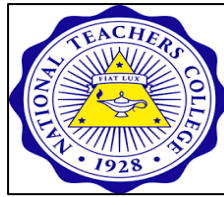


National Teachers College



Electronic- Strategic Intervention Materials (E- Sim) in Solving Basic Operations on Integers

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ABSTRACT

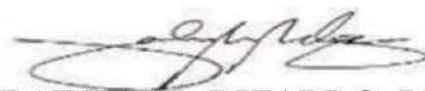
Learning a new lesson is sometimes difficult. A student must apply some knowledge and skills before learning a particular topic. Some students cannot learn the present topic due to low levels of particular knowledge and skills. To resolve this, the teacher should conduct an intervention. One way of intervention is to provide a Strategic Intervention Material (SIM) to students. Nowadays, there are innovations made in SIM like making it as electronic for the intervention to be more effective and interactive. However, students study alone most of the time when using the E-SIM. To resolve this, the researcher incorporated video lessons in E-SIM. In learning a particular topic in Mathematics, the E-SIM with video lessons can be injected and utilized. For uniqueness and applications, the researcher incorporated in E-SIM the important skills of the MATATAG curriculum. To be more novel and interactive, the researcher will integrate the Damath app into the E-SIM.

The researcher used the descriptive and developmental research design. The sampling techniques used by the researcher was purposive sampling. The selected grade 10 students as participants came from San Joaquin Kalawaan High School. The selected master teachers in Mathematics as other participants came from different junior high schools under the Schools' Division Office- Pasig City. A diagnostic test is used to identify the learning needs of students in solving basic operations in integers. The first survey form is utilized to identify the acceptable criteria to be considered in designing (planning) the E-SIM. The second survey form is utilized to evaluate the quality level of the developed E-SIM based on the expert review. After data gathering, the researcher analyzed and interpreted the results using the weighted mean as statistical tool.

Findings from the study revealed the following: (1) The mean of the total scores and basic operations scores of students in the diagnostic test are 13.68 and 10.38; (2) The mean acceptance ratings of each criterion in the first survey form falls under the interval 3.26 to 4; (3) The mean satisfaction rating of the overall quality of the developed E-SIM based on the second survey form result is 3.6486. These findings implied the following: (1) The level of skills of students in solving basic operations on integers is unsatisfactory; (2) According to experts, all criteria stated in the first survey form are very acceptable to be considered in designing the E-SIM in solving basic operations on integers; (3) The quality level of the developed E-SIM in solving basic operations on integers based on the experts' review is very satisfactory. This study concludes the following: (1) Most students in junior high school do not know how to solve basic operations on integers; (2) All criteria stated in the first survey form are very acceptable to be considered in designing the E-SIM in terms of development, implementation, and evaluation plan. (3) The developed E-SIM in solving basic operations on integers is ready for implementation. This present study thereby recommends the following: (1) Students should use the developed E-SIM in their study; (2) Teachers should implement the developed E-SIM during the intervention process; (3) School administrators should conduct a seminar or workshop for the teachers about developing an E-SIM; (4) Researchers should conduct further study about the development and implementation of an E-SIM as well its effectiveness.

APPROVAL SHEET**APPROVAL SHEET**

This thesis entitled, **“ELECTRONIC- STRATEGIC INTERVENTION MATERIALS (E- SIM) IN SOLVING BASIC OPERATIONS ON INTEGERS”**, prepared and submitted by **EUGENE M. BUGAYONG** in partial fulfilment of the requirements for the degree of **MASTER OF ARTS IN EDUCATION**, major in **MATHEMATICS**, has been examined and is recommended for acceptance and approval for **ORAL EXAMINATION**.

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CHAPTER ONE

THE PROBLEM AND ITS BACKGROUND

This section presents the ff: (1) the introduction and background of the study, (2) the review of related literature and studies, (3) the theoretical frameworks, (4) the conceptual frameworks, (5) the statement of the problem (SOP), (6) the significance of the study, (7) the scope and delimitation of the study, and (7) the definition of terms.

➤ *Introduction and Background of the Study*

Learning a new lesson is sometimes difficult. A student must apply some knowledge and skills before learning a particular topic. For example, the operations in whole numbers should be applied in learning the addition of similar fractions. Another example is determining the meaning of different words to understand the meaning of a sentence.

Some students cannot learn the present topic due to low levels of particular knowledge and skills. For example, some students cannot solve the value of a variable in a linear equation. One reason is the incapability of students to solve basic operations on integers. According to the study of Candido in 2023, the one of the topmost least mastered competencies in Math is to perform fundamental operations on integers. One of the stated reasons is the confusion of students with the applying of signs and PEMDAS. In solving the mathematical expression " $2 - 5$ ", some students will answer 3 instead of -3. Another example is solving the mathematical expression " $2(3) + 4$ ". There are some students who will solve first the " $3 + 4$ " instead of " $2(3)$ ". Moreover, according to one of the laws in Mathematics, the basic operations on integers are always involve when solving a linear equation. These are always used when applying the different properties of equality. Hence, learning it is a prerequisite indeed. Students who cannot learn these particular knowledge or skills tend to get a failing grade in a quarter.

To resolve this, the teacher should conduct an intervention. One intervention method is to provide students a Strategic Intervention Material (SIM). The students at home will study the SIM. Teachers are already provided with the discussion regarding the SIM for successful intervention. The Department of Education (DepEd) has already launched the DepEd memo 117 Series of 2005. It provides seminars and workshops for teachers to improve or enhance their skills in developing effective intervention materials for the learning of students.

Nowadays, there are innovations made in SIM for the intervention to be more effective. One of the innovations is the creation of Electronic Strategic Intervention Materials (E-SIM). Here, the SIM is in the form of a digital soft copy. It may be in the form of PPT, Canva, etc. Since it is in digital form, students tend to be more motivated in studying lessons. This is evident in the study of Cañeda and others in 2024. Here, they integrate audio visuals in the E- SIM to make it more interactive.

However, students study alone most of the time when using the E-SIM. After the teacher developed an E-SIM, it will be given to students. Then, they will study that SIM at home. Hence, students will not know the solutions of different answers to particular questions found in activity, assessment, or enrichment card. Moreover, they will not understand how and why those solutions are the correct way. Students will just verify their answers from the answer card if they are correct or not.

To resolve this, the researcher incorporated video lessons in the E-SIM. Here, the teacher is discussing the solutions from the examples relevant to the questions in the activity card. The teacher is the researcher itself. Students will watch each integrated video lesson before they proceed to the activity card. Hence, they will learn the solving process needed for answering the real questions. In creating the video lessons, the researcher recorded itself while discussing the solutions from the examples. These video lessons are in the form of MPEG file. The researcher converted the Power Point Presentation file to MPEG. The questions from each example are written in slides from the PPT Presentation. The recording voice button from the PPT was used by the researcher. The recorded audios were converted by the researcher to AI voice using a website to make the discussions more interactive.

For novelty and application, the researcher incorporated in E-SIM the important skills of the MATATAG curriculum in the video lessons and other parts of the E- SIM. These important skills are the following: (1) Language, (2) Reading and Literacy, (3) "Makabansa", and (4) Good Manners and Right Conduct (GMRC). The implementation has already started. However, it is only launched in some grade levels. Aside from solving basic operations on integers, the researcher also inserted exercises in the video lessons about the following: (1) subject and verb agreements, (2) translating figures into English words and vice versa, (3) translating figures into Filipino words and vice versa, and (4) rules to be obeyed in solving basic operations on integers. The subject and verb agreements are included in the language skills since it is related to grammar. The translation of figures into English words and vice versa is part of reading and literacy since it is relevant to interpretation of symbols. The translation of figures into Filipino words is included in "Makabansa" since it is part of using the national language. The rules to be obeyed in solving basic operations on integers are somehow part of the GMRC since it is relevant to following the basic rules and regulations.

For additional novelty, the researcher integrated the Damath app into the E- SIM. The Damath app is also like the real Damath game with a board and chips. The only difference is the characteristic of the Damath app, which is a software and electronic application. The Damath game is like the Filipino chess "Dama". The rules are the same in which one player will eliminate all chips

of the opponent. The only difference is the involvement of scoring points in the Damath game. In the E- SIM, the researcher input only the download link. Once clicked by the respondent, it will proceed to the Google Play Store App. An internet connection is required to download the Damath app. The researcher highly suggested to download that app in the mobile phone to play it.

➤ *Review of Related Literature and Studies*

• *Mathematical Skills of Students*

The mathematical skills of Filipino students based on the latest PISA test result is below global average. (Chi, 2023). The PISA stands for “Program for International Student Assessment”. It is conducted by the OECD to assess the knowledge and skills of students belong to 15 years old in mathematics, reading and science. The OECD stands for “Organization for Economic Co-operation and Development”. Based on the latest PISA test result, Philippines got a score of 355 in Mathematics. The global average for Mathematics is 472 according to OECD.

The Philippines is ranked as one with the lowest skills in Mathematics in the world (Malipot, 2023). The basis is also latest PISA test result. The mentioned country ranked 76th in Mathematics among 81 countries in the world under OECD. It means that the mentioned country has the 6th lowest mathematical skills among other countries in the world.

• *Skills of Students in Solving Basic Operations on Integers*

Students are struggling with solving basic operations on integers due to sources and possible misconceptions about operations in integers (Embong et al, 2020). The sources of errors found are the following: (1) being careless in computation, (2) low level of knowledge in basic operations, (3) inability to distinguish different operations on integers from one another, and (4) mixing up the rules in solving. The following are the main causes of misconceptions in operations in integers: (1) the rush discussion of teachers in a grading period to complete the budget of work, and (2) the students’ memorization of rules but lack of application.

An intervention is needed to improve the skills of students in solving basic operations on integers. (Harun et al, 2023). Based on the item analysis in their study, there are misconceptions and errors shown by students regardless of sex and section. These misconceptions involve subtracting integers and other operations which include negative integers.

Conducting an intervention using the integers module lessons helps the students in their mathematical difficulties (Bryant et al, 2020). In their study, there are two groups. One group is composed of students who utilized the integers module lessons. The other group includes the students who did not use the integers module lessons. They found out in their study that students who utilized the integers module lessons lessen their mathematical difficulties than those who did not utilize. Basic operations on integers are some of the fundamental topics needed to be learned by students before solving complex questions in Mathematics.

There are different capturing strategies that teachers can use to deal with the difficulties of students in solving negative integers (Amir et al, 2022). These capturing strategies are the following: (1) Yulia's Understanding of the Context, (2) Yulia's Strategies for the In-Line Numbers Problem, and (3) Yulia's Strategies and Difficulties in Solving Number Line Model. In the first strategy, students will understand first the negative number through the context of real-life situations. In the second strategy, students will try to draw a number line and apply it in arranging the integers in ascending or descending order. In the third strategy, students will solve basic operations on integers by applying the number line.

• *Instructional Materials*

The step- by- step approaches for teaching materials development are the following: (1) defining lesson objectives, (2) finalizing the content and concepts, (3) highlighting the materials required, and (4) emphasizing the assessment and performance evaluation strategies (Harman, 2024). In defining the lesson objectives, the teaching material should facilitate the students to learn the learning objectives. In finalizing the content and concepts, all learning contents in the teaching material should be correct and aligned with the learning objectives. In highlighting the materials required, the teaching material should be interactive to different kinds of students. In emphasizing the assessment and performance evaluation, the teaching material should help the students to demonstrate what they have learned.

The challenges in implementing high quality instructional materials are the following: (1) insufficient resources, (2) lack of training, (3) resistance to change, (4) aligning instructional materials with curriculum standards, (5) technological barriers, and (6) time constraints (National Math + Science Initiative, 2023). Insufficient resources refer to the lack of funds and capital needed for the implementation of instructional materials. Trainings are also needed by educators to know the proper procedures and ethics in implementing the instructional materials. Resistance to change is also problem since there are educators who are over equipped with some traditional instructional materials with low or moderate quality. If the instructional material is not aligned with curriculum standards, then implementation will be useless since students will not meet the learning objectives. Without appropriate gadgets, instructional materials in software form will not be implemented. If there is not enough time, the proper procedure for the implementation of instructional materials will not be completed.

The criteria to be considered in evaluating instructional materials are the ff: (1) accuracy, (2) relevance, (3) understandability, (4) interest and engagement, (5) alignment with learning outcomes, (6) immediate applicability, and (7) instructional soundness (Young, 2020). Accuracy refers to the validity of the presented content in the implemented instructional material. The implemented instructional material is relevant if it addresses the learning needs of the students. Understandability refers to the appropriateness of the implemented instructional material to the current understanding of students. The implemented instructional material is interested and engaging if it is interactive to the students. Alignment with the learning outcomes pertains to the students' learning of the desired outcome with the assist of the implemented instructional material. The implemented instructional material is immediate applicable if the students applied their learning to work and real- life situations. Instructional soundness pertains to the effectivity of the implemented instructional material.

- *Strategic Intervention Materials (SIM)*

The Department of Education (DepEd) has already launched the DepEd memo 117 Series of 2005 entitled “Training Workshop on Strategic Interventions for Successful Learning”. It was signed by the former DEPED Secretary Florencio B. Abad on April 13, 2005. It is aligned to one of the DEPED's goals which is to raise continuously the education quality in the country. The training workshops aim the following: to enhance teachers' skills in test analysis and interpretation, and to capacitate them in various intervention materials for remediation and enrichment of learning. Here, the teachers' skills in developing effective intervention materials for students' learning will be improved. Many intervention materials have been developed and have been proven effective. One of the examples of effective intervention material is the SIM.

The utilization of SIM in Mathematics was found effective in addressing the skills of students in solving basic operations of integers (Candido, 2023). Here, the Tom Lavella's brain- based learning and teaching strategies was applied in developing the material. The key principles of brain- based learning include the ff: active learning, collaboration, visuals, chunking and movement. The strategies based on the brain- based principles are the ff: physical movement, collaboration, visual aids, multisensory learning, and storytelling.

The SIM address also the skills of students in solving problems involving quadratic functions (Cabrella and Dumigsi, 2019). The study of Cabrella and Dumigsi showed that the proficiency level of students who used the SIM was “satisfactory” while those who only used the Math learners' materials “did not meet expectations”. Thus, there is a significant difference between the proficiency level of students who used the SIM and the proficiency level of students who used the original learners' material.

