



Acceptability of Self-Learning Modules, Motivation and Mathematics Achievement of Learners

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Ma. Mechelle A. Gadingan

Master Teacher III, Bais National High School, Bais City Division

<https://orcid.org/0009-0006-0837-4615>

Abstract:

In this pandemic time when face to face classes have not been allowed, the use of self-learning modules was implemented to ensure continuity of education. The acceptability of self-learning modules can be assessed by the learners in terms of content, assessment and presentation. While working on learning tasks, a learner must be intrinsically and extrinsically motivated to attain the desired learning outcomes, one of which is excellent Mathematics achievement. It is an essential part of the academic venture in the modern era. This study aimed to determine the level of acceptability of Self-Learning Modules, Motivation and Mathematics Achievement of the Grade 10 learners of Bais City National High School of the Division of Bais City during the school year 2020-2021 utilizing descriptive research design. The areas considered for acceptability of self-learning modules are content, assessment, and presentations; while those of motivation are intrinsic and extrinsic. Results shows that the levels of acceptability of self-learning modules according to the aforementioned areas was high; so do with the level of motivation. Further, results reveal no significant difference in the level of acceptability of self-learning modules in the areas of content, assessment and presentation when grouped and compared according to the aforementioned variables. Moreover, there was a significant relationship between the level of acceptability of self-learning modules and the level of Mathematics achievement of Grade 10 learners. Similarly, there was a significant relationship between the level of motivation and the level of mathematics achievement of Grade 10 learners.

Keywords: Grade 10 learners, motivation, mathematics achievement, self-learning modules,

Introduction:

Nature of the Problem

Programmed training in module form is an important educational innovation in instructional design that can supplement traditional face-to-face instruction (Torrefranca, 2017). This approach, called the modular approach, consists of self-directed learning activity packages, which are self-paced, self-instructional, student-directed, and place the responsibility of learning on the students. The learners can assess the acceptability of the self-learning modules as the primary material for engagement in remote learning in terms of content, assessment, and presentation.

Aside from the acceptability of self-learning modules, motivation to learn must not be overlooked. While some learners are motivated by extrinsic factors, others may be motivated purely by intrinsic factors (Cherry, 2021). A learner who engages in a task not because he/she finds it appealing or satisfying but because he/she wants to obtain something of value in return or avoid something unpleasant is extrinsically motivated. On the other hand, when one performs an activity for its own sake rather than the desire for some external reward or out of some external pressure, he/she is intrinsically motivated. Whichever situation is more applicable; a learner must be motivated to learn at all times.

Acceptability of self-learning modules by learners and motivation may be important factors that influence mathematics accomplishment or a student's competency in the topic of mathematics as evaluated by achievement test scores. The relevance of mathematics in both formal education and people's daily lives motivates researchers to investigate mathematical performance (Abin et al., 2020).

However, looking at the current situation, the performance of learners in Mathematics has been very low. This is evident in the 2019 Trends in International Mathematics and Science Study (TIMSS). In the worldwide exam for mathematics and science for Grade 4 students, the Philippines came in last out of 58 countries. (Magsambol, 2020). Moreover, in the result of the Program for International Student Assessment (PISA) for the year 2018, the Philippines placed second-lowest in Mathematics (OECD, 2019). Locally, in Bais City National High School (BCNHS), the SY 2020-2021 School-Initiated Achievement Test results in Mathematics obtained a Mean Percentage Score (MPS) of 55.25 Below Average only (BCNHS Math Department Report, 2020).



The above situations have shed light on the researcher to embark on the study, which determines the level of acceptability of learning modules and the level of learning motivation of Grade 10 learners in relation to their Mathematics achievement.

Current State of Knowledge

One important element of the module is content. Content refers to the degree of understanding or proficiency evident in student work (Module Evaluation, 2019). The modules that the students are using aren't perfect. They vary in each school, and their content is determined by the teachers who created them (Estrada, 2021). Some students may not have a problem understanding their lessons because of a well-explained module, but others may not be as lucky. With the lack of standard books used, the level of learning varies. This idea of Estrada (2021) is relevant to the current study since learners are diverse and may have varying levels of module approval. On the module's content, the Department of Education stressed that the target Most Essential Learning Competencies (MELCs) per quarter are "sufficiently covered, that the instructional design and organization are aligned, and the text and visuals are accurate and error-free," as well as that appropriate learning assessment is included (DepEd Order 001, 2021). Readability should also be ensured and third-party contents are "properly cited and referenced."

Souders (2019) indicates that motivation is derived from the word motive,' which denotes a person's needs, desires, goals, or urges. It is the process of motivating students to take action in order to achieve their objectives. Motivation can be intrinsic or extrinsic. When one is intrinsically motivated, he engages in an activity because he enjoys it and gets personal satisfaction from doing it. When one is extrinsically motivated, he does something in order to gain an external reward. Motivating the learners results in a successful teaching-learning process and leads to a brighter future for the learners. When it comes to studying the lessons, properly motivated pupils have a propensity to learn faster and obtain more opportunities (Adama et al., 2020). Hence, updating their knowledge system, developing positive or favorable attitudes in them and upgrading their technical skills will redound to successful student life.

Furthermore, extrinsic incentives can be very successful. (Cherry, 2021). There are things in life that one has to do in order to gain some type of external reward. External rewards can be a useful and effective tool for getting people to stay motivated and on task. This can be particularly important when people need to complete something difficult or uninteresting, such as a boring homework assignment or a tedious work-related project. This is a revealing idea that would help the researcher assume respondents' motivation level in this new normal. On the other hand, rewards and compliments do not only inspire distance learners (Best, 2020). They allow them to feel connected too. A single positive comment lets a student know that their teacher is still invested in their learning, no matter how far away they happen to be. Any classroom teacher will know the motivating power of timely and thoughtful feedback. This idea helps the researcher enrich concepts on motivation as a variable of this study.

