

Challenges in Using Modular Approach in Mathematics to Senior Students in Zambales Philippines

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ABSTRACT

The study aimed to identify challenges faced by Grade 11 Senior High School students in using a modular approach for learning Mathematics in the San Felipe District, Division of Zambales, during the school year 2020–2021. A descriptive research design was employed, and data was collected through a questionnaire from 144 randomly selected student respondents. The findings revealed that the student respondents were typically female teenagers, with fathers working as farmers and mothers as housekeepers. The students rated the challenges of using the modular learning approach as "challenging" in terms of Subject Matter Content, Delivery and Retrieval, and Family Support. The researcher recommended implementing interventions to alleviate challenges among students, parents, teachers, and school administrators. Suggestions included promoting collaborative learning among neighbors, forming subject area expert committees to review module content, managing time effectively, ensuring clear and visual module materials, incorporating relevant activities, and conducting further studies to validate the findings.

INTRODUCTION

The issuance of Department Order #_2020_012 other known as the Adoption of the Basic Education Learning Continuity Plan for School Year 2020-2021 in the Light of the COVID-19 Public Health Emergency. The national promulgation in the Department of Education on the utilization of modular learning platform to assure the continuity of the acquisition of knowledge and skills among our students. The modular approach situates Filipino students to learn in the comfort of their homes. Limited contact with teachers would place parents or guardians as the learners' model or the "More Knowledgeable Other" (MKO). Because of the global crisis brought by COVID-19 Pandemic, the entire world has faced tremendous challenges not only in health but as well as particularly in education. The virus is an airborne disease where there is a high and great risk of contamination if people are meeting with a big crowd as in the classroom. The Philippine Inter Agency Task Force has strongly recommended on avoidance and restriction on face to face contact with the students.

However, the Department of Education in its efforts to determine the best learning approach to be used in the delivery of knowledge to the students has conducted needs assessment survey. There was a big gap if online would be used because majority of the learning populace are poor and belong marginalized sector where they cannot afford to buy technological gadgets like cellphone with android features, laptop, desk top or tablet. The entire country utilized the modular learning approach.

As the school opening commenced last October 5, 2020 there were several challenges and problems had been observed from among the various elements of learning. The teachers encounter difficulty on supplies of bond paper, ink and printing machines, on the learning contents and assessment on students' progress and development, on the mode of delivery and retrieval. The parents are likewise affected on the situation on their involvement and participation in helping their children to work on the respective modules. Much more so on the part of the students where they are affected on their emotional, social, mental or intellectual and physical development. As published in the national newspapers and aired in national television, that there are students who committed suicide and are traumatic because of the new learning approach. There is an emergence call to look deeper into the implications towards challenges of using modular approach in the learning and academic performance of Grade 11 students in Mathematics hence, this study.

THEORETICAL REVIEW

Distance Learning Education

Distance learning, also known as distance education or distance learning technologies (DET), refers to an educational approach that utilizes information and telecommunication networks for indirect interaction between learners and educators. The terminology used in this field varies, with terms like "distance learning," "distance education," and "ICT" often used interchangeably (FZ273, 2012).

Different definitions exist regarding distance learning technologies. Andreyev (1997) describes it as a comprehensive method of instruction that

combines traditional and new information technologies to deliver educational material, support self-study, and facilitate dialogue between teachers and learners. Polat and Khutorskoy (2000) define distance learning as the use of telecommunications to connect learners, teachers, and tutors who are spatially or temporally separated, with the goal of developing educational products and fostering changes in the subjects of education. Marchuk (2013) characterizes distance learning as instruction that considers spatial and temporal separation, incorporates communication and information perception in a virtual environment, and relies on specialized systems, methodologies, and communication technologies.

Foreign literature also addresses the integration of ICT in education. Chang et al. (2015) provide a detailed overview of ICT application technologies in different learning environments, considering the perspectives of participants. Lupu and Laurentiu (2015) conducted research on educational practices in Romania, finding that while traditional teaching aids were prevalent, ICT usage was limited. It is important to assess the readiness of educational communities, including teachers and specialists, before implementing distance learning technologies.