Also, the SIM can be used to improve students' least mastered skills in Mathematics (Adonis, 2020). These least mastered skills are learning competencies in which students got a low score. The basis is the quarterly assessment of the students. It was revealed in the findings of Adonis that there is a significant difference between the scores in students in a test before and after they used the SIM. The researcher also made a contextualization in SIM. Here, the researcher integrates the SIM to Bicol culture and the Disaster Risk Reduction and Management (DRRM) awareness.

The SIM can be innovated into Electronic Strategic Intervention Material (E- SIM) to improve skills of students in solving integers. (Cañeda et al, 2024). Integrating audio visuals make the E- SIM more interactive. The audio- visual materials address the learning gaps in Mathematics. Also, it provides teachers with valuable resources to improve students' basic skills in integer operations.

The E- SIM can also increase the achievement levels of struggling learners in Statistics and Probability. (Balazo, 2021) The E-SIM is also a SIM but is designed with an electronic platform like pictures, slide presentations, etc. It was shown in the study that there is a significant difference between the scores of students in a test before and after they used the E-SIM.

Moreover, the E-SIM can also improve the level of least mastered competencies of students in solving exponential equations. (Abuda et al, 2019). Here, the E-SIM is embedded with a QR code. Their study revealed that the students' scores in a test before they utilized the E- SIM is significantly higher than after they utilized the material.

- *Video Lessons*

The utilization of video lessons in teaching is effective in increasing the level of mathematical performance of students. (Beltran, 2021). It is stated in the research findings of Beltran that there is a significant difference between the scores of students in a Mathematics test before and after the video lesson was integrated in a Mathematics test.

Video lessons are effective for learning Mathematics based on the experiences of students (Nabayra, 2022). Based on his study, the videos used are created by the teacher itself and uploaded to YouTube. According to students, the teacher-created videos are extensive, flexible, student-centered. In these videos, there is a virtual presence of one of the roles of a teacher which is being the discussant. Moreover, these videos are fit into new normal learning. In conclusion, the teacher-created videos are adaptable for the students' learning in Mathematics.

The use of video lessons in developing a video-based e-module in Mathematics stimulates the students' interests and makes their learning effective (Nabayra, 2020). Based on the findings of Nabayra, the students found the video-based e-module to be unique, interesting, effective, and understandable in terms of learning the mathematical concepts. This study is significant in that the students will appreciate the different mathematical concepts. Also, the video-based e-modules facilitate the 21st-century students' learning at home.

Integrating video lessons in PowerPoint presentation is effective in learning Mathematics (Anwar, 2020). The researchers called this new presentation as "Interactive Video Based PowerPoint Media". Based on data analysis, 67.64% of the students got a score of 70.29 on a test wherein they used the Interactive Video Based PowerPoint Media. Anwar concluded that kind of PPT media is effective and convenient in learning.

Video lessons are also helpful in conducting a learning intervention in Mathematics (Insorio and Macandog, 2021). Here, the researchers use the video lessons via YouTube channel. Their study revealed that there is a significant difference between the mean scores of students in a test before and after the teacher utilized the video lessons via YouTube. It means that interventions through video lessons via YouTube channel helped the students to perform better in Mathematics.

- *MATATAG Curriculum*

The MATATAG Curriculum is primarily designed to solve problems in the current K to 12 curricula according to DEPED (Escuadro, 2023). Some of these problems are congested topics, disorganized sequencing of learning competencies, and cognitive demand imbalance. For example, topics in grade 7 and grade 8 in the junior high school Mathematics curriculum are congested. There are 15 learning competencies in grade 7 first-quarter Mathematics. There are 18 learning competencies in grade 8 first-quarter Mathematics. Usually, the topics in grade 7 and grade 8 Math are fundamentals of high school Mathematics. Hence, students cannot master the fundamental topics in high school Mathematics.

As stated by DepEd, MATATAG stands for "MAke the curriculum relevant to produce job-ready, active, and responsible citizens; TAke steps to accelerate the delivery of basic education services and provision facilities; TAke good care of learners by promoting learner well-being, inclusiveness learning, and positive learning environment; and Give support for teachers to teach better" (Barcelona, 2023). Since the content of the Matatag curriculum is less congested, then the learning of the students may be focused on personal life and work. Also, the teaching process of the teachers may be more effective since they will focus on strategy rather than content.

According to DepEd in 2023, the MATATAG curriculum emphasizes five important skills which are the following: (1) Language, (2) Reading and Literacy, (3) Mathematics, (4) Makabansa, and (5) Good Manners and Right Conduct (GRMC). Since the GRMC is incorporated, there might be character development in the learning of the students. The other four remaining skills are also important. The language helps students enhance their communication skills. The reading and literacy help students to realize and apply moral lessons in life. Mathematics helps students to think critically and solve problems. The "Makabansa" helps students to be responsible citizens of the nation.

- *Damath*

Playing Damath can increase the students' level of computational skills on a whole number (Ricafronte, 2019). Based on the study, the students' level of computational skills after playing the Damath is significantly higher than before playing it. Based on the result, it was shown there was an increase of 27% in the level of computational skills of the students after playing the Damath.

The Damath board game app equips the students with lifelong learning for understanding and ICT-fluency skills (Mc Bride, 2023). When the students are playing Damath, they apply the concepts of solving basic operations of numbers. Moreover, it boosts the students' strategic thinking skills. Playing Damath is like playing chess wherein students will apply strategies to win the game. This game is also enjoyable since two players are battling with each other by applying strategies and basic operations of Math.

- *Synthesis*

The Philippines has low level Mathematical skills. One of the bases is the PISA test result. The country got a score below the global average. Also, its ranking among other countries in the world is very low.

In relation to this, some students have difficulties in solving basic operations on integers. These difficulties include the following: (1) conceptual comprehension, (2) handling factual knowledge, and (3) procedural application. Some reasons are learning errors in solving procedure and misconceptions about the solution content of the students. To resolve this, the teacher should conduct an intervention. The integers module lessons can be used as materials in intervention to help the students in their difficulties. Moreover, teachers may apply the following strategies for the students to learn some basic operations: (1) Yulia's Understanding of the Context, (2) Yulia's Strategies for the In-Line Numbers Problem, and (3) Yulia's Strategies and Difficulties in Solving Number Line Model.

There are criteria to be considered in developing, implementing and evaluating an instructional material. These are the criteria to be considered in developing an instructional material: (1) definition of the lesson objectives, (2) finalization of the content and concepts, (3) highlight of the materials required, and (4) emphasis of the assessment and performance evaluation strategies. The criteria to be considered in implementing an instructional material are the following: (1) availability of the resources, (2) training quality, (3) adaptability to change, (4) alignment of the instructional materials with curriculum standards, (5) technological barriers, and (6) time constraints. The following are the criteria to be considered in evaluating an instructional material: (1) accuracy, (2) relevance, (3) understandability, (4) interest and engagement, (5) alignment with learning outcomes, (6) immediate applicability, and (7) instructional soundness.

The purpose of the Strategic Intervention Materials (E- SIM) is to improve the specific skills of struggling students. The E-SIM was found effective in addressing the skills of students in solving basic operations on integers. It can also address the skills of students in solving problems involving quadratic functions. It can used to improve the students' least mastered skills in Mathematics in a particular quarter. That material was innovated into Electronic Strategic Intervention Material (E- SIM) which improves more the skills of students in solving integers. This innovated material can also improve the skills of students in solving exponential equations.

The integration of video lessons in teaching was found effective in improving the mathematical skills of students. Video lessons are more effective in improving the mathematical skills if they are based on the real- life experiences of students. Hence, a video- based e- module was developed which is learner- centered. Video lessons can also be integrated in Power Point Presentation to make the learning Mathematics more effectively. They are also helpful when integrated in learning intervention in Mathematics.

Those studies are essential in producing effective intervention material. However, no one will guide them in their study since students are studying alone when utilizing the E-SIM. Also, the material is not integrated to other fundamentals of the Matatag curriculum. Hence, the researcher incorporates video lessons and integrates the material to other fundamentals of the Matatag curriculum. In video lessons, the researcher will be the one who is teaching the solutions to different mathematical questions. The other fundamentals of the Matatag curriculum to be integrated are the following: (1) language, (2) reading and literacy, (3) makabansa, and (4) good manners and right conduct (GRMC).

Video lessons are helpful materials for learning the lessons in Mathematics effectively. Based on the study of Beltran in 2021, the utilization of video lessons increases the level of mathematical performance of students. According to the experience of students, they effectively learned Mathematics through teacher-created videos as shown in the study of Nabayra in 2022. Nabayra also used video lessons to innovate the traditional modules into e-modules for more effective learning. Aside from PowerPoint presentations, video lessons can also be integrated with other instructional material like PowerPoint presentations as Anwar and others did in 2020. Moreover, Insorio and Macandog utilized the video lessons in conducting an intervention in Mathematics in 2021 via a YouTube channel which was found effective.

The MATATAG curriculum was design to solve problems in previous curriculum.

The word “MATATAG” stands for the following: (MA)- make the curriculum relevant to produce job- ready, active, and responsible citizens, (TA)- take steps to accelerate the delivery of basic education services and provision facilities, (TA)- take good care of learners by promoting learner well-being, inclusiveness learning, and positive learning environment, and (G)- give support for teachers to teach better. This curriculum focuses in the five important skills which are the following: (1) Language, (2) Reading and Literacy, (3) Mathematics, (4) Makabansa, and (5) Good Manners and Right Conduct (GRMC).

Playing Damath can improve the computational skills of students in solving whole numbers. It also positively contributes to the lifelong learning for understanding and ICT- fluency skills of students.

• Theoretical Framework

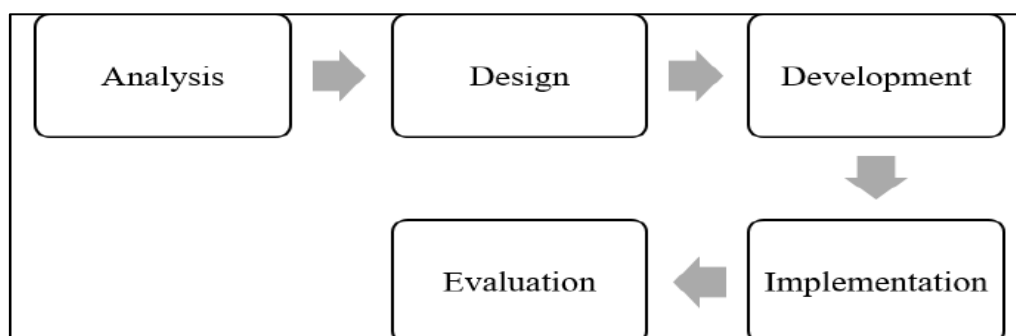


Fig 1 ADDIE Model of Instructional Design

The ADDIE model should be applied to produce a good-quality and effective instructional design. The ADDIE model is a process used by training developers to plan and create effective learning experiences (DeBell, 2020). The ADDIE is an acronym that stands for the following: A- Analysis, D- Design, D- Development, I- Implementation, and E- Evaluation. In the analysis phase, the developer should analyze first the students' learning needs. Sometimes, these needs are the knowledge and skills where the students are lack of. In the design phase, the developer should devise a plan for creating an instructional material. This plan will serve as a guide to produce a good-quality instructional material. In the development phase, the developer will construct the instructional material. Here, an in-depth validation is conducted to improve the quality of the developed material. In the implementation phase, the developer will utilize the instructional material in classroom discussions. Validation of quality is not enough to conclude that the instructional material is effective. It should be implemented to observe if the instructional materials can cater the students' learning needs. In the evaluation phase, the developer will verify how effective and significant is the instructional material after being implemented. Here, the developer should consider both positive and negative results of evaluation for the improvement of the quality of the instructional material.

This model was applied by the researcher in the study. First, a diagnostic test was conducted to analyze the skills of students in terms of solving basic operations on integers. Second, the researcher designed the E-SIM that will help those struggling learners. Then, an E-SIM was developed based on the that design. The next step will be the implementation of that E-SIM to struggling students. Lastly, the researcher will conduct a post- test to evaluate whether the level of skills of the learners is improved after using that E-SIM.

- *Conceptual Framework*

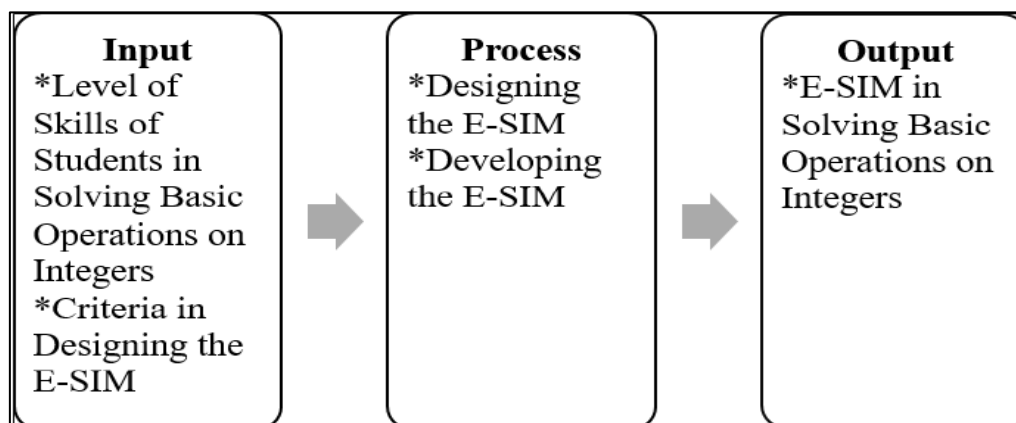


Fig 2 The IPO Model of Analysis, Design, and Development of E-SIM

The IPO model was used since the researcher developed an intervention material as an output. As stated in the figure 2, the inputs are the students' level of skill in solving basic operations on integers and the criteria for designing the E-SIM. They are the things to be considered in designing and developing the E-SIM. The purpose and the content of the E-SIM should be aligned with the level of skills to be improved. Also, the construction process of the E-SIM should be aligned with the acceptable criteria in designing. Based on the figure 2, the processes are designing and developing the E-SIM. These processes are the action needed to produce a good quality E-SIM. According to figure 3, the output is the E-SIM in solving basic operations on integers. This E-SIM is the end- product that will be utilized by the students during the intervention.

- *Statement of the Problem*

The present study aims to determine the following:

- ✓ What is the level of skills of students in solving basic operations on integers?
- ✓ What are the acceptable criteria to be considered for designing (planning) the E-SIM in solving basic operations on integers according to the experts?
- ✓ What is the quality level of the developed E-SIM in solving basic operations on integers based on the experts?