Academic success in general, and mathematical achievement in particular, is linked to cognitive talents and emotional and motivational abilities. (Abin, et al., 2020). Interest in studying mathematical achievement is driven by the importance of mathematics in both formal education and people's daily lives. It can be noted that success in mathematics is related to well-being, satisfaction with life, health, income, employability, and longevity. In mathematics, kids were expected to show significantly fewer learning gains, with less than half of the average gains returning (Kuhfeld et al., 2020). While these and other similar forecasts presented a dismal challenge facing students and educators, they were nonetheless projections. The question remained what would be learning trends really look like in actual data from the school year 2020-21 onwards. This is very appropriate conceptual literature that supports Math achievement in this trying time.

In terms of math, the 2019 Trends in International Maths and Science Study (TIMSS) indicated that Filipino pupils lagged behind their peers in the international evaluation for mathematics and science in grade four (Magsambol, 2020). The Philippines only scored 297 in mathematics and 249 in science, which are "significantly lower" than any other participating country. The country also scored the lowest among all 58 participating countries for both tests. This proves the low performance of Filipino learners in the prestigious Math examination. Every four years, TIMSS examines the mathematics and science knowledge of Grade 4 and Grade 8 pupils all across the world (Mendoza, 2020).

Theoretical Underpinnings

This study is anchored on the Self-Directed Learning (SDL) Theory of Knowles in 1990, Self-Determination Theory of Deci and Ryan in 1985, and Mathematical Learning Theory of Atkinson in 1972.

Self-Directed Learning (SDL) theory states that learners become increasingly self-directed as they mature (Gopalan et al., 2017). The necessity for learners to become self-reliant, self-disciplined, and self-confident in their ability to direct their learning is becoming increasingly important in the current distance learning. Self-directed learning (SDL) refers to the capacity of learners to plan, implement, and evaluate their learning activities. SDL



contextualizes the process in which the learner takes the initiative and responsibility for setting his/her own learning goals, identifying and addressing gaps in his/her learning, identifying resources, selecting and carrying out learning strategies, and evaluating his/her learning. This theory is relevant to this study as self-directed learning is the goal of using self-learning modules. An approach to self-directed learning requires the utilization of instructional materials designed to help the students learn by themselves. These self-instructional materials, which are in the printed module form, consisted of self-contained, independent units of instruction prepared for attaining defined instructional objectives.

This theory suggests that people can become self-determined when their needs for competence, connection, and autonomy are fulfilled. In Self-Determination Theory, different types of motivation are distinguished based on the different reasons or goals that give rise to an action. The most basic distinction is between intrinsic motivation, is that it is inherently interesting or enjoyable, while the extrinsic motivation, which refers to doing something because it leads to a separable outcome. The relevance of self-determination theory to this study is that either intrinsic or extrinsic motivation has unique features to motivate students. Both intrinsic and extrinsic motivations are needed in a learning process, especially in the absence of a teacher to facilitate learning. Learning is a complicated process, and motivation is the hard rock of this process.

The achievement goal theory is the third hypothesis, which assumes that students have many reasons for participating in or not participating in learning and schoolwork (Michaelides et al., 2019). These reasons affect what, how, and why students learn and how they subsequently perform. The main goal of a mastery-oriented person is the learning and mastery of the task on its own. Mastery goals reflect a yearning to achieve competence in terms of set criteria or task mastery. They rely on comparisons with the explicit requirements of the task and/or internal comparisons with an individual's past or potential attainment.

On the other hand, performance goals, in contrast, reflect a desire to achieve competence to the degree that is relative to the performance of others. The goal here is to do well and gain the rewards associated with high performance. The desire to attain high performance sometimes leads to strategic behaviors that can involve making learning more difficult for competitors. Mastery Goals and performance goals are associated with different consequences in the achievement context, with mastery being associated with higher performance than performance orientation. The achievement theory provides underlying concepts for this research because this talks about learning achievement that can be achieved by engaging and performing school works like the self-learning modules.

By linking the three (3) theories, this research has been given a strong foundation. Self-directed learners are to be highly motivated in order for them to develop optimal learning achievement in Mathematics. The need to nurture the explicit requirements to perform tasks in the modules and the innate potential of an individual to excel in his performance must be considered towards attaining goals and success in achievement in a course.

Objectives

This study aimed to determine the level of acceptability of Self-Learning Modules, Motivation and Mathematics Achievement of the Grade 10 learners of Bais City National High School of the Division of Bais City, Negros Oriental during the School Year 2020-2021. Specifically, it sought to answer the following: 1) the level of acceptability of Self-Learning Modules of Grade 10 learners according to the area of content, assessment, and presentation; 2) the level of motivation of Grade 10 learners in terms of the area intrinsic and extrinsic; 3) the level of Mathematics achievement of the Grade 10 learners during the School Year 2020-2021; 4) the significant difference in the level of acceptability Self-Learning Modules of Grade 10 learners when grouped and compared according to the aforementioned variables; 5) the significant difference in the level of motivation of Grade10 learners when grouped and compared according to the aforementioned variables; 6) significant difference in the level of Mathematics achievement of Grade 10 learners when grouped and compared according to the aforementioned variables; 7) significant relationship between the level of acceptability of Self-Learning Modules and the level of Mathematics achievement of Grade 10 learners; and 8) the significant relationship between the level of motivation and the level of Mathematics achievement of Grade 10 learners.

Methodology:

This section presents the discussion of the research methodology used, the subjects and respondents of the study, the research instruments used, the validity and reliability of the instruments, the procedure for data gathering, and the statistical tools and procedure for data analysis.

Research Design



This research study used the descriptive research method to determine the level of acceptability of self-learning modules and motivation in relation to Mathematics achievement of the Grade 10 learners of Bais City National High School of the Division of Bais City, Negros Oriental during the School Year 2020-2021.

A descriptive study reports the summary data such as the measure of central tendency including mean, median, mode, deviance from the mean, variation, percentage, and correlation between variables. This survey research included that type of measurement but went a little beyond the normal descriptive statistics to draw inferences (Nasaji, 2015). Descriptive research deals with the study of status and is widely used in education. Its value is based on the premise that problems can be solved and practices improved through observation, analysis, and description.

