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Learners' Reception of the Grade 11 General Mathematics CapSlet and its Underlying Factors

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Abstract — This mixed method approach, using both qualitative and quantitative research methods design study using survey and focus group discussion sought to find out how acceptable the General Mathematics Capsulized Self-Learning Empowerment Toolkit (CapSLET) was to the learners and what the contributory factors were. It also examined the relationship of the learners' reception of the CapSLET to their performance in the General Mathematics Summative Test. It employed qualitative tools to enhance the collection of data. Two hundred ninety-two (292) Grade 11 students from the different tracks of a public Senior High School in Zamboanga City, were involved as respondents. In general, findings of the study have revealed that the CapsLET was well-received by the students due to the following: (a) the topics in the CapSLET were supported by illustrative examples (drawings, symbols, and pictures) facilitate learners' understanding of the concepts; the steps in the solutions of the given examples and practice tasks were sequentially arranged and easy to follow. Furthermore, from the results of interviews and discussions, students have expressed that it was easier for them to understand the topics in the CapsLET as compared to those in the textbook which could be attributed to the following: (a) proper orientation by the teachers as to the content and format of the CapSLET; and (b) regular schedule of release and retrieval of learning materials. Lastly, it was determined that there was a significant negative correlation between the CapSLET's acceptability to the students and their performance in the General Mathematics Summative Assessment.

Keywords — Distance Learning, Modular Learning, Academic Achievement, Academic Performance, Usability Factor, Information Quality Factor, Teachers Characteristic Factor, Learning Delivery Modality, Acceptability, Perception

I. Introduction

The Covid 19 pandemic disrupted global educational systems, causing class suspensions and requiring drastic changes to ensure learning continuity, necessitating the implementation of distance learning modalities. The Philippines' Department of Education has allowed schools to choose the most effective learning modality based on location, resources, and pandemic restrictions. However, the decision to reopen schools was made, and DepEd Memo No. 012, S. 2020, adapted the basic education learning continuity plan for 2020-2021.

The DepEd Schools Division Office in Zamboanga City has implemented Modular Distance Learning to address COVID-19 cases. This involves individualized instruction using

Self-learning materials in print or digital formats. Learners can access the digital copies online or download them via personal devices, such as computers, tablets, or smartphones.

The Zamboanga City Division Office has introduced the Blended Modular Distance Learning Modality (BLDLM), a combination of Printed Modular Distance Learning, full online, minimal online, offline Digital Modular Distance Learning, and television/radio-based instruction for proper implementation.

The memo recommends schools adopt the Modular Distance Learning Modality, using Self-learning Modules for competency development. Delivery methods include printed, online, offline digital, and radio-based instruction for K-12 students. Locally initiated modes and social-media platforms can be used, with parental, teacher, and school officials' agreement, to ensure data privacy and cyber safety.

DepEd has not prescribed a specific learning delivery modality, but provided options for schools in Zamboanga City. The Division Office developed the Capsulized Self-Learning Empowerment Toolkit (CapSLET) for kindergarten to Grade 12 as a K-12 compliant learning resource for Blended Modular Distance Learning. The Printed Modular Distance Learning (PMDL) modality, primarily based on printed modules, was chosen for schools with weak internet connectivity, such as Talisayan National High School. The implementation of CapSLETs was a top-down decision, without consultations with parents, students, or teachers, and without a needs analysis.

Teachers have identified challenges with students not returning modules on time or with unanswered sections. This led to a study on learner response to distance learning, focusing on the acceptability of learning modules or CapsLETs, and whether this reception is influenced by usability, information quality, or teacher characteristics.

Literature Review

Distance Learning

Honeyman and Miller (1993, as cited in Buselic, 2012) defined distance learning as a "*field of education that focuses on teaching methods and technology with the aim of delivering teaching, often on an individual basis, to students who are not physically present in a traditional educational setting such as a classroom. It has been described as a process to create and provide access to learning when the source of information and the learners are separated by time and distance, or both*".