- *Significance of the Study*

The developed E- SIM is significant in the field of education. This material is beneficial specially to the following:

- *Students*

The developed E-SIM will help the students to improve their skills in solving basic operations on integers. It has video lessons in which there is a teacher discussing the concept and process of solving using an AI voice. It is also equipped with hyperlinks and Macros which make it more interactive. They hyperlink is a part of Microsoft Power Point which is responsible for click- button

effects. The Macros is another part which enables basic programming. Moreover, it will improve the general foundational skills of the students since it is aligned with some features of the Matatag curriculum.

- *Teachers*

The developed E- SIM will help the teachers in providing an effective intervention material to students. It takes more time, effort, and material resources to develop an effective intervention material. One day is not enough time for developing the material. There are many activities and assessments to be constructed. Moreover, it is not easy to do good quality activities and assessments. Aside from construction, there should be a validation from experts. Laptop with updated version of Microsoft PPT is also needed. The E- SIM itself will not be developed if there is no available electronic gadget.

- *School Administrators*

The developed E- SIM will help the head teachers and principals in providing educational resources for intervention program. This E- SIM is one of the primary resources in the intervention program. Without this material, the intervention program will not run through. It also takes more time and effort to assign someone who will develop an effective intervention material.

- *Future Researchers*

This developed E- SIM will help the future researchers in their further studies about more effective intervention materials. Aside from self-teaching video lessons, future researchers may discover other additional tools to make E-SIM more effective. Aside from developing an E-SIM, future researchers may find other ways to make the intervention process more effective.

- *Scope and Delimitation of the Study*

All four basic operations in solving integers were included in the study. These are addition, subtraction, multiplication, and division. They were embedded both in the diagnostic test and the E- SIM. The table of specifications from the appendix I is the proof for the diagnostic test. All questions in the activity, assessment, and enrichment card of the E- SIM are about the four basic operations in solving integers.

All foundational skills of Matatag curriculum were integrated with the E- SIM. These are (1) language, (2) reading and literacy, (3) Mathematics, (4) makabansa, and (5) good manners and right conduct (GMRC). They were evidently shown in the E- SIM. In the activity part of the E- SIM, there are islands which name the five foundational skills. These islands were composed of several questions needed to be answer by the students.

Not all the phase of ADDIE model were applied in the study. The implementation and evaluation phases of instructional design were not included. The research design of the study is descriptive developmental. In descriptive design, the quality of a developed instructional material is just being described based on the experts' review. There is no experiment and application of the material. Moreover, the study will be more difficult and more expensive if the implementation and evaluation phases are included. The researcher conducted a diagnostic test to many students during the analysis phase. The researcher also consulted evaluators of the E- SIM coming from different schools in Schools Division Office (SDO)- Pasig City during the design and development phase. There is no budget remaining for the researcher to do the implementation and evaluation phases.

Not all the features of the Damath app were integrated with the E- SIM. Only the integer category was included. The counting, whole, rational, irrational, polynomial, and binary categories were not included. The focus of the E- SIM is to improve the skills of students in solving basic operations on integers. The Damath app is an additional booster in improving that skills of students.

Not all the digital features were adapted by the E- SIM. The material is limited in the form of Power Point Presentation. The E- SIM is not in form of usual app like the others in the Google Play Store. There are texts, pictures, and videos in the E- SIM just like the usual PPT. However, there are also hyperlinks and Macros applied. The hyperlinks are buttons in a slide that should clicked before proceeding to the next one. The researcher set the PPT in which respondents cannot proceed to the next slide if the hyperlinks are not clicked. The Macros are basic programming applied by the researcher. In this feature, students should answer the first question in a slide correctly before proceeding to the next one.

Not all students were participated in the study. The respondents of the study include grade 10 students. These students were handled by different Math teachers of San Joaquin Kalawaan High School during the School Year 2024- 2025. Based on the observation during class hour, some grade 10 students handled by the researcher cannot solve basic operations on integers in the sequence and polynomial topics. The other sections handled by other Math teachers were also selected for fairness of the selection of respondents.

Not all master teachers were participated in the study. The other respondents of the study are master teachers in Mathematics. They are under the supervision of the Department of Education National Capital Region (DEPED NCR)- Schools Division Office Pasig (SDO Pasig). The content of the E- SIM is solving basic operations on integers. Master teachers in mathematics are more appropriate evaluators. They are more expert in terms of content, teaching strategy, and instructional material about Mathematics. In the researcher's school, there are only four master teachers in Mathematics. In this case, the result for the quality of the developed

E- SIM will not be reliable. Hence, the researcher consulted master teachers in Mathematics in all junior high schools under the DEPED NCR- SDO Pasig.

- *Definition of Terms*

- ✓ Activity Card- It is part of the SIM which discusses some information about a specific skill, and which provides activities aligned with the learning objectives from the guide card.
- ✓ Answer Card- It is part of the SIM which states the answers from different activities and assessments.
- ✓ Assessment Card- It is part of the SIM which measures the level of a particular skill of students.
- ✓ Basic Operations on Integers- These refer to addition, subtraction, multiplication, and division of integers.
- ✓ Electronic Strategic Intervention Materials (E-SIM)- This is a SIM in the form of a digital soft copy.
- ✓ Enrichment Card- It is part of the SIM which enhances the level of a particular skill of students.
- ✓ Guide Card- It is part of the SIM which states the learning objectives aligned with the specific skills that students need to learn.
- ✓ Reference Card- It is part of the SIM intended to state the references used relevant to the present topic.
- ✓ Self-Teaching Video Lesson- This is a video that contains the teaching procedure of a particular topic by the teacher itself.
- ✓ Strategic Intervention Material (SIM)- It is the material created by the Department of Education intended for intervention of a particular skill of students.
- ✓ Title Card- It is part of the SIM which states the particular skill that students need to learn.

CHAPTER TWO

RESEARCH METHODOLOGY

This section describes the following: (1) the research design, (2) the sampling technique, (3) the respondents of the study, (4) the research instruments, (5) the data gathering procedure, (6) the statistical treatment of data, and (7) the data analysis and interpretation

➤ *Research Design*

The researcher used the descriptive and developmental research design. Descriptive research describes the characteristics of specific groups, situations, or phenomena without manipulating and experimenting the variables (Dovetail Editorial Team as cited by Heat, 2023). Here, the researcher determined and described the level of skill of students in solving integers, the criteria for designing an E-SIM, and the quality level of the developed E-SIM through administering a diagnostic test and survey forms. The researcher did not administer the implementation of E-SIM to teachers and students for experiment. The developmental research design is the systematic study of designing and constructing instructional programs and materials that must meet the criteria of validity (Richey et al. as cited by Pasion et al, 2022). Here, the researcher developed an E-SIM in solving basic operations on integers that will help teachers in their intervention procedure with students.

➤ *Sampling Technique*

The researcher used the purposive sampling in selecting the participants of the study. Purposive sampling refers to a group of non-probability sampling techniques in which participants are selected based on the characteristics needed in the study (Nikolopoulou, 2022). The reason why the researcher used the purposive sampling is to achieve the purpose of the study which is to develop a good quality E- SIM. There are two different kinds of respondents used in the study. They are students and teachers. The selected students provided answers to the researcher in SOP 1 which is to determine the learners' level of skill solving basic operations on integers. Hence, the researcher included the students belong to the group of heterogenous sections. This group consists of mix of students who have general average of 75 to 89 in their previous grade level. In this group, the researcher diagnosed students not only who are satisfactory and very satisfactory but also who are unsatisfactory and very unsatisfactory in terms of level of skills in solving basic operations on integers. Unlike in the group of pilot sections, the researcher diagnosed students who are only satisfactory and very satisfactory level. The selected teachers gave answers to the researcher in SOP 2 which is to determine the acceptable criteria in designing the E- SIM. They also provided solution to the researcher in SOP 3 which is to determine the quality level of the developed E- SIM. Hence, the researcher included the teachers who are highly proficient. In DEPED, highly proficient teachers are master teachers. They are more expert in terms of instruction, assessment, and curriculum of a particular subject. They are more capable in determining the acceptable criteria in designing and the quality level of the developed E- SIM.

➤ *Respondents of the Study*

The researcher used the purposive sampling by selecting the appropriate students and master teachers that will contribute positively in developing the E- SIM. The students selected are grade 10. They studied at San Joaquin Kalawaan High School SY 2024- 2025. Their sections were Copper, Fluorine, Krypton, Magnesium, Platinum, Titanium, and Vanadium. The section Copper was handled by the researcher. The other mentioned sections were handled by other Math teachers. All present students from the mentioned sections were participated in the study. The selected master teachers are Math majors. They are working from different junior high schools under the SDO Pasig. These schools are San Joaquin Kalawaan High School, Pinagbuhatan High School, Nagpayong High School, Sagad High School, Rizal High School, Ugong National High School, Eusebio High School, Kapitolyo High School, Rizal Experimental Station and Pilot School of Cottage Industries, Manggahan High School, Santolan High School, and Dela Paz High School. One master teacher in Mathematics per mentioned school were participated in the study.

➤ *Research Instruments*

The researcher used a diagnostic test and two survey forms as instruments to gather data in the study.

➤ *Diagnostic Test*

• *Rationale:*

The researcher used a diagnostic test to identify the learning needs of students in solving basic operations on integers. The major goal of the diagnostic test is to determine the level of prior knowledge of students in a particular subject matter. (Bordia, 2022). The learning needs of students in solving basic operations on integers are also the prior knowledge of students to be measured. Moreover, the result of the diagnostic test became the basis for the development of the E- SIM.

• *Construction:*

The researcher constructed first the table of specifications. The table states the coverage topics, and the number of items allotted per topic. The topic coverages are addition, subtraction, multiplication, division, order of operations, and word problems involving integers. There is a total of 40- item questions in the test. The type of test is computational identification. The time-allotment for taking the test is only one hour. Hence, there are 6- item questions allotted for each topic coverages of addition,

subtraction, multiplication, and division of integers. There are 8- item questions allotted each to topic coverages of order of operations and word problems involving integers. The diagnostic test is in the form of paper and pen.

- **Validation:**

After construction, the researcher consulted the experts to validate the diagnostic test. These validators are master teachers in Mathematics from San Joaquin Kalawaan High School. The researcher gave first the letter of requests to the validators. After approval of validators, the researcher sent the paper form of the instrument to the validators. Students answered the diagnostic test in paper form to maximize the security for cheating. They might use calculator, google or AI once they answered in gform link. A validation form was also given to the validators to write their ratings and feedbacks. Based on their feedback, the researcher revised the diagnostic test.

- **Reliability Testing:**

After validation, the researcher administered the diagnostic test to other students, who were not respondents, to test its reliability. These students came from grade 10 sections G. Trono, D. Ocampo, E. Gomez, F. Fronda, and L. Belardo of San Joaquin Kalawaan High School. Based on the answers of 194 students, the researcher conducted the Cronbach Alpha test. The table 1 on the next page shows the reliability test result of the diagnostic test using the Cronbach's Alpha.

Table 1 Diagnostic Test Reliability Result

Components	Cronbach Alpha Values	Cronbach Alpha Values Based on Standardized Items	Verbal Interpretations
Addition	0.878	0.878	Good
Subtraction	0.709	0.710	Acceptable
Multiplication	0.974	0.974	Excellent
Division	0.961	0.961	Excellent
Order of Operations	0.858	0.847	Good
Word Problems	0.930	0.927	Excellent
Overall	0.980	0.979	Excellent

Based on the table 1, the Cronbach Alpha test result for overall item questions is 0.980 which is excellent. The Cronbach Alpha test results per component are also show on the table. Their interpretations are the following: (1) addition- good, (2) subtraction- acceptable, (3) multiplication- excellent, (4) division- excellent, (5) order of operations- good, and (6) word problems involving integers- excellent.

➤ **First Survey Form**

- **Rationale:**

The researcher used a survey form to identify the acceptable criteria to be considered in designing the E-SIM. The survey form collects data from the respondents that will be used for research. The master teachers in Mathematics can provide data to researcher about the acceptable criteria to be considered in designing the E- SIM.

- **Construction:**

The researcher constructed the first survey form in a 4-point Likert scale. It was typed initially in the paper. Then, the first survey form was migrated into google form. It indicated the criteria to be rated. These criteria are grouped into three components: development, implementation, and evaluation phase. Each criterion has to be rated from 1 to 4 by the experts based on how they are being accepted in designing the E-SIM. The table 2 below shows the description of each rating that will be served as guide for the researcher in determining the acceptable criteria in designing the E- SIM.

Table 2 Acceptability Rating of Criteria in Designing the E- SIM

Ratings	Verbal Interpretations
4	Very Acceptable
3	Acceptable
2	Unacceptable
1	Very Unacceptable

- **Validation:**

After construction, the researcher consulted the experts to validate the survey form. One of the validators is a former full- time instructor in Mathematics from Pamantasan ng Lungsod ng Pasig, a former master teacher in Mathematics, and currently an assistant principal of Buting Senior High School. The two remaining validators are current associate professors in Mathematics and professional education from Pamantasan ng Lungsod ng Pasig. The researcher gave first the letter of requests to the validators. After approval of validators, the researcher sent both the gform link and the paper form of the instrument to the validators. The gform link of the instrument was used primarily by the respondents. It is more convenient but a stable internet connection was needed. The

paper form of the instrument was used secondarily by the respondents in case of unstable internet connection and lack of knowledge in using the google form. A validation form was also given to the validators to write their ratings and feedbacks. Based on their feedback, the researcher revised the first survey form.

- **Reliability Testing:**

After validation, the researcher administered the survey form to other master teachers in Mathematics to test its reliability. They are not respondents of the study. They came from different junior high schools under Schools' Division Office- Mandaluyong City. Based on the responses of 11 master teachers, the researcher conducted the Cronbach Alpha test. The table 3 below shows the reliability test result of the diagnostic test using the Cronbach's Alpha.

Table 3 First Survey Form Reliability Result

Components	Cronbach Alpha Values	Cronbach Alpha Values Based on Standardized Items	Verbal Interpretations
Development	0.979	0.985	Excellent
Implementation	0.839	0.849	Good
Evaluation	0.848	0.844	Good
Overall	0.966	0.973	Excellent

Based on the table 3, the result of the Cronbach Alpha test for overall criteria in the survey is 0.966 which is excellent. The Cronbach Alpha test results per component are also show on the table. Their interpretations are the following: (1) development- excellent, (2) implementation- good, and (3) evaluation- good.

