenge since they are similar problems. I like the module because it is simplified and comprehensive.”] (R18)

“Chada iyang flow... dili ra pod siya ing ana ka lisod... Okay raman, dili ra pod siya ing ana ka daghan parehas sa amoa (DepEd module) nga puros answeranan gyud buh. Kanang daghan gyud bitae kaayo siya sa isa ka activity. Kaya ra kaayo ni sa mga students” [“The flow of the module is nice... it is not so difficult also (on the part of the learners). It is okay, the number of activities is not so plenty also unlike our module (DepEd module) that most of it have to be answered by the students. There are plenty of questions in just one activity. The students can handle answering this module.”] (R15)

Table 2. Descriptive Statistics of the Teachers' Evaluation of the APPR module Design in terms of Language

Standards/Criterion Items (Assigned Weight)	Mean	Average Weighted Mean	SD
A. Coherence and Clarity of Thought (35%)	5	35.00%	0
B. Grammar and Syntax (35%)	4.97	34.79%	0.17
C. Spelling and punctuation (10%)	5	10.00%	0
D. Consistency in Style (20%)	5	20.00%	0
Total		99.79%	

Average Weighted Rating: 100% - Passed
 61%-99% - Conditionally Passed
 60% and below - Failed.

The strengths of the module coincide with the findings of other researches. A module must promote independent learning [20,22]. It must motivate the learners to finish it and this would impact the performance of the learners [21]. The module must be free from errors and accurate [22]. The lesson must help the learners construct their knowledge from their previous lesson [8]. Hence, the result of this study is backed up with the findings of other studies.

Table 2 presents the descriptive statistics of the teachers' evaluation of the APPR module design in language. The table shows that the average weighted rating passed from the criteria provided by the DepEd. Coherence and clarity of thought, spelling, and punctuation, and consistency in styles were all perfect. The module is not perfect in grammar and syntax. It means that the usability of the module in terms of the language is passed.

Table 2 presents that the underlying language of the module passed, and that is for the quantitative results. It is supported by the qualitative result, as shown in Figure 2. Figure 2 presents that the module contains only a few grammatical errors and some of the respondents found terms challenging to understand on the part of the students.

R2 showed some examples of the technical errors found in the module.

"...daun naay kani sir oh, kani you can now proceed with activity 3 peru 4 ang naa diri..." ["...then, I found something like this sir, you can now proceed with activity 3 but on the next page is activity 4..." (R2)

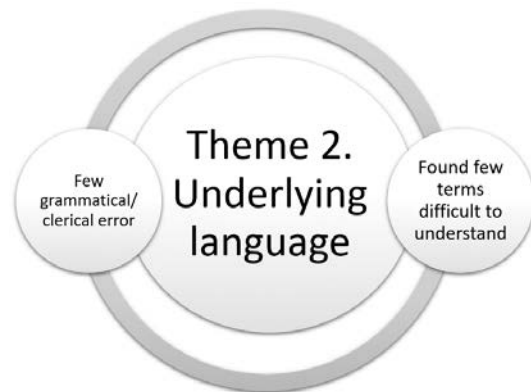


Figure 2. Conceptual Model Showing the Underlying Language on the interview of the teachers/experts after the evaluation of APPR Module design