In the Philippines, distance education began with the Farmers' School-on-the-Air (FSA) in 1952, utilizing radio broadcasting. Over time, ICT became crucial for providing flexible learning opportunities. Online tutorials and teleconferences facilitated by tutors became primary modes of distance education delivery.

The terms "distance learning" and "distance education" are often used interchangeably by various institutions, academic units, government agencies, and the media, with definitions varying depending on the context and stakeholders involved. In general, distance learning refers to any instructional method that allows learners to access education without being physically present with the instructor (Ellison, 2000).

Modular Distance Learning

Modular distance learning involves individualized instruction using self-learning modules (SLMs) in print or digital format. Learners access these materials electronically on devices such as computers, tablets, or smartphones. The teacher monitors progress and provides assistance through various communication channels. Home visits and para-teachers are also utilized (Llego, as cited in teachers.ph). Textbooks are considered a vital part of the education system, particularly in developing countries. They serve as a major source for teaching and learning (Mahmood, 2010).

Reviewers may lack expertise in analyzing texts for cognitive development, and simply providing curriculum contents to authors does not guarantee comprehensive coverage. Teaching modules should meet the requirements of teacher education authorities and cover essential aspects of the subject matter. Evaluation activities are provided, but pre-test and post-test activities may be lacking. Teachers generally assess the modules more positively than students (Macarandang, 2009).

An evaluated environmental outdoor education module received positive feedback from students, indicating its suitability and effectiveness in meeting criteria for content, instructional characteristics, and purposefulness (Samonte, 2004).

Parental Involvement and Challenges in Modular Learning

Parental involvement is vital for children's learning and development, particularly in the context of modular learning. Lara and Saracosti (2019) found that children with low parental involvement tend to have lower academic achievement. To address challenges in education during a pandemic, a multidisciplinary approach involving parents, children, teachers, and professionals from the local community is crucial (Erol & Turhan, 2018). Gender and age differences impact students' engagement in school, with female students exhibiting higher engagement levels (Erol & Turhan, 2018). Students from intact families may perceive higher parental involvement compared to those from divorced families (Erol & Turhan, 2018). Socioeconomic factors such as family income and parents' education influence parental involvement (Manipon, 2018). Parents face challenges like time constraints and language barriers (Jabar, 2011), but their active involvement positively affects academic performance (Chowa, Masa, & Tucker, 2013). Effective communication and collaboration between parents and teachers are vital (Kimaro & Machumu, 2015). Parental involvement is considered a social need and an individual right (Castro et al., 2015). Further research is needed to understand the long-term effects of parental involvement (Van der Zalm, 2010). By addressing challenges and promoting parental involvement, modular learning can be more effective (Mahmood, 2013; Rafiq et al., 2013). 4:58 PM by Merlina Hernando-Malipot).

Distribution and Retrieval of Modules

The distribution and retrieval of modules in modular teaching involve various steps and partnerships with parents and barangay officials (Perras, 2016). Simulations and dry runs are conducted by schools to familiarize teachers and parents with the process, allowing for the identification of challenges and the establishment of guidelines (Meniano, 2020; Saavedra, 2020). School heads meet with barangay officials to secure their assistance in delivering modules to learners' residences (Krupp, 2020).

Parent orientations are conducted to explain the processes and emphasize the importance of following schedules and submitting completed learning outputs on time (Kennedy, 2019; Reid et al., 2019). The distribution process includes health and safety protocols such as wearing face masks and shields, temperature checks, contact tracing logs, and health declaration forms (Pelayo, 2020). Parents are also reminded to practice social distancing and maintain hand hygiene (Mitchell, 2020).

Challenges, such as parents neglecting to pick up modules, are addressed by teachers who may contact parents or personally deliver the modules (Sherrington, 2019; Gonzalez, 2018). The retrieval process follows similar procedures as distribution, with parents signing forms to indicate module receipt and return (Adonis, 2020). The collaboration between schools,

parents, and barangay officials is crucial for successful module distribution and retrieval (Baccay, 2020).