➤ **Second Survey Form**

- **Rationale:**

The researcher used a survey form to evaluate the quality level of the developed E-SIM based on the expert review. The survey form gathers data from the respondents for research purposes. The master teachers in Mathematics can provide data to researcher about the quality level of the developed E- SIM. They served as the expert reviewers.

- **Construction:**

The researcher constructed the second survey form in a 4-point Likert scale. It was typed initially in the paper. Then, the second survey form was migrated into google form. The E- SIM has seven parts: (1) title card, (2) guide card, (3) activity card, (4) assessment card, (5) enrichment card, (6) answer card, and (7) reference card. Each part was rated from 1 to 4 based on the given criteria. The table 4 below shows the description of each rating that will be served as guide for the researcher in determining the quality of the developed E- SIM.

Table 4 Criteria- Based Quality Rating of the Developed E- SIM

Ratings	Verbal Interpretations
4	Very Acceptable
3	Acceptable
2	Unacceptable
1	Very Unacceptable

- **Validation:**

After construction, the researcher consulted the experts to validate the survey form. One of the validators is a former full- time instructor in Mathematics from Pamantasan ng Lungsod ng Pasig, a former master teacher in Mathematics, and currently an assistant principal of Buting Senior High School. The two remaining validators are current associate professors in Mathematics and professional education from Pamantasan ng Lungsod ng Pasig. The researcher gave first the letter of requests to the validators. After approval of validators, the researcher sent both the gform link and the paper form of the instrument to the validators. The gform link of the instrument was used primarily by the respondents. It is more convenient but a stable internet connection was needed. The paper form of the instrument was used secondarily by the respondents in case of unstable internet connection and lack of knowledge in using the google form. A validation form was also given to the validators to write their ratings and feedbacks. Based on their feedback, the researcher revised the second survey form.

- **Reliability Testing:**

After validation, the researcher administered the survey form to other master teachers in Mathematics to test its reliability. They are not respondents of the study. They came from different junior high schools under Schools' Division Office- Mandaluyong City. Based on the responses of 11 master teachers, the researcher conducted the Cronbach Alpha test. The table 5 on the next page shows the reliability test result of the diagnostic test using the Cronbach's Alpha.

Table 5 Second Survey Form Reliability Result

Components	Cronbach Alpha Values	Cronbach Alpha Values Based on Standardized Items	Verbal Interpretations
Title Card	0.846	0.844	Good
Guide Card	0.731	0.780	Acceptable
Activity Card	0.889	0.910	Good
Assessment Card	0.908	0.908	Excellent
Enrichment Card	0.865	0.875	Enrichment
Answer Card	0.950	0.952	Excellent
Reference Card	0.875	0.892	Good
Overall	0.972	0.976	Excellent

Based on the table 5, the result of the Cronbach Alpha test for overall criteria in the survey is 0.972 which is excellent. The Cronbach Alpha test results per component are also show on the table. Their interpretations are the following: (1) title card- good, (2) guide card- acceptable, (3) activity card- good, (4)- assessment card- excellent, (5) enrichment card- good, (6) answer card- excellent, and (7) reference card- good.

➤ Data Gathering Procedure

The researcher accomplished first the NTC ethics review form. Here, the ethics review committee evaluated the research methodology of the study. This is to verify if the researcher follows the right conduct and protocols of data gathering procedure. After the approval of the ethics review form, the researcher proceeded to data gathering.

In gathering data to determine the level of skills of students in solving basic operations on integers (SOP 1), the researcher wrote first a letter of consent for participants to respective Math teachers and advisers of students. The purpose and the output are stated in that letter which is to develop a good quality E-SIM. The reason for the inclusion of participants is also mentioned which is the essence of the result of their diagnostic test. After the approval of the letter of consent for participants, the researcher made some collaborations with the Math teachers regarding the schedule of conducting diagnostic test in selected sections. After making some collaborations, the researcher conducted the diagnostic test. Students were given a 1- hour time to answer the diagnostic test. While the students answering the diagnostic test, the researcher is monitoring the class to avoid cheating and leakages. The researcher checked then the answer sheets to determine the result of the diagnostic test.

In collecting data to determine the criteria in designing (planning) and to evaluate the quality level of the E-SIM (SOP 2 and 3), the researcher wrote a letter of permission for data gathering to the Schools Division Office (SDO)-Pasig. This is to request a permission to conduct a survey to master teachers in junior high school Mathematics among schools in SDO-Pasig. After the letter of request is approved, the SDO-Pasig released an endorsement letter which allows the researcher to conduct survey among junior high schools in Pasig City. Next, the researcher presented the endorsement letter to the school heads. Then, the researcher wrote a letter of consent for participation to the master teachers. The purpose and the output of the study are stated in that letter which is to develop a good quality E-SIM. The reason for the inclusion of participants is also mentioned which is their expertise in designing and validating an instructional material. After the approval of the letter of consent for participation, the researcher conducted a survey to master teachers via Google form. Master teachers were given at most 1 week to answer the survey. The researcher checked then the responses to determine the result of the survey.

➤ Statistical Treatment of Data

After data gathering, the researcher analyzed and interpreted the results using statistical tools. The statistical tools used by the researcher were the weighted mean and sample standard deviation.

➤ Weighted Mean

The formula for getting the weighted mean is given below:

$$\bar{x} = \frac{\sum W_n x_n}{\sum W_n}$$

These are the symbols used in the formula and their corresponding meaning:

$\bar{x}$ - mean

x_n - score

W_n - assigned weight to a score

$W_n x_n$ - product of a score and its assigned weight

ΣW_n - summation of all assigned weights to each score

$\Sigma W_n x_n$ - summation of all products of each score and assigned weight

➤ *Standard Deviation*

The formula for getting the sample standard deviation is given below:

$$s = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n - 1}}$$

These are the symbols used in the formula and their corresponding meaning:

s- standard deviation

x_i - score

$\bar{x}$ - sample mean

n- sample size

$x_i - \bar{x}$ - difference between the score and sample mean

$\sum (x_i - \bar{x})$ - summation of all differences between the score and sample mean

➤ *Data Analysis and Interpretation*

Using the statistical tools, the researcher analyzed and interpreted the data to solve all problems stated in the SOP. The researcher computed the means and standard deviations of the results from diagnostic test and two survey forms. The mean and standard deviation of the result from diagnostic test represents the numerical solution for the first SOP. The mean and standard deviation from two survey forms numerically represents the answer for the second and third SOP.

As mentioned earlier, the researcher used a diagnostic test to solve the first SOP. The results of the diagnostic test became the basis for the design and development of the E- SIM. The basis for the interpretation of the students' mean scores in overall component of diagnostic test is given in the table 6 below.

Table 6 Overall Component Mean Intervals and Verbal Interpretations

Mean Intervals	Verbal Interpretations
30.01- 40	Very Satisfactory
20.01- 30	Satisfactory
10.01- 20	Unsatisfactory
0- 10	Very Unsatisfactory

It was also mentioned that the diagnostic test has components. They are addition, subtraction, multiplication, division, order of operations, and word problems involving integers. The basis for the interpretation of the students' mean scores in addition, subtraction, multiplication, and division component is given in the table 7 on the next page:

Table 7 Addition, Subtraction, Multiplication, and Division Component Mean Intervals and Verbal Interpretations

Mean Intervals	Verbal Interpretations
4.51- 6	Very Satisfactory
3.01- 4.50	Satisfactory
1.51- 3	Unsatisfactory
0- 1.50	Very Unsatisfactory

The basis for the interpretation of the students' mean scores in order of operations and word problems is given in the table 8 below:

Table 8 Order of Operations and Word Problems Mean Intervals and Verbal Interpretations

Score Intervals	Verbal Interpretations
6.01- 8	Very Satisfactory
4.01- 6	Satisfactory
2.01- 4	Unsatisfactory
0- 2	Very Unsatisfactory

As stated earlier, the researcher used the first survey form to solve the second SOP. This will determine the acceptable criteria to be considered in designing the E-SIM. The basis for the interpretation of the mean of experts' acceptance ratings for the criteria in designing the E- SIM is given in the table 9 on the next page:

Table 9 Criteria in Designing the E- SIM Mean Intervals and Verbal Interpretations

Score Intervals	Verbal Interpretations
3.26- 4	Very Acceptable
2.51- 3.25	Acceptable
1.76- 2.50	Unacceptable
1- 1.75	Very Unacceptable

As noted earlier, the researcher used the second survey form to solve the third SOP. This will determine the quality level of the develop E- SIM as whole material and per component. These components are title card, guide card, activity card, assessment card, enrichment card, answer card, and guide card. The basis for the interpretation of the mean of experts satisfactory ratings for the quality of the developed E- SIM is given in the table 10 below:

Table 10 Second Survey Form Score Intervals and Verbal Interpretations

Score Intervals	Verbal Interpretations
3.26- 4	Very Satisfactory
2.51- 3.25	Satisfactory
1.76- 2.50	Unsatisfactory
1- 1.75	Very Unsatisfactory

CHAPTER THREE

RESULTS AND DISCUSSIONS

This section shows and discusses the statistical result of the following: (1) the level of students' skills in solving basic operations on integers, (2) the criteria in designing (planning) the E-SIM according to experts, and (3) the quality level of the developed E-SIM based on the experts' review.

➤ *The Level of Students' Skills in Solving Basic Operations on Integers*

The table 11 below shows the analysis of students' scores in answering the diagnostic test about solving basic operations on integers.

Table 11 Analysis of Students' Scores

Components	Number of Items	Mean	Standard Deviation	Verbal Interpretations
Addition	6	3.54	1.819	Satisfactory
Subtraction	6	2.15	1.589	Unsatisfactory
Multiplication	6	1.94	1.934	Unsatisfactory
Division	6	2.75	1.989	Unsatisfactory
Order of Operations	8	0.84	1.438	Very Unsatisfactory
Word Problems	8	2.42	1.977	Unsatisfactory
Overall	40	13.68	7.835	Unsatisfactory

Based on the table 11, the mean of the students' scores in overall component of diagnostic test is 13.68 out of 40 total items. According to the overall component mean intervals and verbal interpretations in table 6, it falls between the interval 10.01 to 20 which is verbally interpreted as "unsatisfactory". The mathematical skills of Filipino students based on the latest PISA test result is below global average. (Chi, 2023). The Philippines is ranked as one with the lowest skills in Mathematics in the world (Malipot, 2023). The mean of the students' scores in addition component is 3.54 out of 6 total items. According to the mean intervals and verbal interpretations in table 7, it falls between the interval 3.01 to 4.5 which has a "satisfactory" verbal interpretation. The students' mean score in subtraction component is 2.15 out of 6 total items. It falls between the interval 1.51 to 3 which has an "unsatisfactory" verbal interpretation. The students' mean score in multiplication component is 1.94 out of 6 total items. It also falls between the interval 1.51 to 3 which has an "unsatisfactory" verbal interpretation. In division component, the mean of the students' scores is 2.75 out of 6 total items. It falls between the interval 1.51 to 3 which has also an "unsatisfactory" verbal interpretation. In order of operation component, the mean of the students' scores is 0.84 out of 8 total items. According to the mean intervals and verbal interpretations in table 8, it falls between the interval 0 to 2 which has a "very unsatisfactory" verbal interpretation. In word problems component, the students' mean score is 2.42 out of 8 total items. It falls between the interval 2.01 to 4 which has "unsatisfactory" interpretation.

➤ *The Criteria in Designing (Planning) the E-SIM According to the Experts*

The "unsatisfactory" level of skills of students in solving basic operations on integers prompted the researcher to design the E-SIM. This can help the students to improve their skills in solving basic operations on integers. Hence, the researcher consulted the experts to determine the acceptable criteria in designing the E-SIM. These acceptable criteria in designing are significant in developing a good quality E-SIM.

The table 12 below shows the analysis of experts' acceptance ratings in answering the survey about the criteria to be considered in designing the E-SIM in solving basic operations on integers.

Table 12 Analysis of Experts' Acceptance Ratings

Components	Mean	Standard Deviation	Verbal Interpretations
Development Criteria			
Alignment Students' Needs	3.67	0.492	Very Acceptable
Alignment with Learning Objectives	3.83	0.389	Very Acceptable
Quality of the Plan	3.58	0.515	Very Acceptable
Procedure of Developing	3.67	0.492	Very Acceptable
Content	3.67	0.492	Very Acceptable
Cost of Developing	3.83	0.389	Very Acceptable
Duration of Developing	3.75	0.452	Very Acceptable
Implementation Criteria			
Accessibility to Students	3.83	0.389	Very Acceptable
Nature of Respondents	3.58	0.515	Very Acceptable
Quality of the Development of Material	3.58	0.515	Very Acceptable

Procedure of Implementation	3.67	0.492	Very Acceptable
Duration of Implementation	3.83	0.389	Very Acceptable
Evaluation Criteria			
Validity of Evaluation Tool	3.50	0.522	Very Acceptable
Reliability of Evaluation Tool	3.67	0.492	Very Acceptable
Quality of the Implementation	3.67	0.492	Very Acceptable
Procedure of Evaluation	3.58	0.515	Very Acceptable
Duration of Evaluation	3.67	0.492	Very Acceptable

Based on the table 12, the mean acceptance ratings of each criterion fall under the interval 3.26 to 4. Each criterion stated on the table are grouped into three components which are the development, implementation, and evaluation phase. According to the mean intervals and verbal interpretations in table 9, they all have an interpretation of “very acceptable”. The step- by- step approaches for teaching materials development are the following: (1) defining lesson objectives, (2) finalizing the content and concepts, (3) highlighting the materials required, and (4) emphasizing the assessment and performance evaluation strategies (Harman, 2024). The challenges in implementing high quality instructional materials are the following: (1) insufficient resources, (2) lack of training, (3) resistance to change, (4) aligning instructional materials with curriculum standards, (5) technological barriers, and (6) time constraints (National Math + Science Initiative, 2023). The criteria to be considered in evaluating instructional materials are the ff: (1) accuracy, (2) relevance, (3) understandability, (4) interest and engagement, (5) alignment with learning outcomes, (6) immediate applicability, and (7) instructional soundness (Young, 2020).