Study Respondents

The respondents of this study were the Grade 10 learners of Bais City National High School, Bais City, Negros Oriental for this school year 2020-2021. The total enrolment was 611. Since the total population was not manageable, probability sampling was employed. Using Cochran's formula, a sample of 237 was determined. Cochran's formula is used to calculate an ideal sample size given a desired level of precision. It also aims to calculate the desired confidence level, and the estimated proportion of the attribute present in the population (Adam, 2020). It is considered especially appropriate in situations with large populations.

The sample of 237 Grade 10 learners was determined further through stratified random sampling such that all sections are equally represented. Stratified random sampling is one of four probability sampling techniques in which the total population is divided into homogenous groups (strata) to complete the sampling process (Kaplan, 2014). Using the proportion ratio of the population and the sample, which is 38.79 percent, the number of learners per stratum/section was determined and was finally selected through simple random sampling using the lottery method.

Instruments

The researcher utilized a self-made questionnaire for data collection. The research instrument was subjected to validity (4.64-excellent) and reliability (0.730-good). All of them were interpreted as worthy and good; respectively. It was composed of four (4) parts. Part I contains the profile of the respondents as to sex, average family monthly income, and the number of siblings.

Part II contains items intended to collect data on the level of acceptability of the self-learning module in the areas of content, assessment, and presentation. There were 10 items per area with a total of 30 items in all which the respondents rated as 5 – Always, 4 – Often, 3 – Sometimes, 2 – Rarely, and 1 – Almost Never.

Part III contains items on the level of motivation covering such areas as intrinsic and extrinsic motivation. Each area had 10 items, yielding 20 items in all for the respondents to rate as 5 – Always, 4 – Often, 3 – Sometimes, 2 – Rarely, and 1 – Almost Never.

Part IV covers test questions on the coverage of Math 10 from first to fourth quarter which was based on the Most Essential Learning Competencies (MELCs). The topics covered were Sequences, Polynomials and Polynomial Equations, Polynomial Functions, Circles, Plane Coordinate Geometry, Permutations and Combinations, Probability of Compound Events, and Measures of Position. It comprises 50 items with 60 percent easy, 30 percent moderate and 10 percent difficult questions. Scores were interpreted as Excellent (Above 40), Very Satisfactory (31 - 40), Satisfactory (21 - 30), Fairly Satisfactory (10 - 20), and Not Satisfactory (Below 10).

Data Gathering Procedure

The researcher sent a request letter to the Schools Division Superintendent through the office of the principal for the conduct of the study. After securing approval from the superintendent and the school principal, questionnaires were administered to the target respondents. It was distributed through the parents who came to get and return modules. It was a lockdown, so then the respondents had almost a month to answer the self-made questionnaire. The researcher even went to the respondents' houses to retrieve the research instrument since other parents were still afraid to go to school. The data gathered from the respondents' responses were tallied and tabulated and analyzed with the aid of SPSS.

Data Analysis and Statistical Treatment

Objective No. 1 used descriptive and analytical schemes and mean to level of acceptability of self-learning Modules of Grade 10 learners in terms of content, assessment, and presentation.



Objective No.2 used a descriptive-analytical scheme and mean to determine the level of motivation of Grade 10 learners in terms of intrinsic and extrinsic motivation.

Objective No.3 used a descriptive-analytical scheme and mean to determine the level of Mathematics achievement of Grade 10 learners during the School Year 2020-2021.

Objective No.4 used a comparative analytical scheme and Mann-Whitney U test to establish the significant difference in the level of acceptability of self-learning modules of Grade 10 learners when grouped and compared according to the aforementioned variables.

Objective No.5 used a comparative analytical scheme and Mann-Whitney U test to discover the significant difference in the level of motivation of Grade10 learners when grouped and compared according to the aforementioned variables.

Objective No.6 used a comparative analytical scheme and Mann-Whitney U test to establish the significant difference in the level of Mathematics achievement of Grade 10 learners when grouped and compared according to the aforementioned variables

Objective No.7 used a relational analytical scheme and Spearman *rho* to establish the significant relationship between the level of acceptability of self-learning modules and the level of Mathematics achievement of Grade 10 learners.

Objective No.8 used a relational analytical scheme and Spearman *rho* to establish the significant relationship between the level of motivation and the level of Mathematics achievement of the Grade 10 learners.

Ethical Consideration

The researchers guaranteed the respondents' choice to participate in the study, the confidentiality of the data acquired, and the nondisclosure of their names. After completion, all data gathered were discarded to protect against unauthorized access or use of information. Anonymity and confidentiality are essential because they safeguard the privacy of persons who willingly consent to participate in research. The possible harm to the participants, the researcher, the larger community, and the institution must be considered in the study. The harm can be in the form of distress, shame, and worry, which are difficult to anticipate or manage, as well as bodily harm, resource loss, emotional harm, and reputational impairment.

Results and Discussion

This section deals with the presentation, analysis and interpretation of data gathered to carry out the objectives of this study. All these were made possible by following certain appropriate procedures so as to give the exact data and solution to each specific problem.

Table 1
Level of Acceptability of Self-Learning Modules of Grade 10 learners in The Area of Content

Items	Mean	Interpretation
1. The content each lesson is directly relevant to the defined objectives.	4.19	High Level
2. The content of each lesson is simple and easy to understand.	3.94	High Level
3. The topics of each lesson are fully discussed.	4.01	High Level
4. The topics are supported with practice tasks that are suited to the level of the students.	4.21	High Level
5. Each topic is given equal emphasis in the lesson.	4.29	High Level
6. The contents are relevant to the culture of the learner.	4.16	High Level
7. Topics are relevant to the daily activities of the learner.	4.16	High Level
8. The contents match the competencies of the subject.	4.22	High Level
9. Examples are easy to understand for adult learner	4.09	High Level
10. The topics are properly sequenced.	4.18	High Level
Over-all mean	4.15	High Level

Table 1 discloses the level of acceptability of self-learning modules of Grade 10 learners in terms of content. Generally, it obtained an overall mean score of 4.15, interpreted as high level. This supports the findings of Santos (2015), which revealed that overall, teachers and students gave the module a highly acceptable rating with a mean of 4.62; the content of which was rated 4.51 interpreted as highly acceptable. This finding also



reinforced that of Estremera (2017) that as to the content, the module reached the "very satisfactory" quality level with a total mean score of 4.27 and that of Espinas and Ballado (2017) that the module was rated in terms of content, (mean= 4.51) highly acceptable.