Contents of Modules

The contents of the modules are prepared by expert teachers based on the Most Essential Learning Competencies (MELCs) (Colman, 2019). Teachers undergo orientation and training, reviewing sample modules to understand the desired content (Ulla et al., 2017). Collaboration among team members, including authors, illustrators, and editors, is emphasized (Henshaw, 2019). Plagiarism is strictly avoided, and quality assurance is conducted by multiple reviewers (Salmons, 2019; Nardo & Hufana, 2014)

The modules focus on learning objectives and have strong introductions (Brown, 2013). They consider the diverse backgrounds of learners and relate the content to their experiences (Mipham, 2017). The modules address the local health situation and the significance of staying at home (Widler, 2019). Care is taken to use appropriate language and avoid indecent words (Zhang & Bray, 2014). Original illustrations are encouraged, considering the end-users of the modules (Streefkerk, 2020; Costello, 2013). Printing follows standard size guidelines, although some schools opt for booklet formats to reduce expenses (Magsino, 2020; Mercado, 2020).

Usefulness of Modules

Modules are crucial in modular teaching as they serve as primary learning materials (Piña, 2017). They should be designed with the learners' levels in mind and should be easily accessible and understandable (Kullberg et al., 2017). Accuracy and relevance of information are essential, considering the learners' diverse backgrounds and situations (Dhillon and Wanjiru, 2013). Modules should incorporate various presentation strategies and engaging activities to capture learners' interest (Li and Yang, 2016).

Clear guidelines and instructions should be provided to help learners effectively utilize the modules, such as Weekly Home Learning Plans (Serrat et al., 2014). Learners are encouraged to read the learning objectives, grasp the discussion concepts, and complete activities to reinforce understanding (Layng, 2017; Athmika, 2016). Modules enable personalized learning, flexibility, and self-assessment, empowering learners to progress independently (Dunlosky et al., 2013).

Quality of Modules

The passage emphasizes the importance of high-quality modules in modular teaching and their impact on learners (Wijngaards-De Meij & Merx, 2018). Authors or writers should ensure that module contents are aligned with learning objectives, presented clearly, and incorporate discussions and samples for better comprehension (Grossman, 2015). Relating the module content to learners' situations enhances understanding (Harvey, 2017). Modules should contribute to learners' skill development and be tailored to their needs (Wilichowski & Cobo, 2020). Lifelong learning and applicability to real-life

situations are crucial (Levin, 2017). Relevance to learners' present situation and lasting impact on their academic performance and personal growth determine module quality (Feith, 2014; Mustakim, 2014).

Relevance of Modules

The passage emphasizes the importance of creating modules that are relevant to learners by considering their interests, levels of understanding, location, and situation. It states that modules should incorporate the learners' background knowledge and interests (Angeles, 2015). Additionally, the passage highlights the need to address the different levels of understanding among learners to cater to their individual learning needs (Robinson, 2018). Contextualization and localization are also deemed important, as modules should be adapted to the learners' environment (Ozerem and Akkoyunlu, 2015). Lastly, the passage emphasizes the significance of considering the learners' specific situations or conditions to provide content and activities that are applicable and meaningful to their circumstances (Raudys, 2018).

Difficulties and Challenges in Modular Teaching

Teachers face various difficulties and challenges in the implementation of modular teaching. They are often unfamiliar with this learning modality and may require training and orientation to effectively deliver lessons (Partarrieu, 2015; Sejpal, 2013). Private organizations offer online training and orientation programs to support teachers in understanding the flow of different learning modalities (Tolegen et al., 2016). The DepEd provides Learning Delivery Modality (LDM) modules to assist school heads and teachers in comprehending various teaching approaches (Codamon, 2020). However, the challenges continue during the implementation phase, with time constraints being a major concern. Teachers often need to work beyond their scheduled hours and bring work home to ensure preparedness (Magsambol, 2020). Resource constraints, including limited equipment for module production, can also pose challenges (Larson, 2020). Effective coordination, communication, and personalized support for learners are essential for successful implementation (Bagoood, 2020). Monitoring student progress and evaluating the effectiveness of modular teaching methods require careful consideration (Crowe, 2015). Overcoming these challenges necessitates support, professional development opportunities, and collaborative efforts (Partarrieu, 2015; Sejpal, 2013).