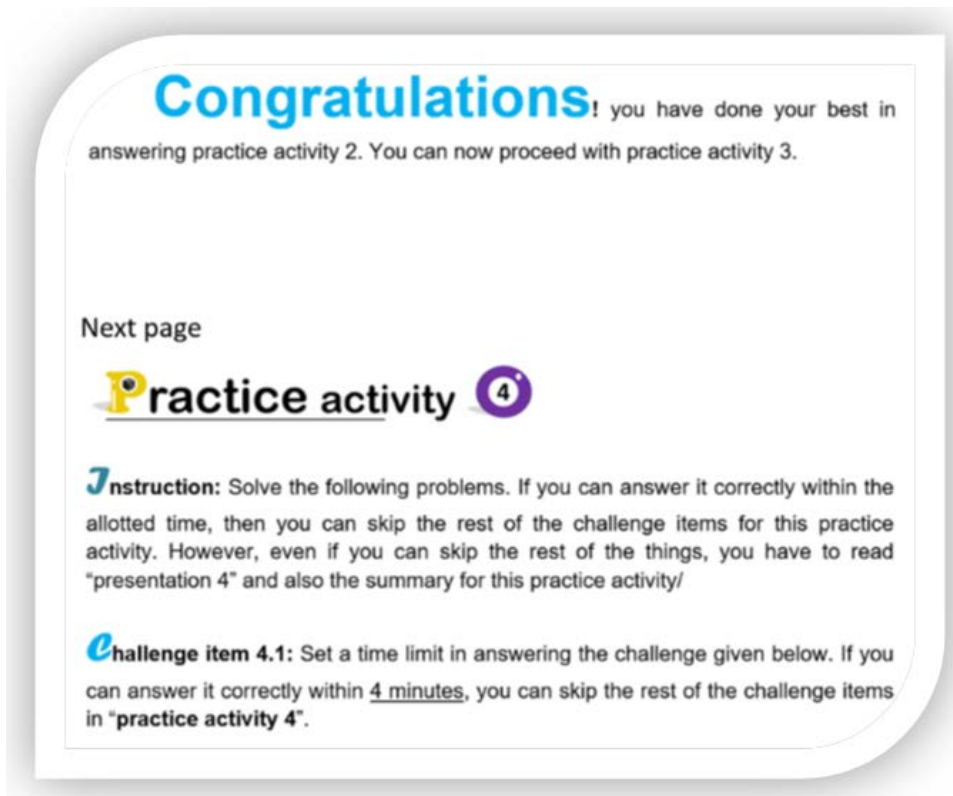


Figure 3. clerical error found by R2 in the APPR module during the evaluation

During the evaluation of the module, it was found out that the underlying language is not perfect, and the teachers find some clerical errors. It is supported by both written evaluation and during the individual interview. But, thanks to the teachers' comments and suggestions. It enhanced the value of the module. All of their comments that are beneficial for the APPR module were revised.

It is very beneficial that the designed module is free from a grammatical and clerical errors. That is why the researcher incorporated all of the corrections given by the teachers and experts and make them ready to be used by the learners. Hence, this module passed the evaluation for language. Similar to other studies in which they found out that their module also passed with the standards specified in the language [14,15].

Table 3 presents the descriptive statistics of the teachers' evaluation of the APPR module design in terms of layout. It was found out that it passed with the standard set by the Department of Education. Factor 3, the visuals, is perfect and the other 2 are physical attributes and format, are not perfect but still can be considered as passed.

Table 3. Descriptive statistics of the Teachers' Evaluation on the APPR Module Design in terms of Lay-out and Design

Factors (Assigned Weight)	Average Weighted Rating	Mean	SD
Factor I. Physical Attributes (35%)	34.79%	4.97	0.17
Factor II. Format (30%)	29.89%	4.982	0.082
Factor III. Visuals (35%)	35.00%	5	0
Over-all Rating	99.68%		

Average Weighted Rating:
 100% - Passed
 61%-99% - Conditionally Passed
 60% and below - Failed

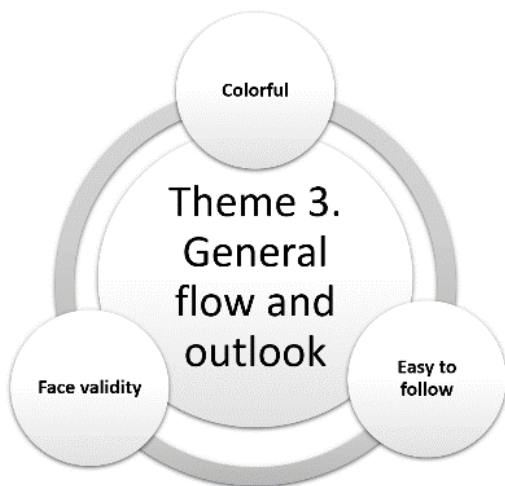


Figure 4. Conceptual Model Showing the General Flow and Outlook on the interview of the teachers/experts after the evaluation of APPR Module design

Table 3 is supported by Figure 4 that presents the module's general outlook and found out that the module is colorful, the steps are easy to follow, and the face validity is good. The systematic arrangement of the module is significant so that the students can understand and use the module easily [18]. APPR modules were arranged systematically to help the learners understand and use them efficiently. R16, R18, and R10 testified to the

arrangement of the APPR module, and they liked its flow and arrangement.

“Kanang naa siyay mga steps, daun makaya ra siya sa mga bata. Ganahan ko kay very attractive and colorful kaayo imong module” [“I found steps on it, and then the students can be able to answer it. I like it because your module is very attractive and colorful”] (R16)

“Over-all ganahan kaayo ko sa arrangement sa module. Sa ako comprehensive man siya, dayun simplified siya, easy to understand, easy to follow, dayun cover to cover ok siya. Naa na pod ang mga steps, naa sa sad mga directions” [“Overall I like the arrangement of the module. For me, it is comprehensive, simplified, easy to follow, and cover-to-cover. It is awesome. There are also steps and directions.”] (R18)

5. Conclusion and Recommendation

APPR module design has passed the criteria set by the Department of Education based on the three major parts: content, language, and layout. The respondents found the module to strongly motivate the learners to finish answering it. The designed module is highly recommended by the mathematics experts and teachers' participants to be used in long-distance learning. Moreover, further study of this design greatly encourages especially on how it affects the performance of the learners.

Acknowledgments

The researchers would like to extend their heartfelt gratitude to the Department of Science and Technology – Science Education Institute (DOST-SEI) for the scholarship granted.