Though all items got high-level results, it can be veered that item No. 5 got the highest mean of 4.29. This is on the giving of equal emphasis on each topic of the lesson. On the other hand, item no. 2 got the lowest mean of 3.94. This is on simplicity and ease of understanding of the content of each lesson in the module. It implies that parts of the modules are not so simplified, making it hard for the learners to understand. This affirmed Madrazo and Dio (2020) when it was found out in their study that most of the jurors of the modules identified very minor errors such as conceptual, grammatical, computational, and other errors in illustrations, pictures, graphs, and tables. This affects the validity of the content which misleads the learners in understanding the lesson.

Table 2
Level of Acceptability of Self-Learning Modules of Grade 10 learners in The Area of Assessment

Items	Mean	Interpretation
1. The assessment matches the Most Essential Learning Competencies (MELC).	4.34	High Level
2. The assessment tools follow the required degree of test difficulty.	4.18	High Level
3. Directions for tasks to be performed are clearly stated.	4.32	High Level
4. Rubrics are provided to guide learners in performing a task	4.50	Very High Level
5. The assessment initiates timely feedback	4.19	High Level
6. Both performance tasks and summative tests are balanced.	4.30	High Level
7. Each question is easily understood by the learners.	4.13	High Level
8. Self-assessment for learners is encouraged.	4.33	High Level
9. Assessment activities are realistic to accomplish.	4.22	High Level
10. The assessment strategies are suited to the learners' level of understanding.	4.22	High Level
Over-all mean	4.27	High Level

Table 2 reveals the level of acceptability of modules of Grade 10 learners in terms of Assessment. As shown in the table, the level of acceptability in the area of assessment is high, having a sub-mean of 4.27. Taking a closer look, it is revealed that item no. 4, which states that rubrics are provided to guide learners in performing a task, got the highest mean of 4.50 or a very high level. This implies that learners are aware of how their outputs are rated with a clear scoring procedure.

However, item no. 7 got the lowest mean of 4.13 or a high level. It states that the learners easily understand each question. It can be inferred from the result that the way questions are crafted is still within the level of understanding of a Grade 10 learner despite being the lowest. In assuring the quality of modules, a teacher-evaluator of the module pointed out that some words in some of the lessons' evaluative exercises are quite difficult to comprehend (Salcedo 2016). This contradicts the result of Ambayanon (2020) study that assessment is very highly acceptable, meeting 81% of the acceptability level, thus making the module a suitable strategy for teaching literature.

Table 3
Level of Acceptability of Self-Learning Modules of Grade 10 learners in The Area of Presentation

Items	Mean	Interpretation
1. The topics are presented in a logical and sequential order.	4.23	High Level
2. The lessons in the modules are presented in a unique and original form	4.30	High Level
3. The learning activities are presented clearly.	4.30	High Level
4. The presentation of each lesson is attractive and interesting to the students	4.22	High Level
5. Adequate examples are given to each topic.	4.13	High Level
6. The drawings are familiar to the learner.	4.09	High Level
7. The illustrations used match the topics in the module.	4.21	High Level
8. The direction is concise, readable and easy to follow	4.21	High Level
9. The font sizes are readable by the target learners	4.36	High Level
10. The pictures are easy to view.	4.00	High Level
Over-all mean	4.20	High Level

Table 3 presents results on the level of acceptability of self-learning modules of Grade 10 learners in terms of presentation. All items obtained a high level of acceptability with a sub-mean of 4.20. This supports the



result of Espinas and Ballado's (2017) study that the module was rated in terms of presentation and illustration (mean= 4.62) highly acceptable.

In table 3, it is also shown that item no. 9 on the font sizes being readable by the target learners got the highest mean of 4.36. This indicates that the modules follow the suggested guideline on font size and style required of a certain grade level. Nevertheless, item no.10 on pictures being easy to view got the lowest mean of 4.00. Due to the use of duplicating machine that would generate only black and white results, pictures in the modules would not be generated as to its expected colors and clarity. This could be the reason why this item is rated lowest by the respondents. As opposed to the responses of Torrefranca's (2017) study, the respondents agreed that the instructions in the modules are well-emphasized, and tables/diagrams, illustrations, pictures, and captions are properly laid out for easy reference. Furthermore, they strongly agreed that the illustrations, pictures, captions, and learning activities helped them to understand the topics fully. Also, in Columbano (2019) study, the examples and illustrations were assessed very well with an overall weighted mean of 4.32.

Table 4
Level of Motivation of Grade 10 learners in the Area of Intrinsic

Items	Mean	Interpretation
<i>I experience pleasure and satisfaction...</i>		
1. when I discover new topics in the modules.	4.44	High Level
2. when I am in the process of accomplishing performance tasks in the modules.	4.27	High Level
3. while learning new things through the modules.	4.32	High Level
4. when I remember prior concepts included in the modules	4.20	High Level
5. because the modules pave the way on my quest for excellence of my studies.	4.19	High Level
6. when I perform activities that require the use of equipment/facilities available at home.	4.12	High Level
7. on exploring topics that I always want to learn.	4.35	High Level
8. in learning ideas that have many applications in daily life.	4.30	High Level
9. when I have fun doing purposeful learning activities.	4.28	High Level
10. when I can answer the evaluation part of the modules.	4.25	High Level
Over-all mean	4.27	High Level

Table 4 provides results on the level of motivation of Grade 10 learners in terms of Intrinsic. The result was generally high with a sub-mean score of 4.27 with all items having mean scores of high-level interpretations. The highest mean score of 4.44 was in item no. 1, stating that pleasure and satisfaction are experienced when new topics in the module are discovered. Learners find it enjoyable to work on new topics with another module rather than dwelling on the same topics repeated from one module to another.

