

Development and Validation of Self-Learning Packets in Linear Equation and Inequalities in Mathematics 8



Melanio V.Neri Jr¹, Elmar L.Ancog²

^{1,2}Saint Columban College, Pagadian City, Philippines

ABSTRACT: The shift of modality brought on by the COVID-19 pandemic, the Department of Education in the Philippines implemented the Distance Learning Modality, which averted the New Normal. Self-Learning Packets (SLPs), satisfy the challenge of distance learning. This descriptive-developmental study aimed to develop and validate SLPs that is aligned with the Most Essential Learning Competency in Mathematics 8. This study underwent five phases guided by the ADDIE Model (Analysis, Design, Development, Implementation, and Evaluation). The developed SLPs was very acceptable as validated by five expert validators invited from Saint Columban College and the Division of Zamboanga Sibugay. Selected Grade 8 students were also asked to evaluate the pretest and posttest. Results shows that the developed SLPs in grade 8 Mathematics were generally valid and acceptable as validated by the experts. The SLPs obtained 96.92% compliance in Content and 95.93% in Layout and Design. Paired t-test was conducted to check if there were significant changes of the student's performance from pretest and posttest. Based on the results there was a significant difference in the scores in pretest and posttest. The mean of pretest and posttest of SLP 1 were 5.10 and 7.30 with mean difference of 2.2 and the mean of pretest and posttest of SLP 2 were 4.60 and 7.20 with mean difference of 2.6, and p-value is lower than 0.05 for both SLPs. The expert validators strongly agreed that the SLPs possesses adequacy, coherence, usefulness, and reliability in equipping and enhancing student skills in linear Equations and Linear Inequalities.

KEYWORDS: development, validation, self-learning packet, linear equation, linear inequalities

1. INTRODUCTION

1.1 Background of the Study

Learning is a continuous process and essential to our existence. Thus, constant learning is necessary for acquiring critical thinking skills and discovering new ways of learning (Tracy, 2010); as we face the post-pandemic and battle with learning losses, we must face and adapt to the change of learning styles of the learners brought by the pandemic. Teachers adopted different strategies to address the student's difficulties and gaps in their learning process. One of these techniques and aids teachers had utilized the Modules in mathematics. Modules are conceptualized and designed to aid the teacher in providing the students with the needed support to progress in their studies. These will increase and deepen the child's skills, knowledge, and understanding in various subject areas in math and include various learning areas in the curriculum. Modules can explore various ideas and concepts that would enrich their understanding of varied subject matters that sharpen their competencies. Furthermore, the Modules tend to reteach the lessons that could be clearer to the learners and help them gain mastery of the skills. Moreover, the Modules guarantee alignment of activities with the tasks/objectives and provide activities where students can have enough practice to enhance and develop their skills and focus on the least mastered skills (Cubillas, 2018).

As many know, Mathematics is a complex subject that needs analysis and critical thinking. To fully understand the subject, conceptualized education is required. Acelajado (2006), Mathematics instruction underscores sense. It establishes the connection between the learners' understanding and perception of mathematics theoretical and concrete structures. Most young learners who are not good at math view mathematics as a subject to be tolerated rather than appreciated because of its complex nature. Thus, a learning module is a good material that provides many drills and exercises parallel to a particular topic or competency that is helpful to students in understanding the lesson well. Furthermore, (Prastowo, 2012) describes and explains the different functions of the module. The first is self-contained educational material. Using modules in the learning process enables students to develop their ability to learn independently of educators. The second function is to take the place of educators. Modules as teaching materials must clearly explain learning information in a way that students of varying knowledge and age may comprehend. Simultaneously, the educator is associated with the explanatory function of anything. Consequently, the utilization

Development and Validation of Self-Learning Packets in Linear Equation and Inequalities in Mathematics 8

of modules is capable of performing the duties of educational substitutes. Finally, the module can be used as an assessment instrument.

By using the modules as a reference for other students, students must be able to assess and measure their understanding of the subject matter they have learned. Students must read the numerous materials in each module.

Nepomuceno (2015) described modules as having the following characteristics: they focus on distinct, identifiable abilities or sets of skills or outputs other than skills. It is relatively brief in ensuring that students use their study time efficiently. Although it might promote group activities, it essentially involves self-teaching. It entails reading, reflecting, and applying theory to practice. A list of extra tasks or resources related to the improved skill is provided. It offers advice to students on how to create their own assignments, activities, and evaluation standards. It is reality-based in that it immerses students in authentic settings and uses simulation methods where that is not possible. It offers suggestions for enhancement and redesign. He provided the following justifications for the importance of modules in education using these features. The first is to help students learn on their own, to make specific minimum standards are met, to offer remedial units, to provide primary education, to update Content, to improve teacher skills, to combine theory and practice, to take into account differences in how people learn, to accommodate different groups in a single course, to review essential points in a class, to help people get certified in their fields, to offer resources for distance education, and to encourage mastery.

Furthermore, he described a module as a tool that enables the organization of various experience sequences to represent the particular interests of the educator or the students. The instructor can concentrate on the student's inadequacies in the subject matter that need to be addressed thanks to self-instructional units, which minimize the need for the instructor to go over topics that the student is already familiar with. It enables the assessment of students' academic progress. It minimizes the repetitive nature of instruction learning. The teacher is allowed to communicate with the student on a personal level. Due to the self-contained structure of self-instructional units, it was possible to update study materials without considerable adjustments. It is a model for instructors who want to create their own materials and incorporate their personalities.

Development of Module

Modules are the most widely accepted learning materials, so it is vital to prepare them intelligently. It impacts learning since using this material has already been spread globally, and many researchers have proved that it affects students' learning process worldwide, especially in the subject of Mathematics.

The K to 12 curricula shall be learner-centered, and the production and development of locally produced teaching materials shall be encouraged. Teachers must consider their ability to construct materials such as modules to facilitate students' learning.

Salandanan (2009) stated that self-instructional materials are described as self-contained. The manner of presentation is such that the learning activities can be undertaken individually or in small groups. These materials are most effectively used in individualized instruction programs. Various strategies have been developed to foster self-directed learning. For instance, Smedley (2007) offered a set of strategies that may assist self-directed learning readiness: creating a supportive learning environment; providing constructive feedback; encouraging self-assessment; using self-reflection; providing opportunities to engage in their learning processes; and developing goal orientation values. These strategies may be helpful for teacher educators considering taking a step towards fostering students' self-directed learning and helping students survive and thrive in this information age.

In addition to these strategies mentioned above, an approach to self-directed learning requires using instructional materials designed to help the students learn independently. These self-instructional materials, which could be in module form, consisted of a self-contained, independent unit of instruction prepared for attaining defined instructional objectives (Macarandang, 2009). Two distinctive features of self-instructional modules are that they promote self-paced learning and their availability at any time and place. As a self-paced learning material, it allows a learner to work at his/her own pace rather than the group's, which can be too fast or slow. The availability of self-instructional material likewise allows students to learn when they wish rather than according to an external timetable. The researcher looks for related studies that support his present investigation to enrich the analysis further. Gagarin (2003) discovered that her produced physics modules were a successful instrument for teaching physics to Samson College of Science and Technology students. The validity and acceptability of the modules were decided to have been established by the Science teachers and college sophomores who worked in her school. In addition, her research findings demonstrated that she created physics modules that improved the educational opportunities available to students. As a result, she suggests using her modules as a model for generating instructional resources in other areas of science across the various grade levels and advocating for their implementation in classroom education. So for this reason, the developed modules were accepted and proven to be effective.