References

- [1] Yun, J. (2018). 10 Skills you Won't Need by 2022-and 10 you will. Retrieved from: au.finance.yahoo.com.
- [2] Rattatumma, T., Puncrobutr, V. (2016). Assessing the Effectiveness of STAD Model and Problem Based Learning in Mathematics Learning Achievement and Problem Solving Ability. Journal of Education and Practice.
- [3] NoprianiLubis, J., Panjaitan, A., Surya, E., Syahputra, E. (2017). Analysis Mathematical Problem Solving Skills of Students of the Grade VIII-2 Junior High School Bilah Hulu Labuhan Batu. State University of Medan North Sumatera, Indonesia. International Journal of Novel Research in Education and Learning.
- [4] Mahanta, D. (2014). Impact of Attitude and Self-Concept of the Students Towards Athematics Upon their Achievement in Mathematics. Nowgong Girls' College. International Journal of Theoretical & Applied Science.
- [5] Mohamed, L., Waheed, H. (2011). Secondary Students' Attitude towards Mathematics in a Selected School of Maldives. International Islamic University Malaysia. International Journal on Humanities and Social Science.
- [6] Kapur, M. (2012). Productive Failure in Learning the Concept of Variance. Nanyang Technological University. Springer Science + Business Media
- [7] DepEd Memorandum No. 42, s. 2020. Guidelines for the Remainder of School Year 2019-2020 in Light of COVID-19 Measures.
- [8] Mcleod, S. (2019). Constructivism as a Theory for Teaching and Learning. Retrieved from:www.simplypsychology.org.

- [9] Saurab. Write a Brief Note on Thorndike's Law of Exercise. Preserve article. Retrieved from: preservearticles.com.
- [10] Fullbrook, P. (2019). What are Learning Theories? Retrieved from: <https://teacherofsci.com>.
- [11] Walker, L. & Warfa, A. (2017). Process Oriented Guided Inquiry Learning (POGIL) Marginally Affects Students Achievement Measures but Substantially Increase the Odds of Passing a Course.
- [12] Jones, E. & Ryan, M. (2015). The Dancer as Reflective Practitioner. Queensland University of Technology, Australia.
- [13] Mawardi, K., Dewi, E., Asmah, S., Pratiwi, T., Sari, U., Putra, F., & Widayanti (2019). Development Islamic-Nuanced Linear Algebra Module with Guided-Inquiry Approach in the Matrix Material. *Journal of Physics: Conference Series*.
- [14] Torres, J. & Tan, R. (2021). Design, Development, and Evaluation of Triangle Congruence Module for Open High School Program. *Sci. Int. (Lahore)*. University of Science and Technology of Southern Philippines.
- [15] Casing, P. & Roble, D. (2021). Students' Mathematical Creative Thinking Ability with Posing-Exploring-Doing-Evaluating (PEDE) Productive Failure Model in New Normal. *American Journal of Educational Research*.
- [16] Istikomah, E. & Herlina, S. (2020). Integral Calculus Module Through Mobile Learning in Mathematics Learning. *Universitas Islam Riau. Mathematics Research and Education Journal*.
- [17] Winata, R., Permata, H., Friantini, R. (2020). The use of Social Arithmetic Contextual Modules on Learning Achievement in Terms of Interest in Learning. *Unnes Journal of Mathematics Education*
- [18] Kurniawati, S., Budiyo & Saputro, D. (2020). Open-Ended Mathematics Module to Improve Students' Higher Order Thinking Skill. *Ahmad Dahlan International Conference on Mathematics and Mathematics Education*.
- [19] Abante, A., Cruz, R., Guevarra, D., Lanada, M.I., Macale, M.J., Roque, M.W., Salonga, F., Santos, L., Cabrera, W. (2021). A Comparative Analysis on the Challenges of Online Learning Modality and Modular Learning Modality: A Basis for Training Program. *International Journal of Multidisciplinary Research and Analysis*.
- [20] Al Mamun, M. A., Lawrie, G., Wright, T. (2020) Instructional Design of Scaffolded Online Learning Modules for Self-Directed and Inquiry-Based Learning Environments. *Science Direct*.
- [21] Javier, R. M. (2021). Vodcasting: A Tool to Aid Modular Learning in English. *Suba National High School Galat Annex. EPRA International Journal of Research and Development (IJRD)*.
- [22] Loria, M., Dio, Villareas, R. (2020). Contextualized Learning Modules in Bridging Students' Learning Gaps in Calculus with Analytic Geometry Through Independent Learning. *Journal of Mathematics Education*.
- [23] Agarin, M. A. L. (2021) The Challenges and Status of Modular Learning: Its Effect to Students' Academic Behavior and performance. *EPRA International Journal of Multidisciplinary Research*.
- [24] Trovela, E. (2021). Perceptions of Parents and Learners to Modular Learning Distance Learning as Contemporary Teaching Strategy. *EPRA International Journal of Research and Development*.



© The Author(s) 2021. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).