Production of Modules

Teachers are assigned the task of producing modules for learners, ensuring they receive hardcopies for the week. The number of modules varies by grade level, with Grade I requiring five modules, Grade II needing seven, and Grade III to VI requiring eight (Sancio, 2020). However, the production of modules poses challenges, as the School MOOE budget is often insufficient, leading teachers to seek donations from parents and stakeholders (Mateo, 2020; Calayag, 2020). In response to reported difficulties, Schools Division Offices (SDOs) manage module printing, but limitations exist, with schools receiving only 50% of modules after the initial two weeks (Umil, 2020; Adonis, 2020).

Teachers spend significant time both at school and home producing modules, with printing, stapling, and sorting becoming routine tasks (Luczon, 2020; Mercado, 2020). They may involve family members in module production (Sornito, 2020). Despite other responsibilities, teachers work independently on module production (Fernando, 2020; Jones, 2018).

Hypotheses

The following hypotheses was tested:

1. There is no significant difference on the challenges encountered using modular approach when grouped according to profile variables.
2. There is no significant difference on the dimensions towards challenges encountered using modular approach.

METHODOLOGY

Population, Sample, and Sampling Technique

The study was conducted in San Felipe District, Division of Zambales during the School Year 2019-2020. The participants of the study are the one hundred forty-four (144) sample size taken from the population of two hundred twenty nine (229) Grade 11 students in San Felipe District. Table 1 shows the distribution of the respondents coming from Governor Manuel D. Barretto National High School, San Felipe Technological Vocational School, and Sagpat High School.

Table 1. Frequency and Percentage Distribution of the Student-Respondents' Profile N=144

Student-Respondents' Profile		Frequency (f)	Percentage (%)
Age Mean=16.94 years old	15 years old	3	2.10
	16 years old	47	32.60
	17 years old	60	41.70
	18 years old	23	16.00
	19 years old and above	11	7.60
	Total	144	100.00
Sex	Male	63	43.80
	Female	81	56.30
	Total	144	100.00
Family Monthly Income Mean=Php 8,576.89 monthly	10,000 and below	116	80.60
	10,001-20,000	7	4.90
	20,001-30,000	15	10.40
	30,001 and above	5	3.50
	Total	144	100.00

Table 2. Frequency and Percentage Distribution of the Student-Respondents' Profile (Continuation)

Student-Respondents' Profile		Frequency (f)	Percentage (%)
Educational Attainment of Father	Elementary Graduate	25	17.40
	High School Level	24	16.70
	High School Graduate	53	36.80
	College Undergraduate	16	11.10
	Masteral	1	.70
Educational Attainment of Mother	Elementary Graduate	19	13.20
	High School Level	26	18.10
	High School Graduate	64	44.40
	College Undergraduate	9	6.20
	College Graduate	20	13.90
	Masteral	3	2.10
	Doctoral	3	2.10
	Total	144	100.00
Occupation of Father	No Work	22	15.30
	Teacher	4	2.80
	Government Employee	6	4.20
	Military/Police	6	4.20
	Driver	18	12.50
	Construction worker	43	29.90
	Farmer	45	31.20
	Total	144	100.00
Occupation of Mother	No work	55	38.20
	Teacher	9	6.20
	Government Employee	7	4.90
	Military/Police	9	6.20
	Driver	1	.70
	Housemaid/Caretaker	36	25.00
	Vendor	27	18.80
	Total	144	100.00

The study was conducted at San Felipe District, Division of Zambales. Please see appendix B on the History of San Felipe, Zambales. Figure 2 presents the map of Zambales showing the location of San Felipe, Zambales. The history of San Felipe District is in Appendix B.