In the Study of Alberto, which is cited by Hena (1997), developed self-instructional modules based on the needs and interests of fourth-year BSE/BSEEd students, the effectiveness of which she tested is experimental research. The excellent

Development and Validation of Self-Learning Packets in Linear Equation and Inequalities in Mathematics 8

performance of the experimental group demonstrated that the modules were helpful aids for facilitating learning. The same result was found by Receno (2001); in his study, He created and tested teaching materials to help first-year students at St. Michael College of Laguna improve their listening abilities. One of the things she discovered is that for first-year students to pay attention and value listening, they need to be provided with instructional tools that help them identify and use their internal linguistic resources.

However, Aggabao (2002) conducted a study to produce personalized self-instructional modules on selected themes in basic mathematics for use in the Teachers' College at the University of Isabela. The experimental method found that the college's materials for teaching Basic Mathematics must be revised and made for self-teaching. It was also found that teaching with self-instructional materials is just as effective as the current way of teaching and that both students and teachers like the idea of using individualized, self-instructional materials to teach Basic Mathematics. Moreover, Torre Franca (2017) concluded in her study on developing Self-Instructional Modules that the constructed educational modules on Rational Expressions and Variations within the field of Algebra are acceptable based on separate examinations by expert jurors and student users. The training modules are also consistent between these two groups of evaluators when statistical comparisons of ratings are made, which her study was supported by Isola (2010) and Abdu-Raheem (2014).

Despite the results of the different studies and solutions to distance education, challenges and issues concerning the effectiveness and coherence of the appropriate development approach still need to be supported. There still needs to be solid evidence that those developed modules are relevant to the different kinds of learners (Pacheco, 2022).

The accelerating literature suggests the baseline of learning modules to address distant learning and measures its effectiveness in attaining desired learning outcomes. However, some literature gaps were noticed as to the limitations of each study. Most of the standard learning modules developed a focus on contextualizing the objectives, lesson content, and assessment forms and are proven effective in grasping the lesson. However, this study would like to achieve the validity and effectiveness of the self-learning module to address the least mastered skills in Math 8, specifically in linear equation and linear inequalities.

The researcher has pursued this study because he believes that students can learn meaningfully with less supervision from teachers. He also believes that this will be of great help in improving mathematics instruction. This study aims to develop a self-learning module and validate its effectiveness in assessing student learning, performance, and achievement during this new standard setup of education.

The topic chosen by the researcher is based on the Most Essential Learning Competency (MELC) in Grade 8 Mathematics. There will be two SLPs with different competencies. SLP1 will focus on Linear equations in two variables. SLP 2 will focus on Linear Inequalities in two variables. The researcher chose those topics because it would help the learners if modules were contextualized and easy to understand for this topic are always part of the list of least mastered skills in mathematics 8.

However, in the recent event, in the new typical Education amidst Covid-19 for Junior High School, there has yet to be an online study on creating and validating Self-learning modules for teaching mathematics. Therefore, it is compelling to develop and validate self-learning modules in teaching Mathematics 8 that would benefit the learner in Junior High School.

Although, as of this school year, All schools are implementing full in-person classes, there is still a need to use self-learning packets to recover those learning losses during the pandemic. Using those developed learning packets helps and teaches students to manage their time and maximize their learning in other skills which are essential in every aspect of life.

Hence, students need to learn and master the competencies in the early grade, particularly in Math, for one skill may be a prerequisite to another. Thus, Math teachers should be equipped with more than just teaching strategies and techniques. However, they should also be innovative and armed with appropriate instructional materials such as Contextualized Learning Materials based on the learners' needs, which was highlighted in this study.

1.2 Theoretical Conceptual Framework

The researcher used the ADDIE (Analysis, Design, Development, Implement, and Evaluate) model to develop the Self-Learning Packets on Linear Equations and Linear Inequalities in Mathematics 8.

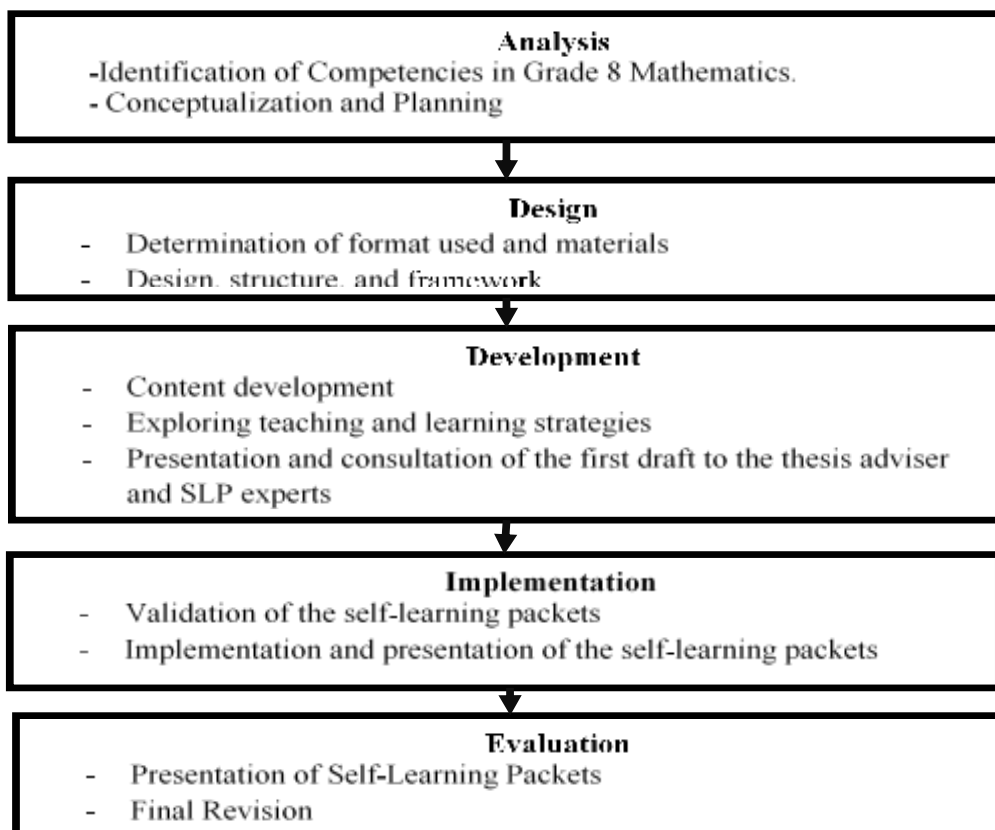


Figure 1. Conceptual Framework of the Study

As shown in Figure 1, the diagram illustrates the study's direction. Developing a learning packet in grade 8 Mathematics anchors the ADDIE (Analysis, Design, Development Implementation, and Evaluation) paradigm by Seels and Glasgow. Because it provides a dynamic and adaptable guideline for practically applicable training and performance support tools, the model is an excellent choice for this particular research project. It is supported by instructional theories such as behaviorism, constructivism, social learning, and cognitivism (Cullata, 2021), wherein the current education system adheres to.