Buselic (2012) categorized distance learning into synchronous and asynchronous learning methods. Synchronous learning involves technology-based teaching, requiring a common timetable and resources. Asynchronous learning is more flexible, allowing students to access course materials on their own schedule. These methods can sometimes be combined to deliver a

single course. However, the effectiveness and impact of distance learning depend on external factors like technology, instructional design, instructor characteristics, and perceived ease of use. Researchers also consider factors like perceived usefulness and ease of use in distance learning (Ahmed et al., 2021).

Al-Fadhli (2011) explored the shift from traditional face-to-face learning to remote learning due to technological advancements. He found that teachers' characteristics significantly influence students' perception of e-learning courses. Successful implementation of distance learning requires technology advancement and teacher collaboration. Waheed and Hussain (2010) and Malik (2009) also found that interaction between learners and instructors is crucial, especially when facing assignment problems. Teachers' guidance and encouragement motivate students to embrace remote learning. Sun et al. (2008) suggested that teachers' attitudes towards remote learning could positively impact students' acceptance.

Another factor that affects how distance learning is received by the learners is information quality significantly influences learners' acceptance of distance learning. Delone and McLean (2003) emphasize personalized, complete, relevant, easy-to-understand, and secure content. Taat et al. (2019) found that learners were able to learn independently due to clear, easy information, facilitating their understanding of the lesson.

Modular Learning

Tseng, et al (2008, in Fried-Tate et al, 2014) describes Modular learning as arranging information in a way that presents points intelligibly, that is individualized according to learners' needs. Thus, unlike, traditional course frameworks which generally presents information in a sequential and linear way, modular learning tend to use a more holistic approach using learning objectives rather that topics as basis for organization.

Studies on the use of self-learning modules such as the CapSLET also vary in their focus and findings. Torrefranca (2017) emphasized that content and instruction in modular learning should not just focus on the format, language, content, and its alignment to objectives/ competencies but also on students' acceptability of the modules used. The instructional goal of modular learning should not just be to provide the necessary content but also to make it easy for students to digest and understand it.

Academic Achievement in Mathematics

This study sought to examine the Capsulized Self-Learning Empowerment Toolkit (CapSLET) for General Mathematics. Thus, this section focused on academic achievement in Mathematics and discussed some studies that pertain to it. As mentioned in the study of Silk et al. (2017):

"Mathematics is one of the core learning areas in most educational systems around the world including that of the Philippines. Educational planners and curriculum developers are concentrating much on this field as an integral learning area. This subject seems to become one of the parameters of learning or so-called literacy and is necessary to the development of every Filipino student towards making him locally and globally competitive. However, there is a persistent problem with Mathematics in the Philippine educational system and Mathematics performance is considered by most citizens of the country to be deteriorating. Hence, new methods, strategies, techniques and approaches have been and must be engineered and reengineered to facilitate learning and address the problem."

In view of this, the National Education Testing Center (NETC) found that students' Mathematics performance in the National Achievement Test was below the mean percentage set by the Department of Education due to the pandemic. Valderma (2012) also noted a deterioration in low Mathematics ability students exposed to online modular instruction, while high-ability students showed no improvement or decline. Online modular learning is not recommended for these students.

Silk et al. (2017) also determined that fully independent modular learning was not suitable for all learners and observed that most students would leave out certain metacognitive activities and questions if answers to the questions were left optional by the teacher.

On the contrary, Lim (2016) found that using modules in teaching Mathematics, particularly word problem-solving, is a practical and effective approach that helps students learn concepts without cramming. Columbano (2019) and Melad (2016) concluded that valid and reliable modules can supplement teaching and learning of concepts. The use of simple language, examples, and self-assessment questions enhances the reliability of modular content. This teaching method provides students with more opportunities to study less understood subjects, potentially benefiting them significantly.