On the other hand, the lowest mean score of 4.12 was in item no. 6, stating that pleasure and satisfaction are experienced while performing activities that require the use of equipment/facilities available at home. It can be inferred that learners like working on performance tasks given in the module when the equipment/facilities needed to accomplish such tasks are available at home. In this time of pandemic where mobility is controlled, learners are still motivated to do a task when the required resources are not at hand. People are intrinsically motivated to take on the best challenges because those are the most interesting activities; that facilitate competition and promote development (Thomson & Jaque, 2017). This means that learners had to perform a challenging activity such as one that requires equipment and facilities because it helps hone their skills and develop their autonomy of doing things. In fact, the results of Chang et al. (2018) study show that in the course of Project-Based Learning (PBL) activities, learners should be encouraged to enjoy the project-making activities themselves to arouse learning action.

Table 5
Level of Motivation of Grade 10 learners in The Area of Extrinsic

Items	Mean	Interpretation
<i>Using the modules, I am motivated to learn...</i>		
1. in order to obtain a more prestigious job in the future.	4.50	Very High Level
2. to help me make a better choice regarding my career orientation.	4.50	Very High Level
3. in order to improve my competence.	4.43	High Level
4. to do well in the summative tests.	4.44	High Level
5. to please my family.	4.41	High Level
6. because I want to impress my learning facilitators.	4.33	High Level
7. when I can produce outputs as required in the modules.	4.35	High Level
8. if the topic offers various applications across other learning areas.	4.21	High Level
9. when I am rewarded with material things for having accomplished the modules.	4.21	High Level
10. when I do collaboration with my siblings in working on practice tasks of the	4.07	High Level



modules.

Over-all mean

4.35 High Level

Table 5 provides results on the level of motivation of Grade 10 learners in terms of Extrinsic. A sub-mean of 4.35 interpreted as high level is obtained as revealed in the table. Both item no. 1 and 2 had the highest mean of 4.50 or a very high level. This is on one's motivation to learn using the modules to obtain a more prestigious job in the future and help make a better choice regarding career orientation. This connotes that one needs to study hard using the modules. This is one way of attaining the learning goals that will drive one to bigger successes in lifelike landing on a respected work and achieving a wisely chosen career.

However, item no.10 had the lowest mean score of 4.07 or a high level. This on the motivation of working on the modules when done by collaborating with siblings while doing the practice tasks. This implies that there is still cooperation done from among siblings of the family while working on the tasks provided in the modules despite that they are also working on different modules being on different grade levels. Older siblings who are expected to guide and help the younger ones cannot offer enough help because they are also busy answering their modules. As featured in the T74 Newsletter, an elder sister drew up a schedule that would give each sibling their best shot at finishing their work. She motivated his younger brother to meet his deadlines and cheered him on when he grew discouraged with his math and science assignments (Kirsch, 2020). On average, helping her brother with his schoolwork takes two to three hours a day, but it was successfully sustained, and the younger brother and other siblings held on to it as part of the motivation.

Table 6
Level of Mathematics Achievement of the Grade 10 Learners During the School Year 2020-2021

Variable	N	Mean	Interpretation
Math 10 Achievement	237	33.86	Very Satisfactory

Table 6 reveals the level of Mathematics achievement of the Grade 10 learners during the School Year 2020-2021. It is shown in the table that Math 10 learners obtained a mean score of 33.86 in the achievement test, interpreted as very satisfactory. This means that the learners have demonstrated competence of knowledge of the subject matter, including its application. The learners obtained scores or ratings that exceeded the expectations. This result's relevance is that math achievement is possible with constant practice and determination (Callaman & Itaas, 2020).

However, Education Secretary Leonor Briones said that the performance of Filipino students in large-scale assessment – which is the National Achievement Test (NAT) – gravitates towards the low proficiency levels, especially in Science, Math, and English (Gonzales, 2019). Meanwhile, the Philippines ranked 2nd from the bottom among the participating countries in the recent Programme for International Student Assessment (PISA) 2018 according to DepEd - National Report of the Philippines (2019). This alarming result revealed that Filipino students recorded a mean score of 353 points in Mathematics Literacy, significantly lower than the Organization for Economic Co-operation and Development (OECD) mean of 489 points. It is also reported that only 1 out of 5 Filipino students, or approximately 19.7%, attained at least the minimum proficiency level (Level 2) in Mathematics Literacy (Callaman & Itaas, 2020).

Table 7
Level of Mathematics Achievement of the Grade 10 Learners During the School Year 2020-2021 When Grouped According to the Aforementioned Variables

Variables	Categories	Mean	Interpretation
Sex	Male	32.79	Very Satisfactory
	Female	34.64	Very Satisfactory
Parents' Average Family Monthly Income	Lower	33.69	Very Satisfactory
	Higher	33.99	Very Satisfactory
Number of Siblings	Few	33.64	Very Satisfactory
	Many	34.02	Very Satisfactory

Table 7 shows the SY 2020-2021 mathematics achievement level of Grade 10 learners when grouped according to sex, parents' average family monthly income, and the number of siblings. As to sex, the male got a mean of 32.79 and the female, 34.64; both interpreted as Very Satisfactory. This implies that it is the female who displays higher achievement in Math 10 compared to the male. This confirms the result of Hdii and Faground



(2018) in their attempt to discover students' performance in different subjects, including Mathematics, according to their gender. It was found that female students nowadays outnumber male students and get better grades in all the categories of subjects. To confirm this claim, girls achieve higher test scores than boys do in all three subjects (Chinese, Math, and English), in line with the common perception of female advantage among Chinese students (Liu, 2018).

In terms of average family monthly income, those belonging to families with lower income obtained a mean score of 33.69 while those of higher-income obtained 33.99; both interpreted as Very Satisfactory. The result implies that though the higher group had a higher mean score than the lower group, the result is negligible. Hence, both groups have almost the same level of mathematics achievement. However, Machine et al.'s (2017) results showed that those students attain greater academic achievement for a student from financially leveled-up families though 29.7% of students strongly disagree. Though many factors affect a student's performance, the socio-economic factor has the greatest impact (Li & Qiu, 2018). When grouped according to number of siblings, those with few siblings got 33.64, and those with many got 34.02; interpreted as Very Satisfactory. It can be inferred that those with many siblings have better mathematics achievement than those with few ones. It can be attributed to the fact that many siblings can help and assist each other in answering the modules. This supports the findings of the study of Portillo and Farjadpour (2019) on The Impact of the Ethnical Background and the Number of Siblings of the Scores of Math Anxiety which showed that students with more than 3 siblings happen to score much lower in Math Anxiety than students with two or less siblings. Hence, those with many siblings having lower math anxiety levels tend to perform better than their counterparts.

