# Assessment and Acceptability of Module in Mathematics for Non-STEM Freshmen Students

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**Abstract**
The study aimed to assess the level of acceptability of the mathematics module for non-STEM first-year students enrolled in mathematics programs. The format of the mathematics module contains these essential parts: overview title, learning competencies, and discussion using the 5E's of the Instructional Model: engage, explore, explain, elaborate and evaluate. This mathematics module was implemented to the 79 first-year students as the participants for the evaluation of the acceptability of the said mathematics module. Eight mathematics teachers were included as participants in the evaluation of the acceptability of the module, including the teacher who implemented the module. The mathematics module has excellently met the standards, and no revision is needed, as reflected in the evaluation by the students and the experts. Thus, the developed mathematics module can enhance mathematics competency to minimise the gaps for non-STEM students enrolled in math-related programs.
Keywords: Assessment, acceptability, mathematics module.

## 1. Introduction

The goal of education is to provide help or guidance to teachers to select and determine techniques for teaching or providing a learning environment for students (Hamalik, 2001; Andrini, 2016). But as time progressed, a lot of innovation and changes happened in the field of education. One of which is the K to 12 curricula.

The K–12 Basic Education Curriculum is made to ensure that future generations are able to communicate, think clearly and critically, take moral considerations into account while solving problems, and have a sense of environmental responsibility (Fajarini, 2016). The Senior High School was added as a part of the curriculum. The curriculum offers options for “STEM (Science, Technology, Engineering, and Mathematics)” and non-STEM specialisations, such as “Technical Vocational and Livelihood (TVL)”, “Humanities and Social Sciences (HUMSS)”, “General Academics, Sports, Design, and Arts (GASDA)”.

Furthermore, preparing students for college mathematics is quite challenging, considering the significant differences in how each student learns. Thus, there emerges the need to plan for an instructional scheme that can make higher education available to many students, especially non-STEM senior high students who plan to enrol in mathematics-related programs and simultaneously offer an individualised learning experience. Among the various strategies, individualised instruction is a modular approach.

The modular approach is among many countries' most widely recognised teaching-learning techniques. It is almost used in all subjects considering the individual differences among the learners, which necessitates the planning for adopting the most appropriate teaching techniques to help individuals grow and develop at their own pace Kandarp (2013) in Sadiq & Zamir (2014).

Improving the math competency of Non-STEM K to 12 graduates entering college who will take math-related programs may contribute to the increased rates of college persistence and degree completion, helping to improve individuals' lifetime earnings and overall welfare (Hodara, 2013). Hence, the researcher's developed mathematics module may enhance students' mathematics competencies and prepare the Non-STEM K to12 graduates by providing them with an alternative pathway to gain access to enrol in any university math-related programs.

## 2. Literature Review

### 2.1. K to 12 Basic Education Curriculum

Education reform is sweeping the nation. The development of K to12 standards and One of the numerous areas of reform action is the evaluation of K–12 schools, instructors, and students. Other areas include changes to college admissions regulations and accountability procedures.

With Grade 11 enrollment during the academic year 2016–2017, the Philippines is only beginning to adopt the Senior High programme. Starting in JHS and continuing in SHS is the career route specialism. In the Philippines, grades 11 and 12 make up the second phase of secondary education. In addition to the core skills, students can choose from three categories of electives: academic, technical/vocational, and entrepreneurial. The end-of-Grade 12 examination is intended to serve as both an admission exam for college and the secondary level's exit assessment (Sarmiento & Orale, 2016).

In order to give students time to consolidate newly acquired academic abilities and competences, a two-year senior high school (SHS) curriculum was added to the program's core (Department of Education, 2010). The goal of the programme is to prepare students for work following graduation by providing training in a variety of specialisations, or SHS tracks, of their choosing. Based on different student interests and competencies, these tracks were created.

The SHS curriculum serves as a stepping stone for life in college or university, business, and industry, with industry being considered as the less prestigious of the two in terms of prestige (Bidwell, 2014; Peano et al., 2008). For instance, in the Philippines, more students would choose the academic route over any other track. Research found that just around 3% of aspiring students chose tech-voc courses, whereas about half chose academic routes (Lagajino et al., 2015). According to enrollment statistics provided by DepEd, around 39% of senior high school students in the Philippines chose the tech-voc route, while 60.6% chose the academic track. In Japan, around 73% of people choose the academic path, while only 24% took the tech-voc path.