The analysis phase includes the conceptualization, planning, and identifying topics and competencies in Grade 8 Mathematics for the two (2) self-learning packets. The Most Essential Learning Competencies (MELCs) from DepEd were used to select the competencies in the first quarter. The analysis result was self-evaluated and continued evaluation with experts for improvement.

The design phase focuses on the material's design, structure, and framework. It determines the format used in the self-learning packets, choosing relevant materials, learning strategy, assessment form, and evaluation.

The development phase includes the content development of the self-learning packets, enumerating the processes or set of procedures in the SLP development. Self-learning packets, presentation, consultation of the first draft to the thesis adviser and SLP experts, and initial validation of the SLP happened in this phase. This phase also covers the formative and summative evaluation that reflects students' academic achievement.

The implementation phase comprises the application of the development results in the learning process to know the effectiveness, attractiveness, and efficiency of the self-learning packets. The evaluation phase is the presentation and final revision of SLPs.

Branson (1975) stated that the ADDIE Instructional Design model was first created in the 1970s by the Center for Educational Technology at Florida State University and initially established by the United States armed forces as part of a military training initiative through the efforts of educational technology experts in scrutinizing practices and activities in the teaching-learning process in education and training programs. Instructional designers generally use this model for teaching (Morrison, 2010).

The development of this self-learning packet is aligned with the Theory of Constructivism advocated by Jean Piaget. According to this theory, learners construct knowledge out of their experiences. It further established that the learners' advancement in learning concepts progresses through three levels of knowledge expertise: pictorial and abstract. Constructivism is an approach to teaching and learning based on the premise that the learners' cognition results from "mental construction." In other words, the learners tend to gain more knowledge by grasping and applying new information and methods to what they already know (Bada, 2015). It focuses on learners reflecting on their experience doing something to gain conceptual insight and practical expertise.

Development and Validation of Self-Learning Packets in Linear Equation and Inequalities in Mathematics 8

Students would perform or do a hands-on, minds-on experience with little or no help from the instructor as they are engaged in making products or models, role-playing, giving a presentation, problem-solving, and playing a game.

The Experiential Learning Theory supports this research. Experiential Learning Theory (ELT) by David Kolb states that learning necessitates polar opposite abilities; thus, conflict arises and forces learners to choose which skills to employ to overcome the dispute in a given learning situation. Although the ELT acknowledges that learners may have learning preferences, it emphasizes the importance of a well-rounded learning experience (Asip, 2019).

This self-learning packet (SLP) focused on the topics in Mathematics 8 found in Most Essential Learning Competencies. The SLP was validated using the two criteria: Content and Design and Layout.

1.3 Statement of the Problem

This study determines the extent of development and validation of the Self-Learning Packets in Mathematics 8 in one of the schools in Payao, Zamboanga Sibugay this school year 2022-2023.

Specifically, it aims to answer the following questions:

1. To what extent is the validity of the Self-Learning Packet in terms of its Content based on the following compliance factors:
 - 1.1. Intellectual Property Rights;
 - 1.2. Learning Competencies;
 - 1.3. Instructional Design and Organization;
 - 1.4. Instructional Quality;
 - 1.5. Assessment; and
 - 1.6. Readability?
2. To what extent is the validity of the Self-Learning Packet in terms of its layout and design based on the following compliance factors:
 - 2.1. Physical Attributes;
 - 2.2. Design Layout;
 - 2.3. Typographical Organization; and
 - 2.4. Visuals?
3. What changes or improvements can be made to make the Self-Learning Packets more helpful to learners based on the following parts/phases:
 - 3.1. Cover Page;
 - 3.2. Pretest;
 - 3.3. Mini-Lesson;
 - 3.4. Exercise;
 - 3.5. Posttest;
 - 3.6. Add-on; and
 - 3.6. Answer key?
4. What are the general comments, suggestions, and recommendations made by the content experts on the developed Self-Learning Packets?
5. What is the level of students' achievement using the SLP as revealed in the pretest and posttest?
6. Do students' mathematics achievement improve from pretest to posttest?

1.4 Significance of the Study

This study is designed to develop and validate Self-Learning Packets in Mathematics, specifically linear equations, and inequalities. The result of this study will significantly contribute to the following:

Learners. The learners serve as the ultimate beneficiaries of the results and findings of this study, for the self-learning packets will serve as a supplementary intervention to them.

Teachers. This study shall provide the teachers teaching Mathematics subjects with the importance and status of the development and validation of learning packets in mathematics to address the learning and performance of students in mathematics subjects. Thus, teachers will be motivated and interested in developing and creating more contextualized Learning packets for their Learners.

Parents. Parents' involvement in learners' education plays a significant role. This Self-learning packets will help family bonding and boost the learners' interest.

Development and Validation of Self-Learning Packets in Linear Equation and Inequalities in Mathematics 8

School Administrator. The results of this study shall provide information on the extent of the development of Self-Learning Packets in Mathematics. Having the data on this matter will guide the school administrator in determining the areas that need to be enhanced and maintained progressively in addressing students' learning status in mathematics.

Other Researchers. This study shall serve as a reference for future research relevant to the topic.

1.5 Operational Definition of Terms

The following terms are used extensively in this study and shall be taken according to the definition given hereunder:

Self-Learning Packets. It refers to the learning materials developed and constructed by teachers in mathematics to be utilized by students.

Development. In this study, this refers to the level of how teachers in Mathematics develop the Self-Learning Packets in Mathematics 8.

Validation. It refers to evaluating the created self-learning module within the specific criteria.

ADDIE Model. It is an instructional system design framework that many instructional designers and training developers use to develop courses. The name is an acronym for the five phases it defines for building training and performance support tools: Analysis, Design Development Implementation Evaluation Most current ISD models are variations of the ADDIE process.

Content Expert. A content expert is someone who is an expert in a particular topic. They are mathematics teachers and instructional design experts who also serve as validators of SLPs.

2. RESEARCH METHOD

This chapter presented the research methodology of the study. It includes a discussion on the research design, research methods, sampling techniques, instrumentation, data gathering techniques, and statistical treatment used to analyze the data of the study on the development and validation of Self-Learning Packets in mathematics.

2.1 Research Design

This study employed a quantitative research design to develop Self-Learning Packets in Math 8. It used the ADDIE (Analysis, Design, Development, Evaluation, and Implementation) model -a quantitative research design. It served as a solid basis for creating a practical course or program.

ADDIE model was designed for educational research. It is used in the development and validation of educational products. It is also concerned with advancing product-oriented research and enhancing academic quality, as it is linked to the education evaluation program. Furthermore, it is not simply to evaluate educational theories but to create effective products for special school programs, such as teaching and learning materials and media (Gustiani, 2019).

2.2 Research Environment

The study was carried out in one of the schools in Payao District, Zamboanga Sibugay. It currently employs twenty-seven (27) personnel with twenty-one (21) teachers, Three (3) para-teachers, and three (3) non-teaching personnel, including the school head. Now, the school accommodates 563 learners for 2022-2023.

Despite the different interventions provided, the school faces a significant challenge of learners' low academic performance, particularly in Mathematics. Some of the learners are cutting classes, increasing the number of absentees, and many factors affect the learners' performance, especially in mathematics. thus, developing Self-learning packets would be a great help for it will serve as a supplementary materials to the learner to help address the issue.