➤ *The Quality Level of the Developed E-SIM Based on the Experts*

After determining the “very acceptable” criteria in designing the E- SIM, the researcher proceeded to the development of the material. The researcher aligned the E- SIM with the student needs and learning objectives. The developed E- SIM provided activities, assessments and enrichments about solving basic operations on integers. The researcher planned well the development of the E- SIM. All “very acceptable” criteria in designing the E- SIM were considered by the researcher in developing the material. The researcher developed the E- SIM in proper procedure. The title and guide card were constructed first by the researcher. They were followed by activity, assessment, and enrichment card. Lastly, the answer and reference card were made. The researcher ensured that the contents of the develop E- SIM were valid. The develop E- SIM was undergone several evaluations from the experts. The researcher also considered the cost and duration of developing the E- SIM. The free Macros features were used and no other basic programming software were paid by the researcher. The duration of developing the E- SIM is not more than 1 school year.

The table 14 below shows the analysis of experts’ satisfaction ratings in evaluating the quality level of the developed E-SIM in solving basic operations on integers.

Table 13 Analysis of Experts’ Satisfaction Ratings

Components	Mean	Standard Deviation	Verbal Interpretations
Title Card	3.7500	0.32177	Very Satisfactory
Guide Card	3.7778	0.29588	Very Satisfactory
Activity Card	3.5500	0.46807	Very Satisfactory
Assessment Card	3.6389	0.43712	Very Satisfactory
Enrichment Card	3.5833	0.42935	Very Satisfactory
Answer Card	3.5556	0.45690	Very Satisfactory
Reference Card	3.7500	0.40514	Very Satisfactory
Overall	3.6486	0.35490	Very Satisfactory

Based on the table 13, the mean satisfaction rating of the overall quality of the E-SIM is 3.6486. According to the mean intervals and verbal interpretations in table 10, it falls under the interval 3.2600 to 4 which is interpreted as “very satisfactory”. The utilization of SIM in Mathematics was found effective in addressing the skills of students in solving basic operations of integers (Candido, 2023). The SIM can be innovated into Electronic Strategic Intervention Material (E- SIM) to improve skills of students in solving integers. (Cañeda et al, 2024). The E-SIM have components which are title card, guide card, activity card, assessment card, enrichment card, answer card, and reference card. The mean satisfaction ratings of each component fall under the interval 3.26 to 4 which is interpreted also as “very satisfactory”.

CHAPTER FOUR

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

This section describes the following: (1) the summary of findings, (2) the conclusions, and (3) the recommendations.

➤ *The Summary of Findings*

Based on the results and discussions, the researcher arrived at the following findings:

- *What is the Level of Skills of Students in Solving Basic Operations on Integers?*

The level of skills of students in solving basic operations on integers is unsatisfactory. Students are good in adding integers. The level of their skills in addition operations is satisfactory. However, they are not good in subtracting, multiplying, and dividing integers. The levels of their skills in subtraction, multiplication, and division operations are all unsatisfactory. Hence, students are worst in solving order of operations and word problems involving integers. The level of their skills in solving order of operations is very unsatisfactory. The level of their skills in solving word problems is unsatisfactory but almost near to unsatisfactory.

- *What are the Acceptable Criteria to be Considered in Designing (Planning) the E-SIM in Solving Basic Operations on Integers According to Experts?*

According to experts, all criteria stated in the survey form are very acceptable to be considered in designing the E-SIM in solving basic operations on integers. The criteria that are very acceptable to be considered in designing the development phase of the E-SIM are the ff: (1) The intervention material should be aligned with the learning needs of the students. (2) The intervention material should be aligned with the learning objectives. (3) The quality of the intervention material plan should be good. (4) The procedure for developing the intervention material should be presented with step-by-step instruction. (5) The content of the intervention material should be evident based. (6) The cost of developing the intervention material should be reasonable. (7) The duration of developing the intervention material should be acceptable. The following criteria are very acceptable to be considered in designing the implementation phase of the E-SIM: (1) The intervention material should be accessible for students. (2) The respondents who will utilize the material should be junior high school students. (3) The quality of the developed and validated intervention material should be good. (4) The procedure for implementing the intervention material should be clearly indicated. (5) The duration of implementing the intervention material should be acceptable. These criteria are very acceptable to be considered in designing the evaluation phase of the E-SIM: (1) The evaluation tool for the effectiveness of intervention material should be valid. (2) The evaluation tool for the effectiveness of intervention material should be reliable. (3) The quality of the implementation of intervention material should be good. (4) The procedure for evaluating the effectiveness of intervention material should be clearly indicated. (5) The duration of evaluating the effectiveness of intervention material should be acceptable.

- *What is the Quality Level of the Developed E-SIM in Solving Basic Operations on Integers Based on the Experts' Review?*

The quality level of the developed E-SIM in solving basic operations on integers based on the experts' review is very satisfactory. The very satisfactory rating of the overall E-SIM can be observed from the high quality of its components. The quality levels of title card, guide card, activity card, assessment card, enrichment card, answer card, and reference card are all very satisfactory. The developed E-SIM have good quality content. Aside from questions to answer, it also has video lessons that can guide the students in their study. Moreover, the developed E-SIM is interactive. It has hyperlinks and macros which add excitement and joys to the students while they are studying.

➤ *The Conclusions*

Based on the enumerated findings, the researcher formulated the following conclusions:

- Most students in junior high school do not know how to solve basic operations on integers.
- The acceptable criteria to be considered in developing an E-SIM are the following: (1) alignment with the learning needs of the students, (2) alignment with the learning objectives, (3) quality of the intervention material plan, (4) procedure of developing the intervention material, (5) content of the intervention material, (6) cost of developing the intervention material, and (7) duration of developing the intervention material. The following are the acceptable criteria to be considered in implementing a developed E-SIM: (1) accessibility to students, (2) nature of the respondents, (3) validity of the intervention material, (4) procedure for implementing the intervention material, and (5) duration of implementing the intervention material. These are the acceptable criteria to be considered in evaluating the implemented E-SIM: (1) validity of the evaluation tool for measuring the effectiveness, (2) reliability of the evaluation tool for measuring the effectiveness, (3) quality of the implementation, (4) procedure of implementing the intervention material, and (5) duration of evaluating the intervention material.
- Based on the experts' review, the developed E-SIM in solving basic operations on integers is ready for implementation.

➤ *The Recommendations*

Based on the formulated conclusions, the researcher made the following recommendations:

- Students should study well the topic about solving basic operations on integers. Teachers should include the topic about solving of basic operations on integers in the review part of the actual teaching (if it is relevant), intervention, and remediation process. School administrators should mentor the teachers to enhance their actual teaching, intervention, and remediation process about solving basic operations on integers. Future researchers should conduct more researches about improving the skills of students in solving basic operations on integers.
- Students should be aware of the basic way of using the E- SIM. Teachers should plan how to implement the E- SIM properly. School administrators should manage the inclusion of the E- SIM as learning resources for intervention programs. Future researchers should conduct more researches about the designing of E- SIM.
- Students should use the developed E-SIM in their studying of lessons. Teachers should implement the developed E-SIM during the intervention process. School administrators should include the developed E- SIM as learning resources for intervention programs. Future researchers should conduct more researches about the development of E- SIM.

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APPENDIX

APPENDIX A

Pre-Oral Revision Matrix



National Teachers College

Graduate Program, School of Teacher Education

National Teacher College

Graduate Program of School of Teacher Education

REVISION MATRIX

Student Name: Eugene M. Bugayong

Program: Master of Arts in Education Major in Mathematics

Research Presentation: Pre-Oral Presentation

Sem / SY / Date: 1st Semester AY 2023-2024

Research Title: Electronic Strategic Intervention Material (E-SIM) in Solving Basic Operations in Integers

Panelists' Recommendation	Plan of Action	Page Number	Remarks
From Dr. Dennis G. Caballes			
*Pls highlight the novelty of the paper: the integration of Fundamentals of Matatag Curriculum.	*The researcher will input the novelties in the scope and limitation part. These are integrating fundamentals of the Matatag curriculum, video lessons, and the Damath app.	17-18	
*Pls indicate the research gap of other studies in the RRL which can be filled with my new study.	*The researcher will insert the research gaps and the solution plans in the synthesis part of RRL. These research gaps are a lack of guidance in studying students and not integration into other fundamentals of the Matatag curriculum.	10-12	
From Dr. Eric G. Teñoso			

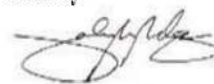
*It should be clear in the study how will the teacher and students utilize the E-SIM.	*The process of utilization of E-SIM will be explained in the last part of the theoretical framework. Not only the implementation but also the analysis, design, development, and evaluation are elaborated in the theoretical framework.	13-14	
*Elevate more the E-SIM which shows more novelty.	*Aside from scope and limitation, the novelty will be elaborated in the last part of the introduction and background of the study. These are integrating fundamentals of the Matatag curriculum, video lessons, and the Damath app.	3-4	
From Dr. Nicanor M. San Gabriel			
*Revise the topic or skill in solving linear equations. Choose a topic or skill that will encompass other difficulties in Math.	*The researcher will change the topic from linear equations to integers. The topic of integers will encompass almost all algebraic topics in Mathematics. This change will be indicated in almost all parts of the thesis, especially in the title part.	Every page number with phrase solving linear equations	

Prepared by:



EUGENE M. BUGAYONG
LPT
Researcher

Noted by:

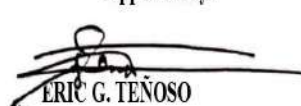


JOHN RAINIER P. RIZARDO
LPT, EdD
Adviser

Approved by:



DENNIS G. CABALLES
LPT, MAT, PhD, Postdoc
Panelist



ERIC G. TEÑOSO
LPT, EdD
Panelist



NICANOR M. SAN GABRIEL
LPT, EdD
Panelist

APPENDIX B

Access for E- SIM

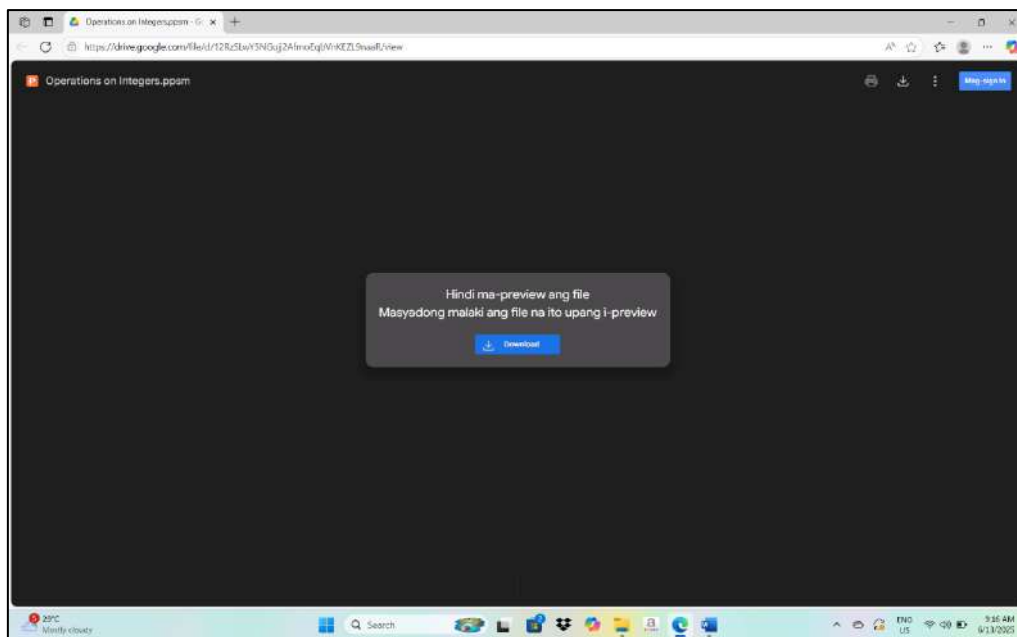
➤ **Instruction:**

Click the link below using laptop. Smartphone may also be used as long as the MS Power Point is updated. Make sure that there is also an internet connection and enough memory space.

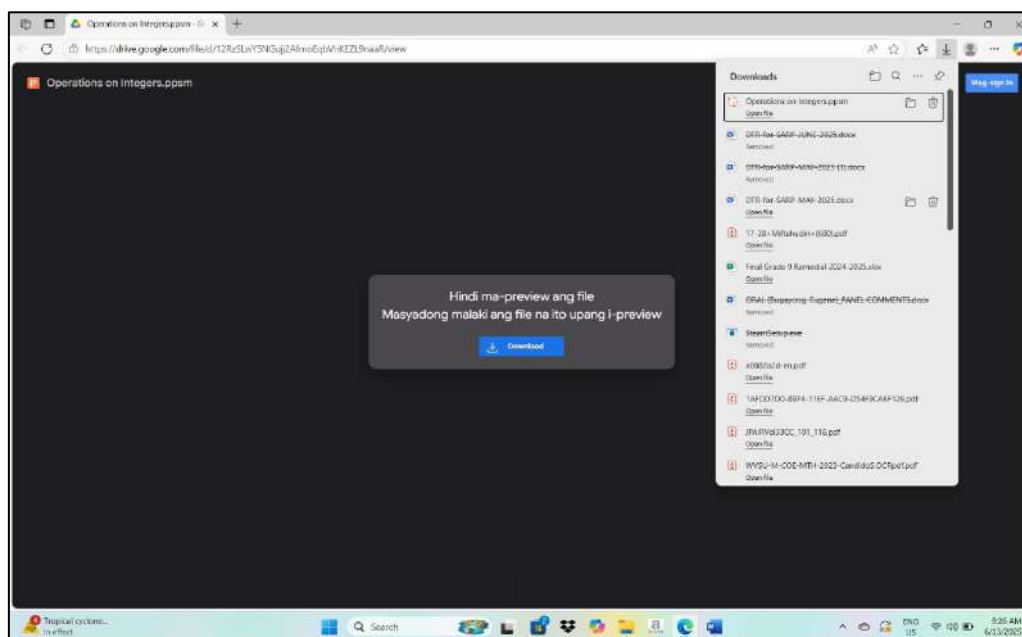
➤ **Link:**

https://drive.google.com/file/d/1Hzpwb65z5bAb_cOCmoadDGTE-F2N3MFK/view?usp=drive_link

- Click the “download” button.



- After downloading, click the “open file”.



- If there is a dialog box that appears about enabling the Macros, click it.
- Once the file is open, click the appearing buttons for next slides. Watch the videos and answer the questions. Have fun!