Additionally, "the STEM track of the Philippine K to 12 Enhanced Basic Education Curriculum is intended to produce secondary school graduates who took science, research, mathematics, and engineering-related courses at the tertiary level, thereby increasing the nation's scientific and scholarly workforce (Philippine Basic Education, 2013 in Estonanto, 2017)".

Non-STEM students are those in their senior year of high school who want to attend college but do not choose the “Science, Technology, Engineering, and Mathematics (STEM)” strand (Formoso, 2016). Here are some examples of these non-STEM strands and tracks: “Accounting, Business and Management (ABM)”, “Humanities and Social Sciences (HUMSS)”, “Technical-Vocational-Livelihood (TVL)”, Sports, and Arts and Design, as well as the “General Academic Strand (GAS)”.

Additionally, research has been done on the maths performance of both STEM and Non-STEM strands/tracks. In order to compare how engineering students from STEM and non-STEM SHS programmes performed on Calculus 1, Molina (2019) carried out a study. The study's respondents, who number 486 in all, are engineering students. “Out of the 486 responders, 466 came from STEM SHS and 20 came from non-STEM SHS. Utilising the (1) Midterm Departmental Exam (MDE), (2) Final Departmental Exam (FDE), and (3) Final Grade, data were gathered. According to the outcomes, engineering students struggled in Calculus 1”.

In addition, it was discovered that engineering students from STEM and non-STEM SHS courses performed significantly differently when it came to discovering derivatives. “This distinction demonstrated that STEM engineering students outperformed non-STEM engineering students in terms of discovering derivatives. The performance of engineering students in the STEM and non-STEM streams was also significantly different in the applications of derivatives. According to this finding, engineering students from the STEM strand outperform those from the non-STEM strand when applying derivatives. The performance of engineering students in the STEM and non-STEM tracks in Calculus 1 was shown to be significantly different. According to the findings, engineering students from the STEM strand did better in Calculus 1 than engineering students from the non-STEM strand”. The study suggested further research into the potential factors contributing to students' subpar performance in Calculus 1, including a review of the SHS and engineering curricula.

The problem-solving skills of STEM (“Science, Technology, Engineering, and Mathematics”) and non-STEM (“Science, Technology, Engineering, and Mathematics”) graduates enrolled in the “Bachelor of Science in Mathematics Education (BS MathEd)” programme were compared in Tan and Dejoras' (2019) study. The researchers' own Mathematics Problem Solving Ability Test, which has a Cronbach alpha of 0.80, was used to assess the participants' problem-solving skills. The results showed there was no discernible difference in the graduates' capacity to solve problems between “STEM (Mean = 2.07, SD = 0.47) and non-STEM (Mean = 2.08, SD = 0.48)” strands. The participants were discovered to be problem-solving apprentices, able to achieve a partially correct solution but unable to provide the final correct responses. In order to successfully deploy K–12, the researchers advised that basic education programmes be improved. instructors' qualifications may be taken into account when employing new employees, and instructors and students may get high-quality instructional materials and participate in a variety of teacher-training programmes. Additionally, the STEM strand graduates will not be the only ones eligible for the BS Mathematics Education Programme, and mathematics education faculty may offer remedial exercises to help pre-service mathematics teachers become more adept at solving problems.

### 2.2. Module

Modules are independent, optional, or self-contained units of instruction and study. Having a clear understanding of each module's educational goal and place within the programme is crucial. This ought to lead to the respective module's learning objectives (Young & Perovic, 2016). Learners can progress through the material at their own speed using modules. They can be used in place of formal instruction or to supplement it. Trainers must have the crucial talent of writing learning materials in module style, according to Acuram (2015).

In many nations, the organisation of a language curriculum is also increasingly done using modules. As a result, "modules" rather than "units" are now used to structure many course materials. A flexible language curriculum is the only context in which the term "module" is appropriate. A module, according to Taneja (1989), is an instructional unit that is essentially self-contained and a teaching strategy based on the idea of developing skills and knowledge in distinct steps.

The teacher's job when using the module includes monitoring the pupils' progress and helping them realise that the assignment they were given is just as important as other work by giving them fair comments and keeping an eye on them. The students will find purpose in their work when the teacher carefully marks it and provides pertinent feedback, as they will realise that their efforts is not in vain (Lim, 2016).

The module-based system lays the onus of learning on the students, improving their desire for learning and helping them to create a sense of self-concept about their own worlds. It is wholly focused on education that respects the interests, life experiences, and socioeconomic standing of the pupils seated in the classroom. It takes into account the various abilities, objectives, learning styles, and rates that each student has.