Modular Learning and Academic Performance

Similarly, the findings in the study of Vergara (2017) showed a high level of acceptability of the modules by the learners in terms of content, language, and presentation which has led to improved learners' performance. Bacomo, A.C.C. et al (2022) also shows that the learner's academic performance towards the use of self-learning module (SLM) was satisfactory. This implies, that students met the minimum standard of the academic performance set by their teachers, although, students were not able to attain an outstanding performance.

Muhat and Bentor (2022) found that students achieved a mean grade of 82.77 in academic performance with their self-learning module, indicating they can work independently during the pandemic. However, Jou, Mariñas, and Saflor (2020) found no significant relationship between academic performance and modular learning satisfaction.

Modular learning, like CapsLET, offers time flexibility for parents and students, but it can also lead to a lack of regularity and consistency in the learning phase, potentially resulting in a learning gap and low scores. This is particularly problematic in Mathematics, where continuous problem-solving practice is crucial.

II. Methodology

This study used sequential mixed-method. Initially, quantitative data were gathered and analyzed from a survey questionnaire. Qualitative data, then were gathered and analyzed for corroboration, form focus group discussion.

Participants

The researcher considered all 292 grade 11 students from five tracks; Science, Technology, Engineering and Mathematics (STEM), Humanities and Social Sciences (HUMSS), Information and Communication Technology (ICT), Shielded Metal Arc Welding (SMAW) and Electrical Installation and Maintenance (EIM) at Talisayan National High School in Zamboanga City. Due to the large number of students, only two top students from each track were chosen for Focus Group Discussion (FGD), with a total of 10 students considered to participate.

Sampling Techniques

The study used a total enumeration sampling technique in determining the respondents. Student-respondents of the study are those bona fide grade 11 students of Talisayan National High School of S.Y. 2021-2022

Research Instrument

The study used a modified-adapted survey questionnaire from Vergara (2017) and Taat (2019) to assess the acceptability of the Grade 11 General Mathematics CapSLET to learners. The questionnaire consisted of three parts: personal information, learners' acceptability of the CapSLET, and agreeability among students on factors affecting their acceptability. The questionnaire underwent content validation and pilot testing to ensure validity and reliability. A Focus Group Discussion (FGD) was conducted with respondents, using pre-determined open-ended questions based on the survey results. All questions were approved by the thesis adviser.

Data Collection Procedure

To facilitate the study, the researcher obtained permission from authorized offices of the Department of Education, Division of Zamboanga and General Mathematics subject teachers to gather data on summative test scores of Grade 11 students in General Mathematics before commencing with data gathering. 292 student-respondents were given consent and assent forms, and after a week, the forms were retrieved and checked. The survey questionnaires were distributed

to the student-respondents by the researcher and were collected after a week. The researcher also made available online the survey questionnaire using Google Form for respondents who were unable to collect them in person.

Focus group discussions were conducted with two (2) top top grade 11 students in each track, inviting 10 students for a total of 10 tracks, which was recorded with parental consent.

The data collected during the data collection process was stored on Google Drive, deleted after a year, and stored securely with password protection, accessible only to the researcher, in compliance with data privacy laws.

Data Analysis

After gathering and tabulating the data, the researcher used the following statistical tools:

1. The weighted mean and standard deviation was used to described and interpret the learners' level acceptability on the Content, Language and Presentation of General Mathematics CapSLET and the level of agreeability among students on the factors attributed to students' acceptability of CapSLET.

2. Spearman Rank correlation coefficient was used to determine the relationship between the learners' level acceptability and academic performance in General Mathematics Summative Test.

3. The qualitative data obtained from the focus group discussion (FGD) were processed using thematic analysis. In doing this, the researcher transcribed the FGD data. The transcript was coded based on the similarities of the response of the students-respondents.

III. Results and Discussion

Students' level of acceptability of the general mathematics CapSlet.

Content

The salient findings on perceived level of acceptability of the General Mathematics CapSLET in terms of Module Content was high (overall M = 3.22, SD = 0.426, n = 292). This implied that the majority of the respondents perceived that the contents of the CapSLET were highly acceptable. The result implied that the students-respondents believed that the contents of the CapSLET helped them master and develop the subject's competencies even without the presence of their teachers because of the pandemic restrictions.