Table 8
The difference in the Level of Acceptability of Self-Learning Modules of Grade 10 Learners in the Area of Content When Grouped and Compared According to the Aforementioned Variables

Variable	Category	N	Mean Rank	Mann Whitney U-test	p-value	Sig. level	Interpretation
Sex	Male	100	122.55	6495.00	0.494		Not Significant
	Female	137	116.41				
Average Family Monthly Income	Lower	102	115.36	6513.50	0.476	0.05	Not Significant
	Higher	135	121.75				
Number of Siblings	Few	104	118.13	6825.50	0.862		Not Significant
	Many	133	119.68				

Table 8 reveals the difference in the level of acceptability of self-learning modules of Grade 10 learners in the area of content when grouped and compared according to the aforementioned variables. Analysis of statistics shows that males got a mean rank of 122.55, female of 116.41, with a Mann-Whitney U-test of 6495.00 with a p-value of 0.494 when grouped and compared according to sex. When grouped and compared according to average family monthly income, the lower group had a mean rank of 115.36, higher group of 121.75, test result of 6513.50 with a p-value of 0.476. When grouped and compared according to a number of siblings, those with few siblings got a mean rank of 118.13, those with many siblings of 119.68 with a test result of 6825.50 with a p-value of 0.862. Since all the p-values are greater than the level of significance, which is 0.05, the null hypothesis is that there is no significant difference in the level of acceptability of Grade 10 learners in the area of content when grouped and compared according to the aforementioned variables, is not rejected.

It implies that regardless of whether the learners are male or female, parents of lower and higher income, with few or many siblings, have no bearing as to how they recognize the importance of the content of the modules as the primary teaching-learning resource in this time of pandemic. This supports Ramos et al. 's (2021) study that content of the modules is valid and reliable in supplementing the learning of Math concepts but its level of learner's satisfaction is not significant in terms of age, sex, and economic status.

Table 9
The difference in the Level of Acceptability of Self-Learning Modules of Grade 10 Learners in the Area of Assessment When Grouped and Compared According to the Aforementioned Variables

Variable	Category	N	Mean Rank	Mann Whitney U-test	p-value	Sig. level	Interpretation
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Sex		Male	100	126.17	6133.50	0.168	Not Significant
		Female	137	113.77			
Average Family Monthly Income		Lower	102	116.35	6614.50	0.603	0.05
		Higher	135	121.00			
Number of Siblings		Few	104	121.43	6663.50	0.628	Not Significant
		Many	133	117.10			

Table 9 discloses the difference in the level of acceptability of modules of Grade 10 learners in the area of assessment when grouped and compared according to the aforementioned variables. When grouped and compared as to sex, mean ranks of male and female were 126.17 and 113.77, respectively, with a Mann-Whitney U test of 6133.50 and a p-value of 0.603. As to average family monthly income, the mean ranks of the lower and higher groups were 116.35 and 121.00 respectively, with a test result of 6614.50 and a p-value of 0.603. As to a number of siblings, the mean rank result of those with few siblings and those with many siblings were 121.43 and 117.10 respectively, with a test result of 6663.50 and a p-value of 0.628.

The p-values obtained, being greater than the alpha of 0.05, suggest that the null hypothesis is that there is no significant difference in the level of acceptability of Grade 10 learners in the area of assessment when grouped and compared according to the aforementioned variables, is hereby accepted. It can be inferred from the result that sex, average family monthly income and number of siblings do not have a bearing on the way the Grade 10 learners perceive the appropriateness of assessment methods used through the modules. Males have the same level of acceptability of the modules in terms of assessment with the females, so do those from the higher and lower groups in terms of income and those with few or many siblings. This supports Rahman's (2015) finding that no statistical difference is found in the assessment in distance learning in terms of gender and support from siblings. Also, in the study of Natividad (2021), the assessment of the self-learning module in the elementary level shows no significant difference in terms of the family's economic status.

Table 10
The difference in the Level of Acceptability of Self-Learning Modules of Grade 10 Learners in the Area of Presentation When Grouped and Compared According to the Aforementioned Variables

Variable	Category	N	Mean Rank	Mann Whitney U-test	p-value	Sig. level	Interpretation
Sex	Male	100	123.74	6376.50	0.362		Not Significant
	Female	137	115.54				
Average Family Monthly Income	Lower	102	115.01	6478.50	0.435	0.05	Not Significant
	Higher	135	122.01				
Number of Siblings	Few	104	119.42	6872.50	0.934		Not Significant
	Many	133	118.67				

Table 10 shows the difference in the level of acceptability of self-learning modules of Grade 10 learners in the area of presentation when grouped and compared according to the aforementioned variables. As revealed in the table, the results are not significant. The mean rank of male was 123.74, and that of females was 115.54. The mean rank of the lower group was 115.01, and that of the higher group was 122.01. The mean rank of those with few siblings was 119.42 and those with many siblings were 118.67. The Mann-Whitney U tests were 6376.50, 6478.50 and 6872.50 for sex, average family monthly income and number of siblings, respectively. The p-values of 0.352, 0.435, and 0.935; respectively, for the aforementioned variables led to the acceptance of the null hypothesis since they are greater than the 0.05 level of significance. Hence, there is no significant difference in the level of acceptability of modules of Grade 10 learners in the area of presentation when grouped and compared according to the aforementioned variables.

It means that sex, average family monthly income, and number of siblings do not determine the level of acceptability of modules in terms of presentation. It can be inferred that males and females, those with parents of lower-income or higher income, with few siblings or many siblings; have the same view and observation on the modules' logical and smooth flow of ideas, suitability of vocabulary level, suitability of length of sentences and variation of sentence and paragraph structures for their interests as learners. This does not support Jamison's



(2020) study, which revealed no significant difference in the module's use of concrete illustrations based on gender.