Open learning is offered, as well as a workshop system were students and instructors schedule meetings after work hours. The use of peer group education is an option, and the peers can help the slow learner. It has space for both big groups of pupils and little groups.

The learning method is entirely centred on the idea of mastery learning, and the module's main goal is to attain mastery learning. The way instruction is organised is based not on the length of time allotted for class or the accomplishment of particular goals, but rather on how competent a student is overall. What matters is how much competency has been attained, not how and when it occurs. The difficulty the school has is promoting all of the pupils in the room, regardless of their socioeconomic status or level of intelligence, according to some verifiable criterion. Setting a common standard for all pupils and guiding them to the necessary level of development is not simple. In this regard, module-based programmes are more suitable to meet challenges.

Assessment of progress is already embedded into each module. They offer continuous and quick feedback to the pupil. A deficiency module that gives pupils more drive has helped students make up for their deficiencies. Books, essays, bibliographies, lists of supplementary resources, charts, and graphs are examples of printed materials that could be used as part of instructional courses. Films, film strips, pictures, charts, audio and video tapes, and transparencies are examples of audiovisual resources. Lectures, group discussions, role-playing, simulation, and gaming are examples of verbal materials. In addition, it has other elements including field projects or exercises, study questions, issues to be resolved, and self-administered assessments. It is important to properly order the learning activities and objectives. The topic should be accurate, clear, and succinct.

**2.3 Module Development**

The practise of planning and creating modular materials is promoted by module developments. For the purpose of creating and developing modular resources, module writers create a standardised framework. Teachers must be cognizant of the concepts of deep and superficial approaches to learning while creating modules, according to Brown and Atkins (1991). The connection between courses and students' learning styles has been the subject of numerous studies in the past.

According to Stewart and Wilkerson (1999), the modules' purpose is to give teachers the tools they need to make their classrooms active, student-centered learning environments. A module can be identified by the shared qualities listed below: self-contained, autonomous instruction units that are well-defined, arranged, and rigorously assessed
(Kandarp Sejpal, 2013; Brown et al., 1977).

The ADDIE paradigm is a popular model for creating modules and, more broadly, educational materials. "Analysis, Design, Development, Implementation, and Evaluation" make up the five phases of the instructional design model. The results of each phase influence the next one in the process. It is an illustration of "instructional systems design (ISD)". Two such models are the Dick & Carey and Kemp ISD models. The ADDIE model serves as the foundation for the majority of instructional design frameworks now in use. One widely recognised innovation of this methodology is the use of quick prototyping. Getting continual or formative feedback is the foundation of this approach while creating instructional materials.

A teaching module used the 5E model as its foundation. The constructivist theory of learning, which holds that people learn through making sense of their experiences, is the foundation of the 5E teaching paradigm. Engage, Explore, Explain, Elaborate, and Evaluate are the five steps that teaching and learning go through. Based on the 5E instructional approach, the stages of the Primary Connections 5E teaching and learning model were developed (Bybee, 1997).

"For use in teaching at the Teachers College at Isabela State University, Aggabao (2002) undertook a study to create customised self-instructional modules on a few themes in Basic mathematics. After employing the experimental method, it was found that the instructional materials used at the college for Basic Mathematics are insufficient and not intended for self-instruction; that instruction through self-instructional materials is just as effective as the common teaching method; and that students and teachers generally have a favourable attitude towards the use of individualised, self-instructional materials as a mode of instruction in Bas".

A module is a self-paced learning resource, according to Loughran and Berry (2000). It does not push all students at the same pace but rather gives them the freedom to consider, ponder, and change the material according to their skills and talents. Different men have different levels of intelligence, working styles, and ways of controlling things. It has been correctly noted that telling does not constitute teaching and listening does not constitute learning. A response from the opposite side is required because it is a two-way street. Individual differences in reaction speed and intensity exist. One of the most important aspects of module-based education is that it fully respects individual differences and adapts instruction to the learner's level.

### 2.4. Modular Instruction

The modular approach consists of a self-contained unit that covers a single topic in a convenient format, allowing the student to proceed at his own pace either alone or in small groups. It is so structured that the student can recognise the goals, choose the information and approach, and assess his success.

Additionally, it has been demonstrated that using a modular approach to maths instruction is an excellent and efficient way to assist pupils master the subject on their own. This method can be used to target the majority of subjects. While creating educational materials takes time, it is possible to assess their performance through modularity, which is a good thing. The mathematics module is a single, stand-alone instructional component that focuses on a limited number of precise goals. To subsequent units, modules may be added in order to advance mathematical long-term objectives. Individualised learning packages, unpacked, and learning activity packages are just a few of the designations that modules may have (Morn, 1988).