APPENDIX C**REVISED RESEARCH INSTRUMENTS****Solving Operations on Integers**

Name: _____ Score: _____
 Grade and Section: _____ Date: _____

Part 1: Data Privacy Consent

The researcher will assure the privacy and security of any sensitive data. In case there are sensitive issues involved in the study, the researcher will address those ethical issues. All information and responses to be filled up by the participants will be remained confidential and anonymous under the Data Privacy Act. These information and responses will be protected from any illegal leakage under the Data Protection Law.

I hereby allow/ authorize the researcher to use, collect, and process the information for legitimate purposes specifically for research, and allow authorized personnel to process the information.

 Respondent's Printed Name and Signature

Part 2: Test Proper

Directions: Please read the following mathematical questions, then solve them. Write your answer on a $\frac{1}{2}$ lengthwise. Use an extra sheet if you have written solutions. Each correct item number is worth 1 pt.

- 1) What is the sum of 21 and 20?
- 2) What is the sum of 25 and 23?
- 3) What is the result if -17 is added to -11?
- 4) What is the result if -19 is added to -14?
- 5) Solve: $16 + (-11)$
- 6) Solve: $-9 + 3$
- 7) What is the difference if 18 is subtracted from 27?
- 8) What is the difference if 21 is subtracted from 29?
- 9) What is the result in 13 minus 18?
- 10) What is the result in 17 minus -12?
- 11) Perform the indicated operation: $-9 - 6$
- 12) Perform the indicated operation: $-7 - (-2)$
- 13) What is the product of 20 and 24?
- 14) What is the product of 23 and 26?
- 15) What is the result in -15 times -11?
- 16) What is the result in -18 times -13?
- 17) Evaluate: $-15(12)$
- 18) Evaluate: $9(-7)$
- 19) What is the quotient if 40 is divided by 8?
- 20) What is the quotient if 54 is divided by -9?
- 21) What is the result in -49 divided by 7?
- 22) What is the result in -64 divided by -8?
- 23) Simplify: $-35 \div 7$
- 24) Simplify: $42 \div -6$
- 25) Solve: $-15 + (-8) - 16$
- 26) Perform the indicated operations: $\frac{-13(-8)}{4}$
- 27) Evaluate: $7(-17 + -11)$
- 28) Simplify: $\frac{15 - (-9)}{-6}$
- 29) Solve: $2[-12 + (-5)] - 14$
- 30) Perform the indicated operations: $\frac{-3(10 - 16)}{9}$
- 31) Evaluate: $3[-9 - (-2)] + 12$
- 32) Simplify: $\frac{-16 + 7}{11 - 14}$
- 33) Lito bought a notebook which costs Php 27. If his change was Php 73, how much money did he give to the cashier?
- 34) Lita is 52 years old. How many more years did she need to be a qualified as senior citizen which is 60 years old?
- 35) The tens digit of a 2-digit number is thrice its unit digit. If the unit digit is 3, what is the tens digit?
- 36) The total distance that an athlete should run in the oval is 16 km. If there are 8 laps to be accomplished, what is the distance of each lap?
- 37) The cost of an apple in a market is Php 15. Lester bought 7 apples. How much is his change if he gave a 500-peso bill to the cashier?
- 38) Liza is 26 years old. Lyka is half the age of Liza. What is the sum of their age?
- 39) The tens digit of a 2-digit number is quadruple its unit digit. If the unit digit is 2, what is the sum of the digits?
- 40) A car racer should accomplish a total distance of 21 km- route in a race. If the car racer had already finished 15 km and there are 2 remaining laps, what is the distance of each lap?

Criteria for Designing and Quality Level of the E-SIM Based on the Expert Review**Data Privacy Consent**

The researcher will assure the privacy and security of any sensitive data. In case there are sensitive issues involved in the study, the researcher will address those ethical issues. All information and responses to be filled up by the participants will be remained confidential and anonymous under the Data Privacy Act. These information and responses will be protected from any illegal leakage under the Data Protection Law.

I hereby allow/ authorize the researcher to use, collect, and process the information for legitimate purposes specifically for research, and allow authorized personnel to process the information.

Respondent's Printed Name and Signature

Personal Information

Name: _____

Age: _____ Sex: _____

Highest Educational Attainment (Please check only one based on your highest degree)

Master's Degree

____ Complete Academic Requirements

____ Graduated

Doctorate Degree

____ Complete Academic Requirements

____ Graduated

Post Doctorate Degree

____ Enrolled

____ Graduated

Course: _____

Workplace: _____

Position: _____

Contact Number: _____

Email Address: _____

Present Home Address: _____

First Survey Form

Instruction: Please rate each of the following statements below based on its level of agreement as criteria for designing (planning) the E-SIM. The rating "4" is the highest which strongly agrees with the statement as criteria. The rating "1" is the lowest which strongly disagrees with the statement as criteria. Please encircle the numbers.

	Very Acceptable	Acceptable	Unacceptable	Very Unacceptable
Design (Plan) for Development				
The intervention material should be aligned with the learning needs of the students.	4	3	2	1
The intervention material should be aligned with the learning objectives.	4	3	2	1
The quality of the intervention material plan should be good.	4	3	2	1
The procedure for developing the intervention material should be presented with step-by-step instruction.	4	3	2	1
The content of the intervention material should be evident based.	4	3	2	1
The cost of developing the intervention material should be reasonable.	4	3	2	1
The duration of developing the intervention material should be acceptable.	4	3	2	1

Design (Plan) for Implementation				
The intervention material should be accessible for students.	4	3	2	1
The respondents who will utilize the material should be junior high school students.	4	3	2	1
The quality of the developed and validated intervention material should be good.	4	3	2	1
The procedure for implementing the intervention material should be clearly indicated.	4	3	2	1
The duration of implementing the intervention material should be acceptable.	4	3	2	1

Design (Plan) for Evaluation				
The evaluation tool for the effectiveness of intervention material should be valid.	4	3	2	1
The evaluation tool for the effectiveness of intervention material should be reliable.	4	3	2	1
The quality of the implementation of intervention material should be good.	4	3	2	1
The procedure for evaluating the effectiveness of intervention material should be clearly indicated.	4	3	2	1
The duration of evaluating the effectiveness of intervention material should be acceptable.	4	3	2	1

Second Survey Form

Instruction: Please rate the quality of the developed E-SIM based on the given criteria below. Please refer to the PPT file sent as the developed E-SIM to be evaluated. The rating "4" is the highest which strongly shows agreement with the given criteria. The rating "1" is the lowest which strongly shows disagreement with the given criteria. Please encircle the numbers. Also, please write your comments and suggestions if you have:

	Very Satisfactory	Satisfactory	Unsatisfactory	Very Unsatisfactory
Title Card				
The title is aligned with the learning needs of the students.	4	3	2	1
The title is anchored from the MELC (Most Essential Learning Competencies) from the DEPED Math Curriculum.	4	3	2	1
The title is written accurately in terms of grammar, punctuations, and capitalizations.	4	3	2	1
Comments and Suggestions:				

	Very Satisfactory	Satisfactory	Unsatisfactory	Very Unsatisfactory
Guide Card				
The learning objectives are aligned with the title.	4	3	2	1
The learning objectives are SMART (specific, measurable, attainable, result-oriented, and time-bound)	4	3	2	1
The general instructions for utilization of intervention material are clearly indicated.	4	3	2	1
Comments and Suggestions:				

Activity Card				
The video lessons and activities are aligned with the guide card's learning objectives.	4	3	2	1
The content of the video lessons is well explained and concise.	4	3	2	1
The quality of the pictures and sounds of the video lessons are good.	4	3	2	1
The activities are integrated with the features of the MATATAG Curriculum (language, reading, makabansa, and GMRC).	4	3	2	1
The activities are interactive.	4	3	2	1
Comments and Suggestions:				

Assessment Card				
The questions are aligned with the guide card's learning objectives.	4	3	2	1
The difficulty level of each question is appropriate.	4	3	2	1
The questions are organized based on the degree of difficulty.	4	3	2	1
Comments and Suggestions:				

Enrichment Card				
The questions are aligned with the guide card's learning objectives.	4	3	2	1
The questions measure the students' HOTS (higher order thinking skills).	4	3	2	1
The questions are organized based on the degree of difficulty.	4	3	2	1
Comments and Suggestions:				

Answer Card				
The answers to the activities from the activity card are correct.	4	3	2	1
The answers to the questions from the assessment and enrichment card are correct.	4	3	2	1
The answers are listed properly based on the category of questions (activity, assessment, or enrichment).	4	3	2	1
Comments and Suggestions:				

Reference Card				
The sources are credible based on the credential of authors, materials, or sites.	4	3	2	1
The sources are encoded in APA format.	4	3	2	1
The sources are listed in alphabetical order.	4	3	2	1
Comments and Suggestions:				

I hereby certify that my ratings above are all valid.

Respondent's Printed Name and Signature

APPENDIX D

LETTER TO VALIDATORS

 THE NATIONAL TEACHERS COLLEGE
Nepomuceno St, Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

January 25, 2024

Riza R. Noceto
Master Teacher II
San Joaquin Kalawaan High School
Lope K. Santos St, San Joaquin, Pasig City

Madam:

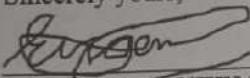
Good day!

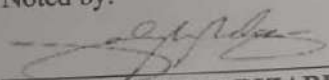
I am one of the students at the National Teacher College currently taking Master of Arts in Education Major in Mathematics. I am writing a thesis titled **"ELECTRONIC STRATEGIC INTERVENTION MATERIAL (E-SIM) IN SOLVING BASIC OPERATIONS ON INTEGERS"** as a final requirement of the course.

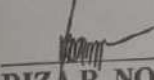
In line with this, I would like to request assistance to validate the diagnostic test in solving basic operations on integers as one of my research instruments. Your expertise and experience in the field of teaching and research will contribute to the improvement of the research instrument. Attached herewith are the diagnostic test and the validation form.

I am hoping for your constructive response and feedback.

Thank you and God bless.

Sincerely yours,

EUGENE MONTEMAYOR BUGAYONG, LPT
Researcher

Noted by:

JOHN RANIER P. RIZARDO, LPT, EdD
Thesis Adviser

Approved by:

RIZA R. NOCETO, LPT, EdD
Validator



THE NATIONAL TEACHERS COLLEGE
Nepomuceno St, Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

January 25, 2024

Kenedy M. Cayabyab

Master Teacher 1

San Joaquin Kalawaan High School

Lope K. Santos St, San Joaquin, Pasig City

Sir:

Good day!

I am one of the students at the National Teacher College currently taking Master of Arts in Education Major in Mathematics. I am writing a thesis titled **"ELECTRONIC STRATEGIC INTERVENTION MATERIAL (E-SIM) IN SOLVING BASIC OPERATIONS ON INTEGERS"** as a final requirement of the course.

In line with this, I would like to request assistance to validate the diagnostic test in solving basic operations on integers as one of my research instruments. Your expertise and experience in the field of teaching and research will contribute to the improvement of the research instrument. Attached herewith are the diagnostic test and the validation form.

I am hoping for your constructive response and feedback.

Thank you and God bless.

Sincerely yours,

EUGENE MONTEMAYOR BUGAYONG, LPT
Researcher

Noted by:

JOHN RANIER P. RIZADO, LPT, EdD
Thesis Adviser

Approved by:

KENEDY M. CAYABYAB, LPT, EdD
Validator



THE NATIONAL TEACHERS COLLEGE
Nepomuceno St, Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

January 25, 2024

Zarlje B. Morales

Master Teacher 1

San Joaquin Kalawaan High School

Lope K. Santos St, San Joaquin, Pasig City

Sir:

Good day!

I am one of the students at the National Teacher College currently taking Master of Arts in Education Major in Mathematics. I am writing a thesis titled "**ELECTRONIC STRATEGIC INTERVENTION MATERIAL (E-SIM) IN SOLVING BASIC OPERATIONS ON INTEGERS**" as a final requirement of the course.

In line with this, I would like to request assistance to validate the diagnostic test in solving basic operations on integers as one of my research instruments. Your expertise and experience in the field of teaching and research will contribute to the improvement of the research instrument. Attached herewith are the diagnostic test and the validation form.

I am hoping for your constructive response and feedback.

Thank you and God bless.

Sincerely yours,

EUGENE MONTEMAYOR BUGAYONG, LPT
Researcher

Noted by:

JOHN RANIER P. RIZADO, LPT, EdD
Thesis Adviser

Approved by:

Zarlje B. Morales, LPT
Validator



THE NATIONAL TEACHERS COLLEGE
Nepomuceno St. Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

January 25, 2024

Maila N. Unsay

Professor

Pamantasan ng Lungsod ng Pasig

Alcalde Jose St, Kapasigan, Pasig City

Madam:

Good day!

I am one of the students at the National Teacher College currently taking Master of Arts in Education Major in Mathematics. I am writing a thesis titled "**ELECTRONIC STRATEGIC INTERVENTION MATERIAL (E-SIM) IN SOLVING BASIC OPERATIONS ON INTEGERS**" as a final requirement of the course.

In line with this, I would like to request assistance to validate the survey form in determining the criteria for designing and quality level of the E-SIM based on the expert review as one of my research instruments. Your expertise and experience in the field of teaching and research will contribute to the improvement of the research instrument. Attached herewith are the diagnostic test and the validation form.

I am hoping for your constructive response and feedback.

Thank you and God bless.

Sincerely yours,

EUGENE MONTEMAYOR BUGAYONG, LPT
Researcher

Noted by:

JOHN RANIER P. RIZARDO, LPT, EdD
Thesis Adviser

Approved by:

MAILA N. UNSAY, LPT, MAME, EdD
Validator



THE NATIONAL TEACHERS COLLEGE
Nepomuceno St, Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

January 25, 2024

Anna Lee G. Baguio

Professor

Pamantasan ng Lungsod ng Pasig

Alcalde Jose St, Kapasigan, Pasig City

Madam:

Good day!

I am one of the students at the National Teacher College currently taking Master of Arts in Education Major in Mathematics. I am writing a thesis titled **"ELECTRONIC STRATEGIC INTERVENTION MATERIAL (E-SIM) IN SOLVING BASIC OPERATIONS ON INTEGERS"** as a final requirement of the course.

In line with this, I would like to request assistance to validate the survey form in determining the criteria for designing and quality level of the E-SIM based on the expert review as one of my research instruments. Your expertise and experience in the field of teaching and research will contribute to the improvement of the research instrument. Attached herewith are the diagnostic test and the validation form.