Table 11

The difference in the Level of Motivation of Grade 10 Learners in the Area of Intrinsic When Grouped and Compared According to the Aforementioned Variables

Variable	Category	N	Mean Rank	Mann Whitney U-test	p-value	Sig. level	Interpretation
Sex	Male	100	120.05	6745.00	0.840		Not Significant
	Female	137	118.23				
Average Family Monthly Income	Lower	102	119.26	6858.50	0.959	0.05	Not Significant
	Higher	135	118.80				
Number of Siblings	Few	104	120.88	6720.00	0.707		Not Significant
	Many	133	117.53				

Table 11 presents the level of learning motivation of Grade 10 learners in the intrinsic area when grouped and compared according to the aforementioned variables. Statistical analysis using the Mann-Whitney U test shows that the result was not significant. When grouped and compared according to sex, the male had a mean rank of 120.05 while the female had 118.23, obtaining a test value of 6745.00 and a p-value of 0.840. Considering average family monthly income as the grouping variable, the lower group had a mean rank of 119.26. The higher group had 118.80, with a test result of 6858.50 and a p-value of 0.959. As to the number of siblings, those with few siblings had a mean rank of 120.88, and those with many had 117.53, with a test result of 6720.00 and a p-value of 0.707. Having all p-values greater than 0.005, which is the significance level, prompted the acceptance of the null hypothesis. Hence, the null hypothesis that there is no significant difference in the level of learning motivation of Grade 10 learners in the area of intrinsic when grouped and compared according to the aforementioned variables is hereby not rejected.

This implies that the level of intrinsic motivation of Grade 10 learners is not based on sex, average family monthly income, and the number of siblings. Male and female, having parents of lower and higher income, having few and having many siblings; experience the same level of motivation that directs them to answer modules for fun without expecting external rewards, gifts, or under any compulsion or pressure. This confirms the result of Naz et al. (2020), showing that there are no noticeable gender differences in intrinsic motivation, indicating the difference between mean scores of boys and girls having a value of t 0.509, which is less than the tabulated value (1.96) at 0.05 level.

Table 12

The difference in the Level of Motivation of Grade 10 Learners in the Area of Extrinsic When Grouped and Compared According to the Aforementioned Variables

Variable	Category	N	Mean Rank	Mann Whitney U-test	p-value	Sig. level	Interpretation
Sex	Male	100	124.11	6339.00	0.324		Not Significant
	Female	137	115.27				
Average Family Monthly Income	Lower	102	119.66	6817.50	0.897	0.05	Not Significant
	Higher	135	118.50				
Number of Siblings	Few	104	116.63	6669.50	0.636		Not Significant
	Many	133	120.85				

Table 12 presents the level of motivation of Grade 10 learners in the area of extrinsic when grouped and compared according to the aforementioned variables. Using the Mann-Whitney U test, the results were not significant. In terms of sex, male and female had mean ranks of 124.11 and 115.27 with a test result of 6339.00 and a p-value of 0.324. In terms of average family monthly income, the lower group had a mean rank of 119.66 while the higher group had 118.50, obtaining a test value of 6817.50 and a p-value of 0.897. Regarding the



number of siblings, those with few siblings obtained a mean rank of 116.63 and those with many 120.85, having a test value of 6669.50 and a p-value of 0.636. Since all the p-values are greater than the alpha of 0.05, the null hypothesis that there is no significant difference in the level of learning motivation of Grade 10 learners in the area of extrinsic when grouped and compared according to the aforementioned variables is hereby accepted.

This means that male and female, lower group and higher group in terms of average family monthly income, with few or many siblings, do not vary in displaying behaviors driven by external rewards for them to accomplish tasks related to achieving learning goals through the modules. This affirms the result of Camus et al. (2018), which disclosed a result signifying a failure to reject the null hypothesis hence a not significant difference in extrinsic motivation and gender, and on economic status and extrinsic motivation. On the contrary, the study of Naz et al. (2020) suggested that significant gender differences in terms of extrinsic motivation are greater in male students than female students.

Table 13
The difference in the Level of Mathematics Achievement of Grade 10 Learners When Grouped and Compared According to the Aforementioned Variables

Variable	Category	N	Mean	t-value	p-value	Sig. level	Interpretation
Sex	Male	100	32.79	-2.255	0.025	0.05	Significant
	Female	137	34.64				
Average Family Monthly Income	Lower	102	33.69	-0.362	0.017	0.05	Significant
	Higher	135	33.99				
Number of Siblings	Few	104	33.64	-0.460	0.646	0.05	Not Significant
	Many	133	34.02				

Table 13 reveals the significant difference in the level of mathematics achievement of Grade 10 learners when grouped and compared according to the aforementioned variables. Statistical analysis using the independent t-test shows that it is significant in terms of sex and average family monthly income but not in the number of siblings. Veering closely at the results, the male got a mean of 32.79 while female got 34.64, with a t-value of -2.55 and a p-value of 0.025, which is less than the alpha of 0.05. In terms of average family monthly income, the lower group got a mean of 33.99 while the higher group got 33.64 with a t-value of -0.362 and a p-value of 0.017. Furthermore, those with few siblings had a mean of 33.64, while those with many siblings had 34.02 with a t-value of -0.460 and a p-value of 0.646.

The p-values obtained suggest that a significant difference existed in the level of Mathematics achievement of Grade 10 students in terms of sex and average family monthly income but not in the number of siblings. This infers that the achievement of Grade 10 students varies as to sex and average family income. As evident in their mean scores, female had higher achievement level compared to male. This agrees with the result of Naz et al. (2020), disclosing the value of t (2.07) that indicates a significant gender difference in academic outcomes confirming further that female students' academic achievement is better than male students. Also, in the study of Lacia (2016), gender (both at Level1 and Level 2) did not appear to be a factor in students' achievement.