One goal of MI is to provide the student the freedom to move at his own pace. The idea that self-pacing is preferable is based on the widely held conviction that students do not learn concurrently and do not progress at the same rate (Burns, 1971). Giving the pupil the option to select his learning mode serves another purpose. If we think that learners solve issues and learn through various strategies based on distinct behaviour repertoires, then having a choice between various learning modes is desirable (Burns, 1971).

“Evidence suggests that MI satisfies the needs of today's students more effectively than traditional, both in terms of the quality of learning and content, according to research by Goldschmid, B., and Goldschmid, M. (1973). However, applying MI could run into certain issues. These are offered from the viewpoints of the instructors, administrators, and students. MI has emerged as one of the most promising alternatives in higher education today due to its emphasis on customised learning and its adaptability to different individuals”.

The need for instructional materials that encourage independent and individualised learning has increased with the spread of technology and the reduction of time and space by gadgets. Individualised instruction and modules for independent study may take the place of the traditional lecture-only teaching style.

The demand for educational possibilities for students from all backgrounds tends to be met through the development of self-learning materials or resources for modular training, regardless of their aptitude, IQ, or prior accomplishments, as well as in terms of moral, emotional, and personality aspects. For each student and circumstance, individualised instruction aims to create the best possible learning environment (Nardo, 2017).

When teaching word problem-solving to third-year BEED students at “Eastern Samar State University (ESSU)” using lecture methods and modular training, Lim (2016) used a quasi-experimental design to assess the effects of the instruction. “Based on the pre-test and post-test mean scores of both control and experimental groups, the following findings were formulated: (1) there is no significant difference between the pre-test mean scores of the subjects; (2) there is a significant difference between the post-test mean scores of subjects; and (3) there is a significant difference between the mean gain scores of the two groups of respondents – experimental and control groups". When taught utilising a modular approach, the experimental group outperformed the control group, which received education using the more conventional lecture style. Based on the stated findings, it is determined that word problem solving, namely, modular education in math teaching, is an effective teaching strategy. Although the study's findings indicated that both groups learned using the two different teaching strategies, the participants taught through modular instruction fared much better than those who received traditional lectures.

Cappetta (2007), in his dissertation, "Reflective Abstraction and the Concept of Limit: A Quasi-Experimental Study to Improve Student Performance in College Calculus by Promoting Reflective Abstraction through Individual, Peer, Instructor and Curriculum Initiates, the pre-test and post-test scores showed that the students in the experimental group scored significantly higher than the students in the traditional section on a post-test of limits".

self-paced teaching module is created in a way that makes it possible for users to learn new information, develop new abilities, or have their preconceived notions tested. The concept of individual variances has been made concrete through modules used as instructional resources, allowing each learner to move at their own pace. Additionally, modules make an effort to fill the gap between the perceived requirement and the course goal of giving students the mathematical tools they will need to build their talents (Calucag, 2013).

Furthermore, "the effectiveness of the teaching-learning process heavily influences the likelihood of the outcome. As Leano (1995) noted, the teacher is a key player in the teaching-learning process and should, as a result, have a comprehensive knowledge and understanding of the students". This serves as a crucial foundation for unlocking the students' potential and ensuring the best possible development of their endowments. According to Nocon et al. (2001), individuals who work in education, particularly in higher education, will surely concur with the generalisation that the average high school graduate enrolling in college does not have any improved mathematics skills.

## 3. Purpose of the Study

This study was conducted for the assessment and acceptability of the mathematics module to bridge the gap for non-STEM freshmen students enrolled in mathematics programs.

"Specifically, the study sought answers to the following questions:

1. What mathematics module can be developed to bridge the gap for non-STEM freshmen students?
2. What is the expert's and student's assessment of the developed instructional module in terms of (a) Learning Outcomes; (b) Content; (c) Activities; (d) Style and Presentation; (e) Organisation; (e) Creativity; and (f) Assessment?"

## 4. Significance of the Study

Teachers and instructors of mathematics should take the initiative to incorporate the established mathematics module to close the skills, concepts, and competencies gaps for first-year students who are not majoring in STEM fields. The results of this study may also improve students' mathematical performance and close any gaps in their knowledge and abilities. Additionally, non-STEM students enrolling in math-related programmes can use the mathematics module that is the result of this research.