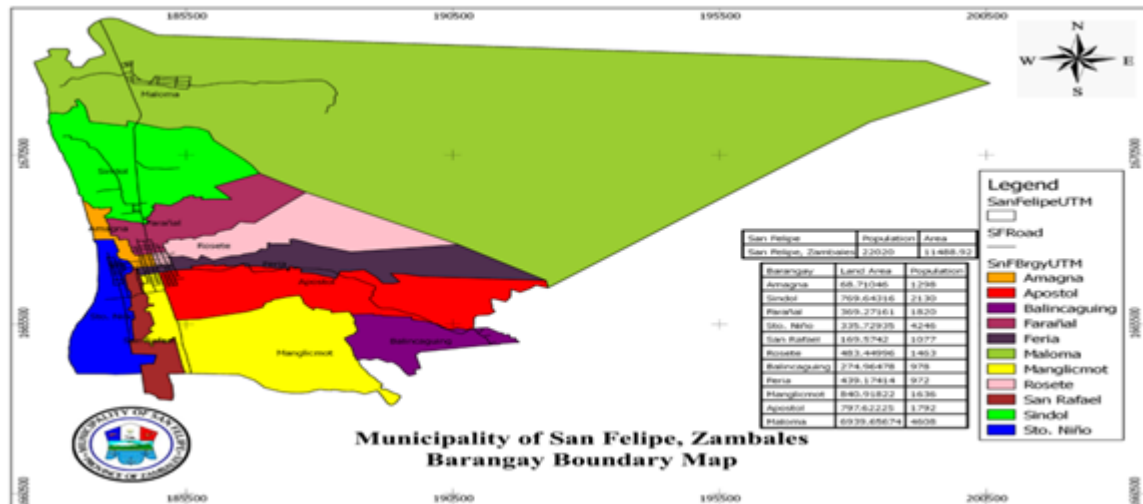


Figure 1. The History of San Felipe District

Method of Collecting Data

A request letter was sent to the Schools Division Superintendent, endorsed by the PRMSU Graduate School Director and the adviser, to obtain permission for the study. The researcher administered an assessment to Grade 11 students, focusing on the challenges encountered in the new normal pandemic schemes using the modular approach. The assessment was conducted using Google Forms to facilitate distribution and retrieval. The researcher conducted a documentary analysis of the retrieved survey instrument and related documents to gain insights and information about the study's topic.

Research Design

The study utilized the descriptive research design with survey questionnaire and documentary analysis in gathering data from the respondents. A descriptive research design can use a wide variety of research methods to investigate one or more variables. Unlike in experimental research, the researcher does not control or manipulate any of the variables, but only observes and measures them. Descriptive research can be used to investigate the background of a research problem and get the required information needed to carry out further research. It is used in multiple ways by different organizations, and especially when getting the required information about their target audience (<https://www.formpl.us/blog/descriptive-research>).

Furthermore, descriptive research is a study designed to depict the participants in an accurate way. It is all about describing people who take Descriptive research aims to accurately and systematically describe a population, situation or phenomenon that can answer what, where, when, and how questions (McCombes, 2020). It provides the ability to witness the phenomenon in a totally natural and unchanged situation (Canonizado, 2020). Its value is based on the premise that problems can be solved and practices

improved through observation, analysis, and description (Koh and Owen, 2017).

Descriptive research seeks to describe the characteristics or behavior of an audience. Its purpose is to describe, as well as to explain or to validate some sort of hypothesis or objective when it comes to a specific group of people. Specifically, this research employed survey that involved interviews or discussions with larger audiences and are often conducted on more specific topics (McNeill, 2018). Finally, descriptive research is a study designed to depict the participants in an accurate way. It is all about describing people who take part in the study. Survey is defined as a brief interview or discussion with an individual about a specific topic (Kowalczyk, 2018).

Research Procedure

The problem or research question was identified, which focused on the challenges encountered by Grade 11 students in the new normal pandemic schemes using the modular approach. A thorough review of relevant literature was conducted to understand existing knowledge and theories related to the topic. A conceptual framework was developed, outlining the key variables, relationships, and hypotheses guiding the study. A formal request letter was sent to obtain permission from the relevant authorities to conduct the study.

The researcher administered the assessment to Grade 11 students using Google Forms and collected the responses. The collected data were organized and tabulated using Excel or SPSS software. Descriptive and inferential statistical techniques were applied to process and analyze the gathered data, answering the research questions and testing the Null Hypothesis.

The results of the data analysis were interpreted, conclusions were drawn based on the findings, and they were related to the existing literature. The implications of the study's findings were discussed, recommendations were provided for future actions or research, and any limitations or areas for further investigation were highlighted. The entire research process, including the problem statement, literature review, methodology, findings, and conclusions, was documented in a comprehensive research report.