I am hoping for your constructive response and feedback.

Thank you and God bless.

Sincerely yours,

EUGENE MONTEMAYOR BUGAYONG, LPT
Researcher

Noted by:

JOHN RANIER P. RIZADO, LPT, EdD
Thesis Adviser

Approved by:

Anna Lee G. Baguio
Validators' Printed Name and Signature



THE NATIONAL TEACHERS COLLEGE
Nepomuceno St. Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

January 25, 2024

Erwin C. Lugtu

Assistant School Principal II

Former Master Teacher II

Buting Senior High School

A Santos St, Buting, Pasig City

Sir:

Good day!

I am one of the students at the National Teacher College currently taking Master of Arts in Education Major in Mathematics. I am writing a thesis titled **"ELECTRONIC STRATEGIC INTERVENTION MATERIAL (E-SIM) IN SOLVING BASIC OPERATIONS ON INTEGERS"** as a final requirement of the course.

In line with this, I would like to request assistance to validate the survey form in determining the criteria for designing and quality level of the E-SIM based on the expert review as one of my research instruments. Your expertise and experience in the field of teaching and research will contribute to the improvement of the research instrument. Attached herewith are the diagnostic test and the validation form.

I am hoping for your constructive response and feedback.

Thank you and God bless.

Sincerely yours,

EUGENE MONTEMAYOR BUGAYONG, LPT
Researcher

Noted by:

JOHN RANIER P. RIZARDO, LPT, EdD
Thesis Adviser

Approved by:

ERWIN C. LUGTU, LPT, MSME
Validator

APPENDIX E**VALIDATION FORMS**



THE NATIONAL TEACHERS COLLEGE
Nepomuceno St. Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

VALIDATION FORM

RESEARCHER:	Eugene M. Bugayong	VALIDATOR:	Riza R. Noceto
OCCUPATION:	Teacher	OCCUPATION:	Master Teacher
WORKPLACE:	San Joaquin-Kalawaan High School	WORKPLACE:	San Joaquin-Kalawaan High School
SCHOOL:	National Teachers College (Graduate Program, School of Teacher Education)		
COURSE:	Master of Arts in Education Major in Mathematics		

ELECTRONIC STRATEGIC INTERVENTION MATERIALS (E-SIM) IN SOLVING BASIC OPERATIONS ON INTEGERS

Diagnostic Test in Solving Basic Operations on Integers

Directions: Rate the diagnostic test based on each indicated criterion. Use the scale below. Please check (/) the boxes.

5	Strongly Agree
4	Agree
3	Neither
2	Disagree
1	Strongly Disagree

CONTENT VALIDITY					
Criteria	Rate				
	5	4	3	2	1
The test measures the variable of what is intended to measure.	✓				
The coverage items of the test are distributed properly.		✓			
The answer key is correct.		✓			
The type of question is appropriate.		✓			
The directions of the test are clear.		✓			

Comments and Suggestions:

Please provide a table of Specification.



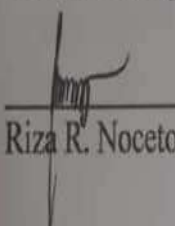
THE NATIONAL TEACHERS COLLEGE
Nepomuceno St, Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

FACE VALIDITY					
Criteria	Rate				
	5	4	3	2	1
Statements are grammatically correct.		✓			
Punctuation marks and other symbols used are correct.	✓				
The font style of the texts is readable.	✓				
The font size of the texts is appropriate.	✓				
Margins and spacing are appropriate.	✓				

Comments and Suggestions:

Please take note of the comment provided in the instrument.
You may revise items 34, 35 and 39.

Validators Signature:


 Riza R. Noceto



THE NATIONAL TEACHERS COLLEGE
Nepomuceno St. Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

VALIDATION FORM

RESEARCHER:	Eugene M. Bugayong	VALIDATOR:	Kenedy M. Cayabyab
OCCUPATION:	Teacher	OCCUPATION:	Master Teacher
WORKPLACE:	San Joaquin-Kalawaan High School	WORKPLACE:	San Joaquin-Kalawaan High School
SCHOOL:	National Teachers College (Graduate Program, School of Teacher Education)		
COURSE:	Master of Arts in Education Major in Mathematics		

ELECTRONIC STRATEGIC INTERVENTION MATERIALS (E-SIM) IN SOLVING BASIC OPERATIONS ON INTEGERS

Diagnostic Test in Solving Basic Operations on Integers

Directions: Rate the diagnostic test based on each indicated criterion. Use the scale below. Please check (/) the boxes.

5	Strongly Agree
4	Agree
3	Neither
2	Disagree
1	Strongly Disagree

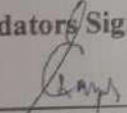


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Nepomuceno St. Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

CONTENT VALIDITY					
Criteria	Rate				
	5	4	3	2	1
The test measures the variable of what is intended to measure.		✓			
The coverage items of the test are distributed properly.	✓				
The answer key is correct.	✓				
The type of question is appropriate.		✓			
The directions of the test are clear.		✓			
Comments and Suggestions:					
You may improve the questions in the item with words.					
To measure/diagnose students needs, the scoring should be checked as:					
Add: /6					
Sub: /6					
Mult: /6					
Div: /6					
Total: /6					

FACE VALIDITY					
Criteria	Rate				
	5	4	3	2	1
Statements are grammatically correct.		✓			
Punctuation marks and other symbols used are correct.		✓			
The font style of the texts is readable.	✓				
The font size of the texts is appropriate.	✓				
Margins and spacing are appropriate.	✓				
Comments and Suggestions:					
Get rid of long paragraphs and grammar errors.					

Validators Signature:


 Kenedy M. Cayabyab



THE NATIONAL TEACHERS COLLEGE
Nepomuceno St. Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

VALIDATION FORM

RESEARCHER:	Eugene M. Bugayong	VALIDATOR:	Zarlie B. Morales
OCCUPATION:	Teacher	OCCUPATION:	Master Teacher
WORKPLACE:	San Joaquin-Kalawaan High School	WORKPLACE:	San Joaquin-Kalawaan High School
SCHOOL:	National Teachers College (Graduate Program, School of Teacher Education)		
COURSE:	Master of Arts in Education Major in Mathematics		

ELECTRONIC STRATEGIC INTERVENTION MATERIALS (E-SIM) IN SOLVING BASIC OPERATIONS ON INTEGERS

Diagnostic Test in Solving Basic Operations on Integers

Directions: Rate the diagnostic test based on each indicated criterion. Use the scale below. Please check (/) the boxes.

5	Strongly Agree
4	Agree
3	Neither
2	Disagree
1	Strongly Disagree

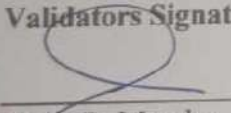


THE NATIONAL TEACHERS COLLEGE
 Nepomuceno St. Quiapo Manila
 GRADUATE PROGRAM
 SCHOOL OF TEACHER EDUCATION

CONTENT VALIDITY					
Criteria	Rate				
	5	4	3	2	1
The test measures the variable of what is intended to measure.	✓				
The coverage items of the test are distributed properly.		✓			
The answer key is correct.	✓				
The type of question is appropriate.	✓				
The directions of the test are clear.	✓				
Comments and Suggestions:					
- IMPROVE / INCREASE THE VARIETY OF QUESTIONS					

FACE VALIDITY					
Criteria	Rate				
	5	4	3	2	1
Statements are grammatically correct.		✓			
Punctuation marks and other symbols used are correct.	✓				
The font style of the texts is readable.	✓				
The font size of the texts is appropriate.	✓				
Margins and spacing are appropriate.	✓				
Comments and Suggestions:					
- HUNDRETHS → HUNDREDS					
- THOUSANDTHS → THOUSANDS					

Validators Signature:


 Zarlie B. Morales



THE NATIONAL TEACHERS COLLEGE
Nepomuceno St, Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

VALIDATION FORM

RESEARCHER:	Eugene M. Bugayong	VALIDATOR:	Maila N. Unsay
OCCUPATION:	Teacher	OCCUPATION:	Professor
WORKPLACE:	San Joaquin-Kalawaan High School	WORKPLACE:	Pamantasan ng Lungsod ng Pasig
SCHOOL:	National Teachers College (Graduate Program, School of Teacher Education)		
COURSE:	Master of Arts in Education Major in Mathematics		

ELECTRONIC STRATEGIC INTERVENTION MATERIALS (E-SIM) IN SOLVING BASIC OPERATIONS ON INTEGERS

Survey Form in Determining the Criteria for Designing and Quality Level of the E-SIM Based on the Expert Review

Directions: Rate the diagnostic test based on each indicated criterion. Use the scale below. Please check (/) the boxes.

5	Strongly Agree
4	Agree
3	Neither
2	Disagree
1	Strongly Disagree

CONTENT VALIDITY

Criteria	Rate				
	5	4	3	2	1
The survey form measures the variable of what is intended to be measured.		✓	✓		
The criteria indicated are clear.		✓			
The scale used is appropriate.	✓				
The type of survey form is appropriate.		✓			
The directions of the survey form are clear.		✓			

Comments and Suggestions:

- (1) Rephrase the statements in each criteria that will respond or be answered by strongly agree, agree, disagree or strongly disagree
- (2) Provide statement that will measure each category e.g. Guide Card, assessment and Enrichment card
- (3) Be consistent with the format
- (4) Statement 1, may be more valid if the students are one who assess the content of the material



THE NATIONAL TEACHERS COLLEGE
Nepomuceno St, Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

FACE VALIDITY					
Criteria	Rate				
	5	4	3	2	1
Statements are grammatically correct.			✓		
Punctuation marks and other symbols used are correct.		✓			
The font style of the texts is readable.	✓				
The font size of the texts is appropriate.	✓				
Margins and spacing are appropriate.		✓			

Comments and Suggestions:

Be consistent with the format - Survey instrument part 2 and part 3 (justify or center)

Validators Signature:

Maila N. Unsay 2/29/24

Maila N. Unsay



THE NATIONAL TEACHERS COLLEGE
Nepomuceno St. Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

VALIDATION FORM

RESEARCHER:	Eugene M. Bugayong	VALIDATOR:	Anna Lee G. Baguio
OCCUPATION:	Teacher	OCCUPATION:	Professor
WORKPLACE:	San Joaquin-Kalawaan High School	WORKPLACE:	Pamantasan ng Lungsod ng Pasig
SCHOOL:	National Teachers College (Graduate Program, School of Teacher Education)		<i>La Consolacion University Philippines</i>
COURSE:	Master of Arts in Education Major in Mathematics		<i>Ph.D in Education Leadership Management - Candidate</i>

ELECTRONIC STRATEGIC INTERVENTION MATERIALS (E-SIM) IN SOLVING BASIC OPERATIONS ON INTEGERS

Survey Form in Determining the Criteria for Designing and Quality Level of the E-SIM Based on the Expert Review

Directions: Rate the diagnostic test based on each indicated criterion. Use the scale below. Please check (/) the boxes.

5	Strongly Agree
4	Agree
3	Neither
2	Disagree
1	Strongly Disagree

CONTENT VALIDITY

Criteria	Rate				
	5	4	3	2	1
The survey form measures the variable of what is intended to be measured.		✓			
The criteria indicated are clear.			✓		
The scale used is appropriate.			✓		
The type of survey form is appropriate.		✓			
The directions of the survey form are clear.		✓			

Comments and Suggestions:

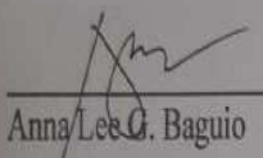
Improve the other statement so that it be fitted for the validation.



THE NATIONAL TEACHERS COLLEGE
Nepomuceno St, Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

FACE VALIDITY					
Criteria	Rate				
	5	4	3	2	1
Statements are grammatically correct.		✓			
Punctuation marks and other symbols used are correct.		✓			
The font style of the texts is readable.		✓			
The font size of the texts is appropriate.		✓			
Margins and spacing are appropriate.		✓			
Comments and Suggestions:					
look for a better word for some of the words used					

Validators Signature:



Anna Lee G. Baguio



THE NATIONAL TEACHERS COLLEGE
Nepomuceno St. Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

VALIDATION FORM

RESEARCHER:	Eugene M. Bugayong	VALIDATOR:	Erwin C. Lugtu
OCCUPATION:	Teacher	OCCUPATION:	Assistant Principal, Former Master Teacher
WORKPLACE:	San Joaquin-Kalawaan High School	WORKPLACE:	Buting Senior High School
SCHOOL:	National Teachers College (Graduate Program, School of Teacher Education)		
COURSE:	Master of Arts in Education Major in Mathematics		

ELECTRONIC STRATEGIC INTERVENTION MATERIALS (E-SIM) IN SOLVING BASIC OPERATIONS ON INTEGERS

Survey Form in Determining the Criteria for Designing and Quality Level of the E-SIM Based on the Expert Review

Directions: Rate the diagnostic test based on each indicated criterion. Use the scale below. Please check (/) the boxes.

5	Strongly Agree
4	Agree
3	Neither
2	Disagree
1	Strongly Disagree

CONTENT VALIDITY

Criteria	Rate				
	5	4	3	2	1
The survey form measures the variable of what is intended to be measured.	✓				
The criteria indicated are clear.		✓			
The scale used is appropriate.	✓				
The type of survey form is appropriate.		✓			
The directions of the survey form are clear.	✓				

Comments and Suggestions:

Please check the notes provided in the survey instrument for clarification and suggestions.



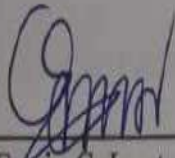
THE NATIONAL TEACHERS COLLEGE
Nepomuceno St. Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

FACE VALIDITY					
Criteria	Rate				
	5	4	3	2	1
Statements are grammatically correct.		✓			
Punctuation marks and other symbols used are correct.		✓			
The font style of the texts is readable.	✓				
The font size of the texts is appropriate.	✓				
Margins and spacing are appropriate.	✓				

Comments and Suggestions:

please check the notes provided in the survey instrument for clarification and suggestions.