## 5. Methodology

### 5.1. Research Design

"This study employed design-based research (DBR) using the ADDIE (Analysis-Design-Development-Implementation-Evaluation) Model to develop the Pre-Calculus and Basic Calculus instructional modules. Design-based research is a methodology designed by and for educators that seeks to increase the impact, transfer, and translation of education research into improved practice. In addition, it stresses the need for theory building and the development of design principles that guide, inform and improve both practice and research in an educational context (Anderson & Shattuck, 2012)".

### 5.2. Participants

For the assessment of the acceptability of the mathematics module, the participants were 79 students, which constituted twenty (20) Bachelor of Secondary Education (BSEd) majors in mathematics taking trigonometry, twenty-six (26) BS Mathematics and thirty-three (33) BS in Computer Science taking calculus from the same university. They were also the student participants in the evaluation of the acceptability of the said bridging module. Eight mathematics teachers were included as participants in the assessment of the acceptability of the mathematics module, including the teacher who implemented the module.

### 5.3. Instruments

"The evaluation form for the mathematics module is a 35-item Likert-type checklist. The instrument was subjected to face and content validity by the experts. This instrument was used to determine the acceptability of the mathematics module in terms of Learning Outcomes, Content, Style and Presentation, Organization, Activities, and Assessment, in which every category has five statements".

### 5.4. Data Collection Procedure

The evaluation instrument for the acceptability of the mathematics module was administered to the participants. The gathered data was collected, analysed and interpreted.

### 5.5. Data Analysis Procedure

The researcher used the frequency count, percentage, mean and standard deviation to analyse the data collected in the study.

## 6. Results and Discussion

The primary goal of this assessment was for the student participants and teachers to evaluate the overall acceptability of the mathematics module to bridge the gap of the non-STEM freshmen student enrolled in mathematics-related programs regarding Learning Outcomes, contents, activities, style and presentation, organisation, creativity and assessment. Eight (8) experts scanned and evaluated the mathematics module.

Table 1 shows the students' and experts' evaluation of the acceptability of the bridging module in terms of learning outcomes.

The learning outcomes of the mathematics module are "highly acceptable" with an overall rating of *(M*=4.62, *SD*=0.39*)*. The rating shows that the mathematics module met the standard excellently, and no revision is needed. This result indicates that the learning activities discussed in the module are sufficient to attain the learning outcomes.

**Table 1.** Acceptability of the Mathematics Module in Terms of Its Learning Outcomes

| | Students | | Experts | | | | |
|---|---|---|---|---|---|---|---|
| | *SD* | *M* | *SD* | *M* | *SD* | *Ave. Mean* | *Description* |
| Module is accompanied by a list of learning outcomes | 0.51 | 4.65 | 0.00 | 5.00 | 0.49 | 4.68 | Highly Acceptable |
| Learning activities are sufficient enough to realize the objectives. | 0.47 | 4.68 | 0.00 | 5.00 | 0.46 | 4.71 | Highly Acceptable |
| The learning outcomes are realistic and simple. | 0.57 | 4.47 | 0.00 | 5.00 | 0.57 | 4.52 | Highly Acceptable |
| The learning outcomes are fitted to the level and needs of the students. | 0.57 | 4.57 | 0.35 | 4.88 | 0.56 | 4.60 | Highly Acceptable |
| The learning outcomes are attainable. | 0.57 | 4.57 | 0.35 | 4.88 | 0.56 | 4.58 | Highly Acceptable |
| Overall Rating | 0.39 | 4.59 | 0.14 | 4.95 | 0.39 | 4.62 | Highly Acceptable |

Note: Description is based on the following scale. 4.50-5.0 (Highly Acceptable), 3.50-4.49 (Acceptabl 2.50-3.49 ( Moderately Acceptable),1.50-2.49 (Fairly Acceptable) 1.00-1.49 (Not Acceptable)

The content of the mathematics module has an overall rating of "highly acceptable" (*M*=4.66, *SD*=0.35). As indicated in the table, the findings revealed that the contents of the module jive with the learning outcomes and topics in Pre-Cal and Basic Cal. Moreover, the contents include the learning activities such as practice exercises with information about the presented lesson.