Data Analysis

Descriptive statistics is a branch of statistics that focuses on summarizing and analyzing data. In the analysis described, several specific tools were used:

1. **Frequency Counts and Percentage:** This tool involves counting the number of occurrences of each category or response in a variable and expressing it as a percentage. It helps in understanding the distribution and frequency of respondents across different profile variables considered in the study.
2. **Weighted Mean:** The weighted mean is used when different data values have varying weights or importance. In this study, each data value may represent a value used by multiple people in the sample, so a weight is assigned to each value. The weighted mean takes into account these weights, with data values that have larger weights contributing more to the overall mean.

3. Analysis of Variance (ANOVA): ANOVA is a statistical method used to measure the significant differences between groups or categories. In this study, it was applied to examine the level of perceptions when grouped according to the profile variables of the respondents. The researcher used the SPSS software program to facilitate the processing and computation of the data.
4. The decision rule mentioned is based on the alpha level of significance, which is a predetermined threshold used to determine if a result is statistically significant. In this case, if the computed significance value is greater than 0.05 (the alpha level), the null hypothesis (no significant difference) is accepted. If the computed significance value is less than 0.05, the null hypothesis is rejected, indicating a significant difference.

RESULTS AND DISCUSSION

Summary of Findings

1. Based on the findings presented, here is a summary:
 - A. Profile of the Student-Respondents:
 - B. Age: Majority of the student-respondents were 16 and 17 years old, indicating they were in their teenage years.
 - C. Sex: 56.30% of the student-respondents were females, while 43.80% were males.
 - D. Family Monthly Income: 80.60% of the respondents had a family monthly income of Php10,000 and below.
 - E. Educational Attainment of Father: Most fathers had a high school graduate education.
 - F. Educational Attainment of Mother: Most mothers had a high school graduate education.
 - G. Occupation of Father: The most common occupation of fathers was arming, followed by construction workers.
 - H. Occupation of Mother: The most common occupation of mothers was not working, followed by working as housemaids/caretakers.
2. Perception of the student towards the challenges on the use of modular learning approach:
 - A. Subject Matter Contents: Students found the modules challenging, particularly in terms of inaccurate information and the number of activities to comply with.
 - B. Delivery and Retrieval: Students found the module development based on their learning capability challenging, but they found the delivery of modules all at once less challenging.
 - C. Family Support: Students found it challenging when their parents and siblings couldn't provide support by explaining things to them, but they found it less challenging when their parents had no time to help with the module activities.

3. Test of difference on the challenges using modular learning approach based on the dimensions when grouped according to student respondents' profile variables:
 - A. Subject Matter Contents: No significant difference in perception based on the student respondents' profile variables.
 - B. Delivery and Retrieval: No significant difference in perception based on the student respondents' profile variables.
 - C. Family Support: Significant difference in perception based on the age profile, but no significant difference based on other profile variables.
4. Test of difference on the dimensions towards the challenges encountered in using modular learning approach:
 - A. There was a significant difference in perception towards challenges in subject matter content, delivery and retrieval, and family support.
5. Proposed Training, Seminar, Workshop, and Orientation:
 - A. It is recommended to provide training, seminars, workshops, and orientations for both teachers and parents to address the challenges and improve the effectiveness of the modular learning approach.

CONCLUSIONS AND RECOMMENDATIONS

Based on the investigations conducted, the following conclusions were reached:

1. The student-respondent is a typical female teenager from a low-income family, with parents who have a high school education. The father works as a farmer, while the mother is unemployed.
2. The student-respondents perceive the challenges of the modular learning approach as "Challenging" in the dimensions of Subject Matter Content, Delivery and Retrieval, and Family Support.
3. There is a significant difference in the perception of Family Support among different age groups. However, no significant differences were found in the perception of Subject Matter Content and Delivery and Retrieval when grouped according to various factors.
4. There is a significant difference in the perception of the challenges of the modular learning approach in terms of Subject Matter Content, Delivery and Retrieval, and Family Support.

FURTHER STUDY

Every research is subject to limitations; thus, you can explain them here and briefly provide suggestions to further investigations.

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