2.3 Research Participants

The participants of this study are the five (5) content experts who validated the Content and the Layout Design of the Self Learning packet. They are purposively selected and are composed of public and private teachers or instructors and ten (10) Grade 8 learners to evaluate the pretest and posttest.

2.4 Sampling Technique

The researcher used the purposive sampling technique to select the five (5) expert validators involved in the validation of the Content of the SLPs and the ten (10) learner enrolled in one of the schools of Payao District Division of Zamboanga Sibugay for School Year 2022-2023.

2.5 Research Instrument

The instruments used to validate the developed self-learning packets (SLPs) were evaluation tools developed by DepEd Developed Learning Resources (DDLRL) prescribed by the Bureau of Learning Resources (BLR). The SLPs were validated by five (5) expert validators using tools to measure the quality of the Content and the Design and Layout.

Development and Validation of Self-Learning Packets in Linear Equation and Inequalities in Mathematics 8

The expert validators used the evaluation tool for Design and Layout. The tool checks the compliance factor of the following factors: (1) Physical Attributes, (2) Design and Layout, (3) Typographical Organization, and (4) Visuals. For the factor to be considered as being met, at least 75% of the criteria must be checked off, they will be the ones to validate the Content of the SLP using the evaluation tool for Content. The tool (Content) checks the compliance factor of the following factors: (1) Intellectual Property Rights Compliance, (2) Learning Competencies, (3) Instructional Design and Organization, (4) Instructional Quality, (5) Assessment, and (6) Readability. At least 75% of criterion items must be marked YES to indicate compliance with the factor.

To determine the level of students' mathematics achievement as revealed in the pretest and posttest results, the Mean Percentage Scores (MPS) and its descriptive equivalent was used. The scoring system was adapted from DepEd Memo No. 160, s. 2012.

2.6 Data Gathering Procedure

The data gathering procedures of the study involved the following activities, which were appropriately done to generate the necessary data; sending a letter to the Schools Division Superintendent to ask permission to conduct the study in its jurisdiction; securing approval from the school head of Balungisan National High School and asked for official permission to look for students purposively to validate the SLP.

The expert validators were informed on the concept of the SLP, as attached to the validation sheet. Aside from that, it is attached to the validation sheet for them to have a basis for rating and validating the Self Learning Packets (SLPs).

The study used the ADDIE (Analyze, Design, Develop, Implement, Evaluate) approach to develop the self-learning module. The ADDIE method applies a product development concept to the development of performance-based learning (Branch, 2009). The following discusses the details of each stage:

Self-Learning Packet Development Procedures

The development and validation of the Self-Learning Packets followed the Instructional paradigm known as ADDIE (which stands for Analysis, Design, Development, Implementation, and Evaluation). There are five phases to this model.

Phase 1. Analysis

This stage consists of analyzing, planning, and conceptualization of the Self Learning Packet (SLP) developed. Based on the ADDIE model development procedure, a needs analysis relative to the corresponding learners must be conducted. It also includes assessing the learners' knowledge, what they want to learn, and why they need to understand them. The researcher purposively chose Linear Equations and Linear Inequalities, for these are one of the least mastered skills topics in mathematics 8. Considering all the factors in developing the learning packet were established in this stage.

Phase 2. Design

The design and development of this learning packet are based on the Department of Education Alternative Delivery Mode (ADM), which refers to alternative modalities of education, including the formal educational system that allows schools to deliver quality education to varied learners and those at risk of dropping out to help them overcome personal, social, and economic constraints in their schooling (DEPED, Alternative Delivery Mode Learning Resource Standards, 2020). This also includes learners affected by class suspensions due to natural hazards that the Philippines are experiencing. In this phase, the researcher purposively conceptualized the design coming from the concept of Guided Integrated Yearning Activities (GIYA) of the Division of Zamboanga Sibugay. These involve different parts of the Learning packets: the Cover page, Pretest, Mini Lesson, Exercises, Posttest, Add-on, and answers key used in developing the SLP.

Phase 3. Development

The researcher started writing and crafting the self-learning packet. Based on ADM learning resources, the management and development process are (1) needs assessment; (2) design and development; (3) quality assurance; and (5) production and delivery. The steps are as follows:

(1) Needs assessment. A need to equip and enhance learners' skills in "illustrating and Graphing Equations" is the main reason these learning packets were developed. Purposively, the researcher sought to equip learners with the steps in illustrating and Graphing Linear equations and Inequalities in two variables since these two topics are one of the least mastered topics in mathematics 8.

Linear Equations and Linear Inequalities in two variables are one of the most essential competencies in mathematics 8. Studying this subject is important not only because it allows learners to be promoted to another higher grade level, but it also lets the students see the topic from a different perspective: as an essential part of society, or mainly to equip themselves with the proper knowledge to face real-life problems involving Linear Equation and Linear Inequalities in two variables. Engagement and interest in a shared learning aspect make a student's task less difficult (Al-Haddad, 2010). Thus, making the SLP exciting and engaging, and numerous activities are provided for learners learning development.

Development and Validation of Self-Learning Packets in Linear Equation and Inequalities in Mathematics 8

(2) Design and development. The processes involved in the development are defining standards, guidelines, and conventions in creating learning resources. Objectives and competencies were based on Junior High School Most Essential Learning Competencies (MELCs). The design and the developmental process were based on the need to equip and enhance learners' skills in Linear Equations and Linear Inequalities in two variables.

The self-learning packet is designed to get the learner's interest and engage in the packet and provide them with the right learning outcome even when the teacher is not around to teach them physically.

The researcher purposively selected the Content of the learning packet (The backbone of the Self-Learning Packets (SLPs)

Quarter	Competencies	Code	SLP No.
1	Illustrates a system of linear equations in two variables	M8AL-IE-3	1
2	Illustrates and graph linear inequalities in two variables	No Code	2

One of the most important factors for students' learning is appropriately crafted objectives and learning outcomes. These objectives and learning outcomes are indicators of the success of an academic program. The objectives and learning outcomes should be identified and presented to the students so that they have a clear vision of what they will be able to learn (Singh, 2017).

Having these considerations on maintaining students' interest and engagement, the researcher kept printing colorful pictures, icons, and cover pages to catch learners' interest. For students to have a conducive learning experience, learning packets were divided into two (2): SLP No.1: Illustrates system of linear equation in two variables, and SLP No.2: Illustrates and graphs linear inequalities in two variables.

The learning packet has the following parts:

1. Cover page displays the title of the material, the grade level, learning competency, and cover art.
2. About the learning Packet contains a little explanation of what this self-learning packet is all about and defines the purpose of creating this packet.
3. Pretest is to determine the prior knowledge that the learners have before the lesson.
4. Mini Lesson walks learners through discussion and sample illustrations that they need to hit the objectives.
5. Exercises guide learners in practicing what they have learned and allow them to practice and apply what they learn.
6. Posttests evaluate the learner's level of mastery in achieving the goals.
7. Add-on engages learners in more activities for additional understanding.
8. Answer Key contains all the answers to the different activities of the self-learning packet.
9. The references list all sources used in developing this self-learning packet.