**Table2.** Acceptability of the Mathematics Module in Terms of Its Content

| | Students | | Experts | | | | |
|---|---|---|---|---|---|---|---|
| | *SD* | *M* | *SD* | *M* | *SD* | *Ave. Mean* | *Description* |
| The Sequence of the topics jives with the topics in Pre –Cal and Basic Cal. | 0.61 | 4.43 | 0.00 | 5.00 | 0.61 | 4.48 | Acceptable |
| The contents of the lessons and self-tests help on reaching the learning outcomes. | 0.53 | 4.54 | 0.46 | 4.75 | 0.52 | 4.56 | Highly Acceptable |
| The contents include the necessary topics and self-tests that will lead to the enhancement of learning. | 0.51 | 4.71 | 0.35 | 4.88 | 0.50 | 4.72 | Highly Acceptable |
| The lessons are clear and well presented. | 0.54 | 4.63 | 0.46 | 4.75 | 0.53 | 4.64 | Highly Acceptable |
| The guide questions help students to understand the lesson better and recall necessary concepts. | 0.58 | 4.62 | 0.35 | 4.88 | 0.57 | 4.64 | Highly Acceptable |
| Overall Rating | 0.36 | 4.64 | 0.18 | 4.85 | 0.35 | 4.66 | Highly Acceptable |

Note: Description is based on the following sc 50-5.0 (Highly Acceptable), 3.50-4.49 (Accepta 2.50-3.49 (Moderately Acceptable), 1.50-2.49 (Fairly Acceptable), 1.00-1.49 (Not Acceptable)

The learning activities of the mathematics module have an overall rating of "highly acceptable "(*M* =4.71, *SD* = 0.32). The findings showed that the bridging module has excellently met the standards, and no revision is needed. The result indicated that the learning activities of the bridging module are relevant to the topics, and objectives presented from simple to more complex examples.

**Table 3.** Acceptability of the Mathematics Module in Terms of Its Activities

| | Students | | Experts | | | | |
|---|---|---|---|---|---|---|---|
| | SD | M | SD | M | SD | Ave. Mean | Description |
| Module provides variety of learners' activity. | 0.47 | 4.67 | 0.00 | 5.00 | 0.46 | 4.69 | Highly Acceptable |
| Activities are relevant to the topics. | 0.41 | 4.78 | 0.00 | 5.00 | 0.40 | 4.80 | Highly Acceptable |
| Activities are relevant to the objectives of the lesson. | 0.49 | 4.68 | 0.00 | 5.00 | 0.48 | 4.71 | Highly Acceptable |
| Activities are relevant and self - motivating to the learners. | 0.51 | 4.63 | 0.00 | 5.00 | 0.50 | 4.66 | Highly Acceptable |
| Activities are presented from the simple ones to the more complex examples. | 0.51 | 4.65 | 0.00 | 5.00 | 0.50 | 4.67 | Highly Acceptable |
| Overall Rating | 9.32 | 4.68 | 0.00 | 5.00 | 0.32 | 4.71 | Highly Acceptable |

Note: Description is based on the following scale. 4.50-5.0 (Highly Acceptable), 3.50-4.49 (Acceptable), 2.50-3.49 ( Moderately Acceptable), 1.50-2.49 (Fairly Acceptable) 1.00-1.49 (Not Acceptable)

The style and presentation of the mathematics module have an overall rating of "highly acceptable" (*M*=4.70, SD=0.34). The findings revealed that the presentation and style are clear, the language is straightforward and comprehensive, the style and format are appropriate to the target clientele, and the illustrations encourage learning new meanings. At the same time, there needs to be more revision regarding directions for the students to understand the topics or activities presented clearly.

**Table 4.** Acceptability of the Mathematics Module in Terms of Its Style and Presentation

| | Students | | Experts | | | | |
|---|---|---|---|---|---|---|---|
| | SD | M | SD | M | SD | Ave. Mean | Description |
| The presentation is clear observing correct grammar. | 0.54 | 4.62 | 0.00 | 5.00 | 0.45 | 4.78 | Highly Acceptable |
| The language is clear and comprehensive in terms of vocabulary. | 0.53 | 4.65 | 0.00 | 5.00 | 0.47 | 4.73 | Highly Acceptable |
| The structure, style and format are appropriate to the target clientele. | 0.59 | 4.57 | 0.00 | 5.00 | 0.49 | 4.68 | Highly Acceptable |
| The directions can be followed by the students without much help from the professor. | 0.60 | 4.48 | 0.41 | 4.83 | 0.54 | 4.58 | Highly Acceptable |
| There are illustrations that encourage for learning new meanings. | 0.52 | 4.67 | 0.00 | 5.00 | 0.49 | 4.74 | Highly Acceptable |
| Overall Rating | 0.34 | 4.68 | 0.08 | 4.97 | 0.34 | 4.70 | Highly Acceptable |

Note: Description is based on the following sc 50-5.0 (Highly Acceptable), 3.50-4.49 (Acceptal 2.5-3.49 (Moderately Acceptable), 1.5-2.49 (Fairly Acceptable), 1.00-1.49 (Not Acceptable).