However, it disagrees with the result of the study undertaken by Ajai and Imoko (2015) that assessed gender differences in mathematics achievement and retention. The study proved that male and female students did not significantly differ in achievement and retention scores, which showed that they could compete in mathematics. On the other hand, whether a learner comes from an affluent family or not, or whether he/she has few or many sisters and brothers, does not have a bearing on how they perform in math achievement tests. This confirms Machebe et al.'s (2017) study, which revealed no difference in children's academic performance based on variation in parent's income.

Table 14
Relationship Between the Level of Acceptability of Self-Learning Modules and the Level of Mathematics Achievement of Grade 10 Learners

Correlates	N	r	Level of Sig	p-value	Interpretation
Level of Acceptability of Modules	237	0.287	0.05	0.00	Significant



Level of Mathematics
Achievement

Table 14 discloses the relationship between the acceptability of modules and the level of mathematics achievement of Grade 10 learners. The table shows the strength of the relationship is 0.287 with a p-value of 0.00 interpreted as significant. Since the p-value of 0.00 is less than the 0.05 level of significance, then the null hypothesis is that there is a significant relationship between the level of acceptability of modules and the level of mathematics achievement of Grade 10 learners.

Therefore, the level of acceptability of modules is associated with the mathematics achievement of the Grade 10 learners. This implies that using the self-learning modules and adhering to its content, assessment, and presentation influences the score obtained by these learners in Math 10 achievement test. This could be attributed to the fact that the learners can repeatedly go on the module in cases wherein they need to study the concepts not adequately learned. This supports the finding of the study of Columbano (2019) that the use of modules can significantly increase the learning of Mathematics. In particular, Natividad (2021) found out that the quality of content has a high positive correlation and is a predictor of academic achievement. Moreover, the students' performance will be successful if they are very well motivated in dealing with modules (Adama et al., 2018).

Table 15
Relationship Between the Level of Motivation and the Level of Mathematics Achievement of Grade 10 Learners

Correlates	N	rho	Level of Sig	p-value	Interpretation
Level of Learning Motivation	237	0.222	0.05	0.01	Significant
Level of Mathematics Achievement					

Table 15 reveals the relationship between the level of motivation and the level of Mathematics achievement of Grade 10 learners. Using the Spearman rho, the result was significant with the strength of the relationship of 0.222 and a p-value of 0.01, which is less than the alpha of 0.05. This led to the rejection of the null hypothesis that there is no significant relationship between the level of motivation and the level of Mathematics achievement of Grade 10 learners.

The intrinsic and extrinsic level of motivation affects the level of Math achievement of Grade 10 learners. This connotes that the innate and external motivation learners display while working with the self-learning modules determines their success in the Math achievement test. High levels of motivation positively correlate with better learning and achievement (Michaelides et al., 2019), and that students with strong learning motivation have high academic performance (Liu & Changg, 2019). Furthermore, Naz et al.'s (2020) result indicates that high intrinsic motivation scores lead to high academic achievement. The positive correlation coefficient indicates that extrinsically motivated students showed higher academic achievement.

In the study Liu (2018), it is shown that holding other control variables constant; the regression results show that each unit increase in the learning motivation scale is associated with 1.708 standardized points increase in Math. Thus, motivation and math achievement are connected and play an important function in students' educational success (Mutjaba et al., 2018). Indeed, academic achievement in general, and mathematics in particular, is positively associated with cognitive abilities and emotional and motivational skills (Abin, et al., 2020). Therefore, motivation plays an important role in predicting academic achievement (Kriegbaum, 2015). The relation between perceived task value and performance is often less pronounced. However, in the TIMSS documentation, it is stated that "TIMSS results have consistently shown a strong relationship between students valuing the subject and their achievement" (Hooper et al., 2017, p. 72).

However, multinational analyses from TIMSS and PISA have found relatively weak relationships between valuing the subject and achievement (Lee and Stankov, 2018). The results of the random effect model showed that motivation has a low-level positive effect on student achievement (Ozen, 2017).

Conclusions:

In conclusion, the level of acceptability of self-learning modules of Grade 10 learners is high in the areas of content, assessment, and presentation. It implies that being highly acceptable, the content of the modules is suitable to the learners' level of comprehension, the assessment strategies are appropriate, and the presentations are engaging and interesting. The modules are in accordance with the identified learning gaps of learners.



The level of learning motivation of Grade 10 learners was high in the areas of intrinsic and extrinsic. It can be inferred that Grade 10 learners bear a high level of intrinsic and extrinsic motivation, driving them to engage more in learning and school works.

The level of mathematics achievement of Grade 10 learners during the School Year 2020-2021 was very satisfactory. It can be concluded that the respondents' achievement in Math 10 exceeds the target expectation.

No significant difference existed in the level of acceptability of self-learning modules of Grade 10 learners in the areas of content, assessment, and presentation when grouped and compared according to the aforementioned variables.

No significant difference existed in the level of motivation of Grade 10 learners when grouped and compared according to the aforementioned variables. From this result, it can be inferred that intrinsically and extrinsically motivated learners have no distinction in terms of sex, average family monthly income, and the number of siblings.

A significant relationship existed between the level of acceptability of self-learning modules and the level of Mathematics achievement of Grade 10 learners. It can be concluded that the level of acceptability of the self-learning modules in terms of content, assessment and presentation influences the Math achievement of Grade 10 learners.

A significant relationship existed between the level of motivation and the level of mathematics achievement of Grade 10 learners. From this result, it can be inferred that both intrinsic and extrinsic motivation affect the Math 10 achievement of Grade 10 learners and that learners' motivation can be linked to one's success in Math achievement tests.

Recommendations

Based on the conclusions of this study, the following recommendations were drawn:

1. LRMDs coordinator retool writers on the choice of language and content of the module, include suitable self-assessment tools that ensure deep engagement with the subject matter, and utilize pictures and illustrations that are clear and attractive learners even when printed without colors.
2. School Guidance-in-Charge should launch programs that have proven to develop motivation among students in modular learning similar to that of the Revitalized Homeroom Guidance Program (RHGP).
3. Teachers should include personal notes on their summative tests inspiring learners to get higher scores in the tests.
4. Class advisers should attach qualitative feedback in the report card every quarter, not only the learners' need but also on their progress.

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