The study by Jou, Mariñas, and Saflor (2022) examined the cognitive factors of modular distance learning among K-12 students during the COVID-19 pandemic. The research involved 1,186 students from a public school in the Philippines. The findings showed that factors like self-efficacy, motivation, and learning strategies significantly influenced academic achievement and satisfaction. Students with higher cognitive factors reported higher academic achievement and satisfaction with their learning experiences.

Similarly, the results of the Focus Group Discussion (FGD) validated the CapSLET's acceptability among learners. Students found the Remember part useful, especially when completing the Try component, as it served as a generalization of the lesson, making it easy for them to review key points quickly. The Remember part was deemed most helpful and needed improvement. These findings are also consistent with those of Yazon's (2016) study on Competency-Based Modular Instruction (CBMI) in the Philippines found its assessment methods, including pretests, self-assessments, and posttests, effective in measuring learners' competency development, with both student and teacher respondents finding them helpful.

Language

The salient findings on the perceived level of acceptability of the General Mathematics CapSLET in terms of Module Language was high (overall M = 3.04, SD = 0.482, n = 292). It could be gleaned from the results that the majority of the respondents found the CapsLET to be highly acceptable with some very highly acceptable because the language used is clear, concise, and free from grammatical errors. Thus, the student understood the explanations and examples in spite of the technical terms and mathematical symbols found in the modules. The respondents indicated that the modules had clear, concrete localized examples and that teachers gave concrete examples per topic.

This finding is supported by the study of Maile and Cooper (2018), who found that Self-learning modules (SLMs) facilitate learners' mastery of knowledge and complex processes, and that contextualized learning modules are user-friendly and have a positive effect on learning within the current educational systems.

However, it was also revealed in the Focus Group Discussion that students, despite finding the CapsLET acceptable, still expressed some difficulty in using it. Most of the student-participants responded that this difficulty was due to their need for the presence of teachers to explain complex concepts to them. This dependence on teacher was seen in the study of Itorralba (2022) and Dangle and Sumaoang (2020) found that high school students struggle with reading and comprehension skills, suggesting that modular learning may not be effective in certain regions and emphasized the importance of indigenous language inclusion. The CapSLET language was praised for its cultural and gender-sensitive content, aligning with the study's cultural practices, as per Mercado (2020), ensuring consistent learning activities.

Presentation

The salient findings on the perceived level of acceptability of the General Mathematics CapSLET in terms of Module Presentation was high (overall M = 3.12, SD = 0.479, n = 292). This implied that the CapsLET module presentation was deemed highly acceptable with some very highly acceptable. The average response of 3.10 could mean that most of the student-respondents found the General Mathematics CapSLET acceptable in terms of how it was presented. From this, it could be inferred that the lessons were clear, the instructions were written well, the examples were easy to follow, and the pictures were helpful.

The respondents also agreed that they understood the content of the modules because the instructions and assessment were clearly written. The examples had clear solutions and explanations, and the font sizes and styles were readable. Additionally, the modules had clear pictures and properly cited references, according to the respondents.

Level of agreeability among students on the factors attributed to students' acceptability of CapSLET

Usability Factor

The salient findings on the perceived level of agreeability on the General Mathematics CapSLET in terms of Usability Factor was high (overall M = 3.00, SD = 0.490, n = 292). This implied that a great majority of the respondents perceived that, in terms of usability, the CapSLET was highly acceptable (scores were within M = 3.00). The respondents agreed that the CapSLET in General Mathematics helped improved learners' performance in class and their ability to solve real-life problems. From the findings, it could be inferred that the students found the content to be self-explanatory and agreed that the instructions were clear and written at an appropriate level for them. It could also be gleaned that, the respondents perceived the CapSLET as helping them to easily complete activities and assessments by following the steps and examples provided.