The organisation of the mathematics module has an overall rating of "highly acceptable" (*M*=4.66, *SD*=0.35). As shown in Table 5, the overall rating of the students was "highly acceptable" (*M*=4.63, *SD*=0.36 and a comparable overall rating of "highly acceptable" was found by the experts (*M*=4.95, *SD*=0.09)

Table 5 shows the student's and experts" evaluation of the acceptability of the mathematics module in terms of its organisation.

**Table 5.** Acceptability of the Mathematics Module in Terms of Its Organization

| | Students | | Experts | | | | |
|---|---|---|---|---|---|---|---|
| | *SD* | *M* | *SD* | *M* | *SD* | *Ave. Mean* | *Description* |
| The contents of the module are well organized. | 0.49 | 4.68 | 0.46 | 4.75 | 0.49 | 4.69 | Highly Acceptable |
| The lessons and self-tests of the module are arranged in ascending order of difficulty. | 0.48 | 4.65 | 0.00 | 5.00 | 0.47 | 4.68 | Highly Acceptable |
| The organization of the lessons and self-tests develops problem solving skills. | 0.52 | 4.61 | 0.00 | 5.00 | 0.51 | 4.64 | Highly Acceptable |
| The organization of the module is appropriate to bridge the gap of learning. | 0.57 | 4.57 | 0.00 | 5.00 | 0.56 | 4.61 | Highly Acceptable |
| The module is useful supplement to reinforce the transfer of learning. | 0.51 | 4.62 | 0.00 | 5.00 | 0.50 | 4.66 | Highly Acceptable |
| Overall Rating | 0.36 | 4.63 | 0.09 | 4.95 | 0.35 | 4.66 | Highly Acceptable |

Note: Description is based on the following scale + 5.0 (Highly Acceptable), 3.51-4.50 (Acceptable), 2.51-3.50 (Moderately Acceptable), 1.51-2.50 (Fairly Acceptable) 1.00-1.50 (Not Acceptable)

The creativity of the mathematics module has an overall rating of "highly acceptable" (*M*=4.65, *SD*=0.39). The result of the study showed that the creativity of the bridging module adds new knowledge and skills that would lead the students to create new problem-solving skills related to the topic, contributes to the acquisition of concepts, understanding and new insights problem-solving skills, and illustrations effectively capture the interest of the learners.

**Table 6.** Acceptability of the Mathematics Module in Terms of Its Creativity

| | Students | | Experts | | | | |
|---|---|---|---|---|---|---|---|
| | SD | M | SD | M | SD | Ave. Mean | Description |
| The module adds new knowledge and skills that would lead the students to create new problems related to the topic. | 0.51 | 4.63 | 0.35 | 4.88 | 0.50 | 4.66 | Highly Acceptable |
| The module contributes to the acquisition of concepts, understanding and solving insights. | 0.54 | 4.63 | 0.00 | 5.00 | 0.52 | 4.67 | Highly Acceptable |
| The module provides contribution to the addition of new insights and problem solving skills. | 0.47 | 4.67 | 0.35 | 4.88 | 0.47 | 4.69 | Highly Acceptable |
| The illustrations effectively capture the interest of the students. | 0.54 | 4.62 | 0.00 | 5.00 | 0.52 | 4.66 | Highly Acceptable |
| The module provides solving insight that would lead the students to create new solutions to the problem at hand. | 0.57 | 4.57 | 0.46 | 4.75 | 0.56 | 4.59 | Highly Acceptable |
| Overall Rating | 0.40 | 4.63 | 0.15 | 4.90 | 0.39 | 4.65 | Highly Acceptable |

Note: Description is based on the following scale. + 0 (Highly Acceptable), 3.50-4.49 (Acceptable), 2.50-3.49 (Moderately Acceptable), 1.50-2.49 (Fairly Acceptable) 1.00-1.49 (Not Acceptable)

The assessment of the mathematics module has an overall rating of "highly acceptable" (M=4.71, SD=0.36)

The result of the study indicates that the assessment of the mathematics module is suited to the level and needs of the students, aligned to the learning outcomes, and self-tests are adequate to cover the topic discussed in the module and stimulate higher-order thinking skills.