(3) Quality assurance. It is a sub-process where the learning packets are evaluated by selected content validators or student validators outside the development team to ensure compliance with the standards and requirements. For quality assurance, the researcher followed the guidelines in evaluating DepEd Learning Resources (DDLRL) as prescribed by the Bureau of Learning Resources (BLR). It focuses on the following criteria.

1. Content
 - a) Intellectual Property Rights Compliance
 - b) Learning Competencies
 - c) Instructional Design and Organization
 - d) Instructional Quality
 - e) Assessment
 - f) Readability
2. Design and Layout
 - a) Physical Attributes
 - b) Design and Layout
 - c) Typographical Organization
 - d) Visuals

Phase 4. Implementation

This phase emphasizes the implementation phase of the ADDIE model. However, in this study, the implementation phase focused on the presentation and consultation of the SLP with the thesis adviser, some colleagues, and SLP Validators. At first, the SLP

Development and Validation of Self-Learning Packets in Linear Equation and Inequalities in Mathematics 8

underwent informal validation by colleagues to conduct pre-validation. Afterward, it was presented to the thesis adviser for some corrections. Then, it was subjected to the expert and student validators to determine the strengths and weaknesses of the developed SLP. Comments and suggestions were considered for improvements and the development of the final SLP.

Phase 5. Evaluation. This is the stage where the learning packet is validated. The developed self-learning packets were sent to the validators, accompanied by a letter of invitation for his time and expertise. The validation of the SLP is divided into two criteria, Content and design, and layout. Two (2) tools were used. Five (5) experts validated the study, and ten (10) students were randomly selected to be part of the evaluation process. The content was validated with the following factors (a) Intellectual Property Rights Compliance, (b) Learning Competencies, (c) Instructional Design and Organization, (d) Instructional Quality, (e) Assessment, and (f) Readability. For Design and Layout, the factors were (a) Physical Attributes; (b) Design and Layout; (c) Typographical Organization; and (d) Visuals. Students and expert validators' verbal suggestions and comments were taken into consideration for the revision of the learning packet. Then all of these suggestions will be incorporated into the newly developed SLP.

Part of the validation was the comments and suggestions as qualitative findings on the different parts of the SLP. With regard to the validation, participants were fully informed of the nature of this developmental research (Richey & Klein, 2005).

The researcher interpreted the expert's responses based on the mean percentage score of each present indicator on each factor and whether or not the developed learning materials complied with it. Individual tables were used to present the responses for each Self-Learning Packet.

2.7 Data Analysis

The data obtained from the validation and evaluation of the self-learning packet from the teacher experts and student-users were treated statistically using numerical and descriptive statistics like frequency count and weighted mean to measure central tendencies using MS Excel and SPSS (Creswell, 2012, p. 183). The Mean Percentage Score (MPS) and the percentage increase based on DepEd Memo No. 160, s. 2012 is used to determine the student's level of achievement. Textual interpretation was also used to report the supporting qualitative data.

2.8 Ethical Consideration

The researcher must ensure that the conduct of this study must not cause any mischief or disruption to the research participants upon participating. The researcher will observe the ethical management practices below and conduct research that attains the scientific standards in education to ensure that the study will be carried out as thoroughly and ethically as possible.

The following considerations are given importance before the conduct of the study:

Consent/Permission. The approval of the principal or teacher-in-charge and parent or guardian. The researchers will ask permission from the principal or TIC and PSDS to conduct the study.

Informed consent. It provides research participants with sufficient information about the study. The researchers handed personally to the research participants to read and sign informed consent.

Voluntary participation. The voluntary participation of the research participants is highly appreciated. Participants can continue or withdraw from the study, and those who choose to cancel will not be subjected to any pressure.

Confidentiality. It is keeping the information about the research participants for safety purposes. The researchers will assure the participants that their identity and personal data will be kept confidential outside the researcher.

Do no harm. It is an obligation not to inflict any damage on the research participants. The researchers will interact face-to-face with the research participant provided that COVID-19 safety protocols are followed.

3. RESULTS AND DISCUSSION

This chapter contains the findings and discussion, which include the presentation, analysis, and interpretation of the validation, evaluation ratings, and feedback of the developed learning packets.

3.1 Content Validation of the SLP by the Experts

The findings of the expert validators' assessment of the Self-Learning Packets' Content are shown in Table 1. As demonstrated in Table 1, it is evident that both SLPs received a very satisfactory factor compliance to all factors, Factors I: Intellectual property rights compliance, II: Learning Competencies, III: Instructional Design and Organization, IV: Instructional Quality, V: Assessment, and VI: Readability. Both SLPs are descriptively remarked compliant to all factors under Content as validated by the experts.

Table 1. Expert Validators' Evaluation of the SLPs in Terms of Content.

FACTORS	SLP No. 1		SLP No. 2	
	Factor Compliance %	RMK	Factor Compliance %	RMK
Factor I: Intellectual property rights compliance	95.00%	C	95.00%	C
Factor II: Learning Competencies	100.00%	C	100.00%	C
Factor III: Instructional Design and Organization	98.18.00%	C	100.00%	C
Factor IV: Instructional Quality	93.33%	C	98.18%	C
Factor V: Assessment	90.00%	C	93.33%	C
Factor VI: Readability	100.00%	C	100.00%	C
Overall	96.09%	C	97.75%	C

Note: At least 75% of criterion items must be marked YES to indicate compliance with the factor.

According to Roman (2016), some of the characteristics of the Content of instructional material are that it should be aligned with the curriculum, it should have an adequate discussion of the lesson, and the ideas and concepts must be thoroughly discussed and well-expressed.

The remarkable factor compliance performance of the SLPs of all factors means as follows: In Factor I: Intellectual Property Rights Compliance, the SLPs have no copyright violations, and references, materials, texts, and visuals are correctly and accurately cited. In Factor II: Learning Competencies, the Content of the SLPs is consistent with the targeted DepEd learning competencies intended for the learning area and grade level. In Factor III: Instructional Design and Organization, the Content of the SLPs contributes to achieving the learning objectives, is suitable to the targeted learners, is organized and motivational with the use of guided activities, and develops higher-order thinking skills. In Factor IV: Instructional Quality, the SLPs have no factual and computational errors or social content violations, and the Content and information are up-to-date and accurate. Moreover, in Factor V: Assessment, the SLPs' assessments are varied and aligned with the objectives, and using the SLPs, teachers can evaluate learners' progress in mastering the competencies. However, it was found that there were some typographical and grammatical errors found in the SLPs. Some of the pictures needed to be correctly cited at the bottom part of it; even though it is included in the reference part, there is still a need to put the source of the picture. In Factor VI: Readability, the SLPs' vocabulary, and sentences are based on the learners' experience and understanding and are clear to the targeted learners.

Table 2. Summary of Expert Validators Validation of SLPs in Terms of Content.

SLP No.	Competencies	Content Validators	Remarks
1	Illustrates Linear Equation in two variables	96.09%	Complied
2	Illustrates and Graphs Linear inequalities in two variables	97.75%	Complied
Overall Compliance Performance		96.92%	Complied

In addition, experts suggested checking some minor grammatical errors and reducing the sizes of the graphs in some parts of the SLP. They were also reported to revise some of the questions in the pretest and posttest that did not fall under higher order thinking skills (HOTS) and confusing questions. It was also said always to observe the margin and the proper way to encode equations. They also reported that the SLPs must include a table of contents so the learner can quickly locate the undone activities. Also, they emphasize that the graph should be presented clearly to identify if it is a broken or solid line quickly. All of these comments and suggestions were adequately noted and will be incorporated into the development of the final learning packet. SLPs performed a commendable 96.72% factor compliance, which means that the learning packet complies with the requirements of all six factors based on DepEd ADM standards.