The study found that CapSLET in General Mathematics was highly usable, with clear writing and no grammatical errors. Respondents found it useful for real-life applications and understood how mathematics applies in the real world. This aligns with Taat and Francis' (2019) study, which found usability factors positively impacting acceptance and learning effectiveness. The study also highlighted the app's user-friendliness.

Information Quality Factor

The salient findings on the perceived level of agreeability on the General Mathematics CapSLET in terms of Information Quality Factor was high (overall M = 3.08, SD = 0.421, n = 292). This implied that a majority of the respondents perceived that the quality information of the CapSLET were highly acceptable (scores were within M = 3.08). The results indicated that most student-respondents were in agreement about the quality information in the CapSLET's content,

the CapSLET covered the necessary learning competencies for learners, which they could apply in real-life situations.

The study found that students found the CapSLET to be effective in understanding lessons due to its language proficiency and clear content. They found the system acceptable due to its clear instructions, step-by-step explanations, and well-structured problems. The topics were presented in a logical sequence, connecting previous and new lessons. This finding aligns with a moderate level of acceptance among students regarding information quality in a study by Taat and Francis (2019).

Teacher's Characteristics Factor

The salient findings on the perceived level of agreeability on the General Mathematics CapSLET in terms of Teacher Characteristic Factor was high (overall M = 3.27, SD = 0.412, n = 292). The results suggested that most students had a high level or very high level of agreement with the teacher characteristic factor, meaning that they felt positively about the CapSLET because of their teachers. The results suggested that the respondents implied a positive perception of the teachers' characteristics and practices in relation to the CapSLET in General Mathematics. Such finding are supported by those of Taat, M. S., and Francis, A. (2019) where the respondents also agreed that the teachers contributed greatly to the CapSLET in General Mathematics.

Relationship between learners' acceptability of the CapSLET and their academic performance in the General mathematics Summative Test

Using Spearman's Rank correlation coefficient, the study found a significant negative correlation between students' acceptability of the CapSLET and their academic performance in the summative test. Although, there is a possibility that as academic performance decreases, students' acceptability of the General Mathematics CapSLET may increase, the correlation is weak, with an effect size of only 0.0135. Therefore, it is possible that this correlation may not always hold true.

It was worth noting, however, that based on the FGD revealed that most students answered CapSLET activities or summative tests at night due to daytime jobs, and some students did not return modules on time, leading to low scores in the summative test. This delay may be due to geographical distance and pandemic commuting restrictions.

The findings in this study diverged from those of Vergara (2017), which found a positive correlation between learners' acceptability of the module and their academic performance. Additionally, this study also contradicted the findings of Jou, Y.-T. Mariñas, and K.A.; Saflor, C.S. (2022), which determined that there was no significant relationship between students' academic performance and their satisfaction with modular learning.

IV. Conclusion

Based on the findings, the following conclusions are drawn:

1. The General Mathematics Capsulized Self-Learning Empowerment Toolkit (CapSLET) can be a valuable tool for students to enhance their understanding and skills in General Mathematics, provided that the following should be considered in its development: (a) establish clear objectives that are aligned with the intended learning competencies; (b) include tasks that deepen understanding and improve skills; (c) provide relevant examples and illustrations; and, (d) and use clear and concise language that is sensitive to gender and culture. The presentation style should be easy to follow, with helpful pictures and illustrations to aid students in their learning.

2. The CapSLET's user-friendliness, high-quality content, and teacher involvement make it an acceptable and valuable resource for students. The Usability Factor provided clear guidance to students which enabled them to easily complete activities and assessments by following the steps and examples provided in the CapSLET. The Information Quality Factor ensured high-quality information that is well-organized and easy to understand. The Teacher Characteristic Factor led to the enhancement of students' learning experiences with the CapSLET with teacher involvement and support.

3. The findings suggest that while the General Mathematics CapSLET may be an effective tool for some students, external factors such as delays in submission or return, and work-related distractions may hinder its effectiveness for others. It is important, then, for educators and students to be aware of these factors and take steps to address them in order to maximize the effectiveness of the CapSLET.

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