**Table 7.** Acceptability of the Mathematics Module in Terms of Its Assessment

| | Students | | Experts | | | | |
|---|---|---|---|---|---|---|---|
| | *SD* | *M* | *SD* | *M* | *SD* | *Ave. Mean* | *Description* |
| The assessment is related to the objectives. | 0.47 | 4.73 | 0.46 | 4.75 | 0.47 | 4.74 | Highly Acceptable |
| The self-test serves to facilitate better understanding of the lesson discussed. | 0.50 | 4.66 | 0.00 | 5.00 | 0.49 | 4.69 | Highly Acceptable |
| Assessment activities and self-test are suited to the level and needs of the students. | 0.48 | 4.66 | 0.35 | 4.88 | 0.47 | 4.68 | Highly Acceptable |
| Assessment tasks and self-tests are adequate that cover the topics discussed in the module. | 0.53 | 4.65 | 0.00 | 5.00 | 0.52 | 4.68 | Highly Acceptable |
| The activities and tests stimulate higher order thinking skills. | 0.48 | 4.77 | 0.00 | 5.00 | 0.46 | 4.79 | Highly Acceptable |
| Overall Rating | 0.36 | 4.69 | 0.10 | 4.93 | 0.36 | 4.71 | Highly Acceptable |

Note: Description is based on the following sc 51-5.0 (Highly Acceptable), 3.51-4.50 (Accepta 2.51-3.50 (Moderately Acceptable), 1.51-2.50 (Fairly Acceptable) 1.00-1.50 (Not Acceptable)

***Overall Acceptability***. The overall acceptability level of the mathematics module is "highly acceptable" (*M*= 4.65, *SD*=0.03).

Based on the study's result, the participants rated the mathematics module as "highly acceptable" in terms of learning outcomes, content, style and presentation, organisation, creativity and assessment and in terms of its overall rating. This outcome indicates that the developed bridging module can serve as instructional materials that will help students bridge the gap of learning and develop students' higher-order thinking skills.

Table 8 shows the students' and experts' evaluation of the overall acceptability of the mathematics module.

**Table 8.** Overall Acceptability of the Mathematics Module

| | Students | | Experts | | | | |
|---|---|---|---|---|---|---|---|
| | *SD* | *M* | *SD* | *M* | *SD* | *Ave. Mean* | *Description* |
| Learning Outcomes | 0.39 | 4.59. | 0.14 | 4.95 | 0.39 | 4.62 | Highly Acceptable |
| Content | 0.36 | 4.64 | 0.18 | 4.85 | 0.35 | 4.66 | Highly Acceptable |
| Activities | 0.40 | 4.60 | 0.00 | 5.00 | 0.40 | 4.63 | Highly Acceptable |
| Style and Presentation | 0.36 | 4.63 | 0.10 | 4.93 | 0.35 | 4.65 | Highly Acceptable |
| Organization | 0.36 | 4.63 | 0.09 | 4.95 | 0.35 | 4.66 | Highly Acceptable |
| Creativity | 0.40 | 4.63 | 0.15 | 4.90 | 0.39 | 4.65 | Highly Acceptable |
| Assessment | 0.36 | 4.69 | 0.10 | 4.93 | 0.36 | 4.71 | Highly Acceptable |
| Overall Rating | 0.03 | 4.63 | 0.05 | 4.93 | 0.03 | 4.65 | Highly Acceptable |

Note: Description is based on the following scal -5.0 (Highly Acceptable), 3.51-4.50 (Acceptable) 2.51-3.50 (Moderately Acceptable), 1.51-2.50 (Fairly Acceptable) 1.00-1.50 (Not Acceptable)

## 7. Conclusions and Recommendations

The learning outcomes, content, activities, style and presentation, organisation, creativity and assessment were sufficient, relevant and suitable for the intended users, and the evaluators rated the module "highly acceptable". Therefore, the researcher had achieved the usefulness in developing a ready and usable instructional material that can be utilised to bridge the gap in the mathematics skills and competencies of non-STEM students. Furthermore, mathematics instructors may adopt modular instruction as one of the learning modalities to this new usual way of teaching and address the equity issues presented by this transition to distance learning to attain the quality of education the students need.

Students, being the most important beneficiaries of the study, the developed mathematics module in mathematics may fill the gaps of their deficiency in their mathematical skills and competencies. This benefit may enhance and improve their mathematics performance as well. Moreover, the bridging module, which is the output of this research, can be used by non-STEM students enrolled in math-related programs. Other researchers may conduct similar studies focusing on other subject areas in mathematics to bridge the gap in the mathematics competencies of the non-STEM K to 12 graduates who enrolled in mathematics-related programs.

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