Table 3 presents the expert validators' evaluation of the layout and design of the Self-Learning Packets.

Table 3. Expert Validators' Evaluation of the SLPs in terms of Layout and Design

FACTORS	SLP No. 1		SLP No. 2	
	Factor Compliance %	RMK	Factor Compliance %	RMK
Factor I: Physical Attributes	90.90%	C	90.90%	C
Factor II: Design and Layout	96.66%	C	96.66%	C
Factor III: Typographical Organization	100.00%	C	100.00%	C
Factor IV: Visuals	95.38%	C	96.92%	C
Overall	95.76%	C	96.12.00%	C

Note: At least 75% of criterion items must be marked YES to indicate compliance with the factor.

As presented in Table 3, Factor III: Typographical Organization was completely compliant, surpassing other factors. Factor II: Design and Layout, Factor I: Physical Attributes, and IV: Visuals. Both SLPs are descriptively remarked compliant to all factors under Layout and Design as validated by the experts. Overall factor compliance of the SLPs is commendable.

The expert validators were impressed by the research packet's presentation and arrangement and praised the researcher's initiative in developing the SLPs. The design and layout stimulate the reader's interest and engagement in SLP as supplemented learning.

According to Sauer (2012), students' interest has a positive effect when they do performance tasks. Not only are their scores high, but their behaviors reflect engagement. When they are interested, they comprehend more, write better, demonstrate, and show a more focused work ethic

Table 4. Summary of Expert Validators Validation of SLPs in Terms of Design and Layout.

SLP No.	Competencies	Layout and Design Validators	Remarks
1	Illustrates linear equation in two variables	95.76%	Complied
2	Illustrates and graphs linear inequalities in two variables	96.12%	Complied
Overall Compliance Performance		95.93%	Complied

The performance of the evaluated SLP's overall design and layout was commendable to the expert validators. According to the table, factor compliance for both SLP scores is almost the same. They also like the use of attractive colors and creativity in graphics. Overall, table 4 shows that SLPs performed a commendable 95.93% factor compliance, which means that the learning packet complies with all four factors based on DepEd ADM standards.

Moreover, experts considered the self-learning packet to meet the minimum requirements in all four design and layout criteria factors. The researcher must implement the experts' validators' revisions, suggestions, and recommendations to improve the developed SLPs.

For the revisions and enhancements that can be made to make the self-learning packets more helpful to learners based on the following parts/phases are represented in Table 5.

Development and Validation of Self-Learning Packets in Linear Equation and Inequalities in Mathematics 8

Table 5. Revisions and Enhancements to Make the Self-Learning Packets More Helpful to Learners Based on the Following Parts.

	Comments/Suggestions/Recommendations	Action taken
Cover Page	1. Make a little revision of the cover page of SLP 1 or use an appealing image instead of a graph topic.	Edited the cover page and follow the suggestion of the evaluator.
	2. Indicate quarter no. and week	They were checked and edited.
	3. Check the typographical errors.	
Introduction	4. Check the minor grammatical errors.	Grammar and wording had been edited as per the evaluator's correction.
Pretest	5. Apply Bloom's Taxonomy in constructing test Questions.	It was checked and revised and edited the applicable item numbers.
	6. Consistency in the arrangement of options	Edited the applicable numbers
	7. Observe Margin	Adjusted the margin from .5 to 1 inch
Mini Lesson	8. Reduce the size of the graph and not proportionally drawn	Adjusted the size of the graphs
	9. Check the typographical errors.	They were checked and edited.
	10. Check for grammatical errors.	Checked the Content of the SLP.
Posttest	11. Apply Bloom's Taxonomy in constructing test Questions.	It was checked and revised and edited the applicable item numbers.
	12. Consistency in the arrangement of options	Edited the applicable numbers
	13. Check for grammatical errors.	Checked the Content of the SLP.
Answer Key	14. Put it on a separate page	Transferred to a separate page
	15. It should be in reverse order.	Edited and in reverse order
Add-on	16. Cite the source	Cited the source in the reference

In the general comments, suggestions, and recommendations on the developed self-learning packets, the content experts' validators recommend changing the cover page of SLP 1; They also suggest being mindful of grammatical and typographical errors. They also suggested that the learning packet must separate the development team and references on another page. There should be a table of contents so that the learners are aware of the Content. Rest assured that the researcher considered and implemented all these comments, suggestions, and recommendations in the SLPs. Overall, they appreciated the developed self-learning packet for the informative lesson presented and the lesson's chronological order.

The results of the students' SLP achievement, as shown by the pretest and posttest, were presented in Table 6.

Table 6. Pretest and Posttest of the Students after the Validation of the Experts

SLP No.	Competencies	Test Conducted	Mean Score	MPS	Descriptive Equivalent
1	Illustrates linear equation of two variables	Pretest	5.10	51.00%	Average Moving Towards Mastery
		Posttest	7.30	73.00%	
2	Illustrates and graphs linear inequalities in two variables	Pretest	4.60	46.00%	Average Moving Towards Masters
		Posttest	7.20	72.00%	

After the experts validated the developed self-learning packets, the student's achievement level moved toward Mastery in SLP 1 (Linear Equation) and SLP 2 (Linear Inequalities), as shown in Table 6. The mean percentage scores of the pretest in both SLPs fall

Development and Validation of Self-Learning Packets in Linear Equation and Inequalities in Mathematics 8

under the Average on the Descriptive Equivalence. On the other hand, the Mean Percentage Scores of the Posttest in both SLPs fall on Moving towards mastery based on its descriptive equivalence. Table 6 shows that validated SLPs are acceptable to the students based on the DepEd Memo No.160, s.2012.

According to Dahar (2012), instructional material is a learning tool that allows students to learn faster and better. He described that using appropriate instructional materials significantly affects secondary students' academic performance. He also stressed the importance of quality textbooks and other educational resources in fostering academic success for learners.

Table 7. Paired-Sample T-Test to test the significant differences in student's Mathematics achievement from pretest to posttest.

SLP No.	Test Conducted	Mean	N	SD	t-value	df	P-value	Remarks
1	Pretest	5.10	10	1.370	-5.659	9	.000	With significant Difference
	Posttest	7.30	10	1.059				
2	Pretest	4.60	10	1.776	-4.088			
	Posttest	7.20	10	1.135				

Paired t-test was conducted to check if there were significant changes of the student's mathematics achievement from pretest to posttest. As shown in the table 7, there were a significant difference in the scores in pretest and posttest. The mean of pretest and posttest of SLP 1 were 5.10 and 7.30 with mean difference of 2.2 and the mean of pretest and posttest of SLP 2 were 4.60 and 7.20 with mean difference of 2.6, and p-value is lower than 0.05 for both SLPs. This means that there was statistically significant rise in students' scores for both SLPs from Pretest to Posttest This result implies that the developed SLPs helps improved students' performance in mathematics. These results warrant the claim that the developed Self-learning Packets could improve the students' mathematics achievements.

4. SUMMARY OF FINDING, CONCLUSION, AND RECOMMENDATION

This chapter presents the summary of findings on the development and validation of the Self Learning Packet in Linear Equation and Linear Inequalities in Mathematics 8. The researcher created a conclusion based on the result findings and a recommendation based on the outcome of the research study.

4.1 Summary of Findings

The results of data analysis and interpretation are summarized in the following findings:

1. To what extent do experts validate the Self-Learning Packet in terms of its Content based on the following compliance factors: Intellectual Property Rights; Compliance; Learning Competencies; Instructional Design and Organization; Instructional Quality; Assessment; and Readability?

The experts validated the Self Learning Packet contents using the evaluation tool adopted in ADM Standards by the Department of Education. There are six factors under Content, and under these factors are standards or criterion items that validators need to verify if the SLPs are found compliant with them. SLP 1 (Linear Equation) garnered 96.09% factor compliance, and SLP No. 2 (Linear Inequalities) garnered 97.75% factor compliance. It was evident in the results that the SLPs were found compliant based on the set criteria at 75% by ADM Standards. The overall compliance performance of the SLPs in terms of Content is 96.92%. It means that the Content of the SLPs developed is generally acceptable as perceived by the validators.

2. To what extent do teachers validate the Self-Learning Packet in terms of its layout and design based on the following compliance factors: Physical Attributes; Design and Layout; Typographical Organization; and Visuals?

The experts validated the Self Learning Packet's Layout and Design using the tool adopted in ADM Standards by the Department of Education. There are four factors under layout and design. Under these factors are standards or criterion items that validators must verify if the SLPs comply with. SLP 1 (Linear Equation) garnered a 95.74% complaint factor, and SLP 2 (Linear Inequalities) garnered a 96.12% factor compliance. Both SLPs are descriptively remarked compliant to all factors under Layout and Design as validated by the experts. Overall factor compliance of the SLPs is 95.93%. The result implies that all aspects of the Layout and Design of SLPs are highly valid, suitable, and acceptable as rated by the expert validators.

3. What revisions and enhancements can make the Self-learning Packets more helpful to learners based on the following parts/phases: Cover Page; Pretest; Mini Lesson; Exercise; Posttest, and Answers key?

In evaluating the Self-Learning Packets (SLPs), the expert validators were encouraged to give their comments, suggestions, and recommendations to improve the learning materials. The cover page differed from other learning materials and used attractive colors to attract users' interest. The quarter number and week number were included in the said SLPs. The overview had minor grammatical errors and was reviewed and edited by the researcher. Some questions in the pretest need to be revised, and applied Bloom's taxonomy in constructing the questions. In the Mini-Lesson part, some changes were made, especially in the first one,

Development and Validation of Self-Learning Packets in Linear Equation and Inequalities in Mathematics 8

and the typographical, grammatical, and margins were edited. He also made some minor revisions, such as consistency in font style and correct usage of formulas. The answer key has been edited with signs, operations, and spacing and made in an upside-down format.

Overall, the researcher applied the necessary revisions. Removed and edited typographical and grammatical errors in the Content of the body of the SLPs and made the graphs larger. All of these changes made the SLPs more helpful to learners.

4. What are the content experts' validators' overall comments/ suggestions/ recommendations on the developed self-learning packets?

Expert validators suggested checking, removing, and editing typographical and grammatical errors on some parts of the SLPs. They commended the researcher's eagerness to develop the learning packet, which is self-learning. It was also commended for its simplicity and attractiveness. They also recommended that it be administered to the students after the validation process. It was also mentioned that this learning material would help students stay interested and engaged throughout the journey in answering the material. Those suggestions and recommendations were considered and applied to the learning packet.

5. What is the level of students' achievement of the SLP, as revealed in the pretest and posttest?

Based on the DepEd Memo No. 160, s. 2012, the student's achievement level is moving toward mastery in SLP 1 (Linear Equation) and SLP 2 (Linear Inequalities). The mean percentage score of the pretest in SLP 1 garnered 50.23%, and the (MPS) mean percentage score of the posttest was 72.16%, with a percentage increase of 21.93%. For the SLP2, the pretest obtained 45.38%, while the posttest gained 70.12%, with an increase of 24.74%.

Overall, the MPS results of both SLPs showed that the developed self-learning packet is quite effective for the students.

4.2 Conclusion

Based on the study's findings, the developed Self-Learning Packets (SLPs) in Linear Equations and Linear Inequalities in Mathematics 8 complied with the validation criteria based on the expert validators' evaluation. The expert validators agreed to all the factors pertaining to the aspects for validation and evaluation. This implies that the self-learning packet satisfies the pertaining aspects, essential parts, and features of supplementary learning material. For them, the SLP was deemed content-wise. Its structure and design encourage independent learning, promote interest and engagement, and align with the Most Essential Learning Competency (MELC) required in the Grade 8 Curriculum.

4.3 Recommendations

The following suggestions are made in light of the results and findings of the study:

1. A pretest-posttest quasi-experimental research with a larger population should be evaluated to determine the efficacy of the self-learning packet (SLP) in improving student conceptual understanding in Linear Equation and Inequalities.
2. Mathematics teachers in the Grade 8 curriculum may consider validating and using the developed learning packets with their students to assess further its validity and effectiveness in the present learning modality.
3. Development and validation of self-learning packets should be shared in School Learning Action Cell sessions by the school leaders and encouraged teachers to develop a Self-Learning Packet in other areas of Mathematics.
4. The mathematics teachers shall be provided with more professional training and workshops on the principles of learning material development.
5. School administrators should take steps to construct and validate learning packets in the education system, particularly in the different areas of mathematics.
6. The developed Self-Learning Packets should undergo Educational Soundness General Evaluation for the appropriateness of content and the quality of learning resources produced.

REFERENCES

- 1) Abdu-Raheem, B. O. (2014). Improvisation of instructional materials for teaching and learning in secondary schools as predictor of high academic standard. *Nigerian Journal of Social Studies*, 17(1), 131–143.
- 2) Acelajado, M. J. (2006). *The modular teaching approach in college algebra: An alternative to improving the learner's achievement, persistence, and confidence in mathematics*. Philippines: De La Salle University.
- 3) Aggabao, A. H. (2002). Development and Evaluation of Individualized Self-Instructional Modules on Selected Topics in Basic Mathematics. (*Journal of Research, Isabela State University*, Vol. XI, No. 1.
- 4) Al-Haddad, S. (2010, December 23). An Investigation of 12-16-year-old Pupils' Understanding of Statistics and Probability in the Kingdom of Bahrain. *Procedia Social and Behavioral Sciences*, 8, 121–128.
doi:<https://doi.org/10.1016/j.sbspro.2010.12.017>

Development and Validation of Self-Learning Packets in Linear Equation and Inequalities in Mathematics 8

- 5) Ames, H., Glenton, C., & Lewin, S. (2019, January 1). Purposive sampling in a qualitative evidence synthesis: A worked example from a synthesis on parental perceptions of vaccination communication. *BMC Medical Research Methodology*, p. 19. doi:10.1186/s12874-019-0665-4
- 6) Asip, B. W. Experiential Learning Based Online Learning Development in the Jakarta Religion Affair Training Center. Apr. 2019, pp. 1–8, <http://bitly.ws/dzkm>. Accessed 21 May 2021.
- 7) Bada, S. (2015). Constructivism Learning Theory: A Paradigm for Teaching and Learning. *IOSR Journal of Research & Method in Education (IOSR-JRME)*, 5(6), 66–70. Retrieved from <http://iosrjournals.org/iosr-jrme/papers/Vol-5%20Issue-6/Version-1/I05616670.pdf>
- 8) Branson, R. K., Rayner, G. T., Cox, J. L., Furman, J. P., King, F. J., Hannum, W. H. (1975). Interservice procedures for instructional systems development. (5 vols.) (TRADOC Pam 350-30 NAVEDTRA 106A). Ft. Monroe, VA: U.S. Army Training and Doctrine Command, August 1975. (NTIS No. ADA 019 486 through ADA 019 490).
- 9) Calderon, O., Ginsberg, A. P., & Ciabocchi, L. (2012). Multidimensional Assessment of Pilot Blended Learning Programs: Maximizing Program Effectiveness Based on Student and Faculty Feedback. *Journal of Asynchronous Learning Networks*, 16(4), 23-37.
- 10) Crossman, A. (2020). What You Need to Understand About Purposive Sampling. ThoughtCo. <https://www.thoughtco.com/purposive-sampling-3026727>
- 11) Cubillas, T. (2018). Development And Validation of Strategic Intervention Materials (Sims) In Teaching Elementary English 4-Content Validation <https://www.journalijdr.com/sites/default/files/issue-pdf/13138.pdf>
- 12) Cullata, R. A. (2020). From <https://www.instructionaldesign.org/models/addie/>
- 13) Dahar, M. (2011). Effect on the Availability and the Use of Strategic Intervention Material on Academic Performance of Students in Punuab (Pakistan), *Eurojournal Publishing Inc.*, 345–347.
- 14) Deped. (2020, May 8). Alternative Delivery Mode Learning Resource Standards. Department of Education.
- 15) Deped Memo No. 160 Series of 2012. Maximizing utilization of the National Achievement test results to raise the achievement levels and low performing school.
- 16) Dynan, L., Cate, T., & Rhee, K. (2008). The impact of learning structure on students' readiness for self-directed learning. *Journal of Education for Business*, 84, 96-101.
- 17) Gagarin, C. (2003). Module in Physics I: Development and evaluation (Master's thesis). Eulogio "Amang "Rodriguez Institute of Science and Technology, Manila.
- 18) Gloria G. Salandanan (2009), Teacher education. Quezon City, KATHA Publishing Co., Inc.
- 19) Guglielmino, L. M. (2008). Why self-directed learning? *International Journal of Self-Directed Learning*, 5(1), 1-14.
- 20) Hena, L. J (1997). "Developing Models for Teacher Education Students in Basic Math 1". Unpublished Doctoral Dissertation, University of Eastern Philippines, Catarman, Northern Samar. <http://doi.org/10.1177/1362168815572747>.
- 21) Isola, O. M. (2010). Effect of Standardized and Improvised Instructional Materials on Students' academic achievement in secondary school physics. (Unpublished Thesis). University of Ibadan, Ibadan.
- 22) Klein, J.D & Richey, R.C (2005). Developmental Research Methods: Creating Knowledge From Instructional Design and Development Practice. Arizona State University. *Journal of Computing in Higher Education* Spring. Vol.16(2), 23-28.
- 23) Loyens, S. (2008). Self-directed learning in problem-based learning and its relationships with self-regulated learning. *Educational Psychology Review*, p. 20, 411427.
- 24) Ma. Leah I. Abad (2006). Training needs and performance of engineering math teachers in the state colleges of region VIII: inputs to a proposed in-service training program, Unpublished MAIS Math Thesis, Leyte Institute of Technology, Tacloban City, Philippines.
- 25) Macarandang, M. (2009). Evaluation of a proposed set of modules in principles and methods of teaching. *E-International Scientific Research Journal International Scientific Research Journal International Scientific Research Journal*, 1(1).
- 26) Merriam, S., Caffarella, R., & Baumgartner, L. (2007). *Learning in adulthood: A comprehensive guide* (3rd ed.)
- 27) Morrison, G. R. (2010). *Designing effective instruction* (6th ed.). New York: John Wiley & Sons
- 28) Nepomuceno, F. (2015.) *Modular Approach to Instruction* (Handout)
- 29) P. Dumigsi, M., & B. Cabrella, J. B. (2019). Effectiveness of Strategic Intervention Material in Mathematics as Remediation for Grade 9 Students in Solving Problems Involving Quadratic Functions. *Asian Journal of Education and Social Studies*, 1–10. <https://doi.org/10.9734/ajess/2019/v5i130137>
- 30) Pacheco, C.J.(2022). Development and Validation of Self-Learning Packets in Grade 7 Science Using a Game-Based Approach. An Unpublished master's thesis. Saint Columban College.
- 31) Prastowo, A. (2012). *Creative Guide to Making Innovative Teaching Materials*. Yogyakarta: Diva Press.

Development and Validation of Self-Learning Packets in Linear Equation and Inequalities in Mathematics 8

- 32) Receno, C. N. (2001). "Development of Instructional Materials for the Enhancement of the Listening Skills among Freshman College Students of SMCL" Unpublished Thesis Philippine Normal University
- 33) Richey, R. C. (1993, November 30). ERIC - ED373753 - Developmental Research: The Definition and Scope., 1994. Google.Com. <https://eric.ed.gov/?id=ED373753>
- 34) Roman, A. D. (2016). Development and Validation of Statistics Module for Quality Educational Research. International Journal of Science and Research (IJSR), 5 (9). DOI: 10.21275/ART20161488
- 35) Sauer, K. (2012). The Impact of Student Interest and Instructor Effectiveness on Student Performance. Education Masters. Retrieved from https://fisherpub.sjfc.edu/cgi/viewcontent.cgi?article=1244&context=education_ETD_masters
- 36) Singh, M. (2017, March). Importance and Benefits of Learning Outcomes. IOSR Journal Of Humanities And Social Science (IOSR-JHSS), 22(3), 65–67. doi:10.9790/0837-2203056567
- 37) Smedley, A. (2007). The self-directed learning readiness of first-year bachelor of nursing students. Journal of Research in Nursing, 17(2), 373-385.
- 38) Shaikh, R. B. (2013). Comparison of readiness for self-directed learning in students experiencing two different curricula in one medical school. Gulf Medical Journal, 2, 27-31.
- 39) Torre Franca E.C. (2017). Development and Validation of Instructional Modules on Rational Expressions and Variations. The Northern Lights Vol. 11 no.1 (2017).
- 40) Tracy, B. (2014). TOP 25 CONTINUOUS LEARNING QUOTES (of 65). A-Z Quotes. <https://www.azquotes.com/quotes/topics/continuous-learning.html>.
- 41) Wikipedia contributors. (2020, November 27). ADDIE Model. Wikipedia. https://en.wikipedia.org/wiki/ADDIE_Model



There is an Open Access article, distributed under the term of the Creative Commons Attribution – Non Commercial 4.0 International (CC BY-NC 4.0) (<https://creativecommons.org/licenses/by-nc/4.0/>), which permits remixing, adapting and building upon the work for non-commercial use, provided the original work is properly cited.