Validators Signature:


 Erwin C. Lugtu

APPENDIX F**DIAGNOSTIC TEST VALIDATORS' PROFILE****Name:** Riza Rodrigo Noceto**Age:** 42**Sex:** Female**Contact Number:** 09228898660**Email Address:** riza.noceto@deped.gov.ph**Workplace:** San Joaquin Kalawaan High School**Position:** Master Teacher II**Highest Educational Attainment:** Doctorate Degree (Graduate)**Bachelor's Degree****Course:** Bachelor of Secondary Education major in Mathematics**School:** Pasig Catholic College**Year Graduated:** 2002**Master's Degree****Course:** Master of Arts in Education Major in Mathematics**School:** National Teachers College**Year Graduated:** 2012**Doctorate Degree****Course:** Doctor of Education major in Educational Leadership**School:** National Teachers College**Year Graduated:** 2021**Previous Works**

*Teacher I; San Joaquin-Kalawaan High School; 2004 to 2010

*Teacher II; San Joaquin-Kalawaan High School; 2010 to 2013

*Master Teacher I; San Joaquin-Kalawaan High School; 2013 to 2021

* Master Teacher II; San Joaquin-Kalawaan High School; 2021 to present

Special Awards

*Most Outstanding Researcher 2021

*Most Outstanding Master Teacher SY 2021-2022

*Most Outstanding Research Coordinator- 2022

*Most Outstanding Master Teacher SY 2022-2023

Name: Zarlie Brunio Morales

Age: 49

Sex: Male

Contact Number: 09998890288

Email Address: zarlie1406@yahoo.com

Workplace: San Joaquin Kalawaan High School

Position: Master Teacher I

Highest Educational Attainment: Master's Degree (Comprehensive Exam Passer)

Bachelor's Degree

Course: BS Math for Teachers

School: Philippine Normal University

Year Graduated: 1996

Master's Degree

Course: MA Math Ed

School: Philippine Normal University

Previous Works

*Math Teacher; La Immaculada Concepcion School; 1996 to 1997

*Substitute Math Teacher; M. Roxas High School; 1997 to 1998

*Math Teacher; A. Maceda Integrated School; 1998 to 2004

*Master Teacher; San Joaquin Kalawaan High School; 2004 to present

Special Awards

*Outstanding Teacher

Name: Kenedy Matabang Cayabyab

Age: 40

Sex: Male

Contact Number: 09362910939

Email Address: kenedy.cayabyab@deped.gov.ph

Workplace: San Joaquin Kalawaan High School

Position: Master Teacher I

Highest Educational Attainment: Doctorate Degree (Graduated)

Bachelor's Degree

Course: BSE Math

School: Pangasinan State University (Bayambang)

Year Graduated: 2005

Master's Degree

Course: Master of Arts in Educational Leadership

School: San Carlos College

Year Graduated: 2015

Doctorate Degree

Course: Doctor of Philosophy in Science Education Major in Math

School: De La Salle University

Year Graduated: 2023

Previous Works

* Teacher I; San Joaquin Kalawaan High School; 2009 to 2017

* Master Teacher I; San Joaquin Kalawaan High School; 2017 to 2024

Special Awards

* Outstanding Master Teacher 2017 to 2020

APPENDIX G**SURVEY FORM VALIDATORS' PROFILE****Name:** Maila Nuñez Unsay**Age:** 52**Sex:** Female**Contact Number:** 09176547211**Email Address:** mailadnunsay@gmail.com**Workplace:** Pamantasan ng Lungsod ng Pasig**Position:** Associate Professor II**Highest Educational Attainment:** Doctorate Degree (Graduated)**Bachelor's Degree****Course:** Bachelor of Secondary Education major in Mathematics**School:** Rizal Technological University**Year Graduated:** 1994**Master's Degree****Course:** Master of Arts in Mathematics Education**School:** Rizal Technological University**Year Graduated:** 2005**Doctorate Degree****Course:** Doctor of Philosophy major in Educational Leadership and Management**School:** La Consolacion University Philippines**Year Graduated:** 2024**Previous Works*****Math Teacher;** Nino Jesus House of Studies; 1994 to 2003***Part Time Instructor;** Rizal Technological University; 1999 to 2004***Associate Professor;** Pamantasan ng Lungsod ng Pasig; 2003 to Present**Special Awards*****Outstanding Professor** 2023

Name: Anna Lee Gayondato Baguio

Age: 50

Sex: Female

Contact Number: 09330418141

Email Address:

Workplace: Pamantasan ng Lungsod ng Pasig

Position: Associate Professor II

Highest Educational Attainment: Doctorate Degree (Comprehensive Exam Passer)

Bachelor's Degree

Course: Bachelor of Science in Mathematics

School: Centro Escolar University (Manila Campus)

Year Graduated: 1994

Master's Degree

Course: Master of Arts in Mathematics Education

School: Rizal Technological University

Year Graduated: 2012

Doctorate Degree

Course: Ph.D. in Educational Leadership and Management

School: La Consolacion University Philippines

Year Graduated: On-going

Previous Works

* Instructor VII; STI Shaw; 1997 to 2013

* Associate Professor; Pamantasan ng Lungsod ng Pasig; 2013 to Present

Special Awards

* Faculty with a Heart (STI National Competition) 2004

Name: Erwin Condalor Lugtu

Age: 36

Sex: Male

Contact Number: 09988583294

Email Address: erwinclugtu@gmail.com

Workplace: Buting Senior High School

Position: Assistant School Principal II

Highest Educational Attainment: Doctorate Degree (Comprehensive Exam Passer)

Bachelor's Degree

Course: Bachelor of Science in Mathematics

School: Polytechnic University of the Philippines

Year Graduated: 2008

Master's Degree

Course: Master of Science in Mathematics Education

School: Polytechnic University of the Philippines

Year Graduated: 2014

Doctorate Degree

Course: Doctor of Philosophy in Education Major in Educational Leadership and Management

School: Pamantasan ng Lungsod ng Marikina

Year Graduated:

Previous Works

- * College Instructor; Holy Rosary College Foundation; 2008 to 2012
- * HS Mathematics Teacher; Lourdes School of Mandaluyong; 2012 to 2013
- * Instructor III; Pamantasan ng Lungsod ng Pasig; 2013 to 2016
- * Master Teacher II; Buting Senior High School; 2016 to 2022
- * Assistant School Principal II; Buting Senior High School; 2022 to present

Special Awards

- * Natatanging Guro [School Based] 2017
- * Gawad Pagkilala bilang Gurong Tagapag-ugnay ng Kagawaran ng Sipnayan [School Based] 2019
- * National Excellence Award as Master Teacher [Leadership in Education Academy and Development (LEAD) Philippines] 2020
- * Natatanging Gurong Tagapamahala (Math) [School Based] 2021
- * Exemplary Tutor Awardee (1st Quarter) [DepEd-ICTS] 2021
- * Model Employee Awardee [Division] 2021
- * Outstanding Master Teacher of the Year [Instabright International Guild of Researchers and Educators, Inc.] 2022
- * Outstanding Non-Teaching Personnel [School Based] 2024

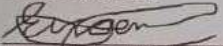
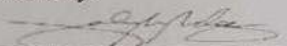
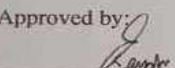
APPENDIX H**DIAGNOSTIC TEST ANSWER KEY**

Answer Key:	32) 3
1) 41	33) Php 100
2) 48	34) 8
3) -28	35) 9
4) -33	36) 2 km
5) 5	37) Php 395
6) -6	38) 39
7) 9	39) 10
8) 8	40) 3 km
9) -5	
10) 29	
11) -15	
12) -5	
13) 480	
14) 598	
15) 165	
16) 234	
17) -180	
18) -63	
19) 5	
20) -6	
21) -7	
22) 8	
23) -5	
24) -7	
25) -39	
26) 26	
27) -196	
28) 4	
29) -48	
30) 2	
31) -9	

APPENDIX I**DIAGNOSTIC TEST TABLE OF SPECIFICATIONS**

Solving Basic Operations on Integers			
Learning Objectives	Topics	Number of Items	Item #
To solve exercises involving fundamental operations on integers	Addition of Integers	6	#1, #2, #3, #4, #5, #6
	Subtraction of Integers	6	#7, #8, #9, #10, #11, #12
	Multiplication of Integers	6	#13, #14, #15, #16, #17, #18
	Division of Integers	6	#19, #20, #21, #22, #23, #24
To apply fundamental operations on integers in solving order of operations	Order of Operations Involving Integers	8	#25, #26, #27, #28, #29, #30, #31, #32
To solve word problems involving basic operations on integers	Word Problems Involving Basic Operations on Integers	8	#33, #34, #35, #36, #37, #38, #39, #40
	Total	40	

APPENDIX J**LETTERS OF PERMISSION FOR RELIABILITY TESTING**

	THE NATIONAL TEACHERS COLLEGE Nepomuceno St. Quiapo Manila GRADUATE PROGRAM SCHOOL OF TEACHER EDUCATION
April 2, 2024	
Kenedy M. Cayabyab Master Teacher 1 San Joaquin Kalawaan High School Lope K. Santos St, San Joaquin, Pasig City	
Sir:	
Good day!	
I am one of the students at the National Teacher College currently taking Master of Arts in Education Major in Mathematics. I am writing a thesis titled "ELECTRONIC STRATEGIC INTERVENTION MATERIAL (E-SIM) IN SOLVING BASIC OPERATIONS ON INTEGERS" as a final requirement of the course.	
In line with this, I would like to ask permission from you to allow me to conduct reliability testing (pilot testing) of one of my research instruments in all your handled students. My research instrument is a diagnostic test which will determine the learning needs of the students in solving basic operations on integers. It is already validated by the experts. The respondents for the reliability testing will be the students coming from grade 10 sections G. Trono, D. Ocampo, E. Gomez, F. Fronda, and L. Belardo of San Joaquin Kalawaan High School.	
Your approval of the above-mentioned request will be highly appreciated.	
Thank you and God bless.	
Sincerely yours,  EUGENE MONTEMAYOR BUGAYONG, LPT Researcher	
Noted by:  JOHN RANIER P. RIZARDO, LPT, EdD Thesis Adviser	
Approved by:  KENEDY M. CAYABYAB Master Teacher 1	



THE NATIONAL TEACHERS COLLEGE
Nepomuceno St. Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

April 2, 2024

Romela M. Cruz
Schools Division Superintendent
Department of Education- National Capital Region
Schools Division Office- Mandaluyong City

Madam:

Good day!

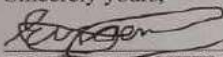
I am one of the students at the National Teacher College currently taking Master of Arts in Education Major in Mathematics. I am writing a thesis titled **"ELECTRONIC STRATEGIC INTERVENTION MATERIAL (E-SIM) IN SOLVING BASIC OPERATIONS ON INTEGERS"** as a final requirement of the course.

In line with this, I would like to ask permission from your kind office to allow me to conduct reliability testing (pilot testing) of one of my research instruments in all junior high schools under SDO- Mandaluyong City. My research instrument is a survey form which will determine the criteria in designing and the quality level of the developed E-SIM. It is already validated by the experts. The respondents for the reliability testing will be some master teachers in Mathematics at all junior high schools under SDO- Mandaluyong City. Attached herewith are the revised researched instruments, validation forms, thesis proposal, and the E-SIM.

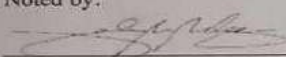
Your approval of the above-mentioned request will be highly appreciated.

Thank you and God bless.

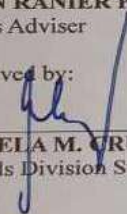
Sincerely yours,


EUGENE MONTEMAYOR BUGAYONG, LPT
Researcher eugenebugayong28@gmail.com , 09665517986

Noted by:


JOHN RANIER P. RIZADO, LPT, EdD
Thesis Adviser

Approved by:


ROMELA M. CRUZ, EdD, CESO VI
Schools Division Superintendent

56024-296

SCHOOLS DIVISION OFFICE MANDALUYONG
RECORDS SECTION
RECEIVED
BY: CAROL A.
DATE: APR 08 2024 12:40

APPENDIX K**LETTER OF ENDORSEMENT FOR RELIABILITY TESTING**



Republic of the Philippines
Department of Education
 NATIONAL CAPITAL REGION
SCHOOLS DIVISION OF MANDALUYONG CITY

R24-04-16

SCHOOLS DIVISION OFFICE MANDALUYONG
 RECORDS SECTION
 RELEASED
 APR 11 2024
 TIME 5:00

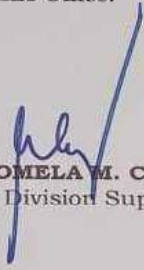
1st Endorsement

April 11, 2024

Respectfully referred to the **SECONDARY SCHOOL HEADS IN THIS DIVISION** the herein attached communication of **EUGENE MONTEMAYOR BUGAYONG** of **NATIONAL TEACHERS COLLEGE** in connection to his request to conduct a study in this division in relation to his research study titled **"ELECTRONIC STRATEGIC INTERVENTION MATERIAL (E-SIM) IN SOLVING BASIC OPERATIONS ON INTEGERS."**

This Office interposes no objection to the above-mentioned request provided that:

1. The schedule of classes should be strictly followed. Interviews should be undertaken outside class hours.
2. Priority is given to school activities and functions of personnel to their duties and responsibilities.
3. No office materials will be used.
4. Participation of learners and teachers from public schools **shall be purely voluntary and will not hamper instructional time** in compliance with the provisions of *DepEd Order (DO) No. 34, s. 2022 titled School Calendar and Activities for the School Year 2022-2023* and *DO 9, s. 2005 titled Instituting Measures to Increase Engaged Time-on-Task and Ensuring Compliance Therewith and the policy on off-campus activities stated in DO 66, s. 2017.*
5. Ethical considerations related to this research shall be strictly observed by all persons involved in this study as stipulated in *D.O. No. 16, s. 2017, Research Management Guidelines.*
6. A **copy of the research** will be furnished to this Office.


ROMELA M. CRUZ
 Schools Division Superintendent





Address: Calbayog St. Brgy. Highway Hills, Mandaluyong City
Email: sdo.mandaluyong@deped.gov.ph
Website: www.depedmandaluyong.org

APPENDIX L**ETHICS REVIEW FORM**

The National Teachers College

629 J. Nepomuceno St., Quiapo, Manila

**Office of the Vice President for Academic Affairs
Research and Publications**

RESEARCH ETHICS REVIEW FORM

Name of Researcher/s: <u>Eugene M. Bugayong</u>	
Title of the Study: <u>Electronic Strategic Intervention Materials (E-SIM) in Solving Basic Operations on Integers</u>	
Affiliation: <u>San Joaquin Kalawaan High School</u>	
Email Address: <u>eugenebugayong28@gmail.com</u>	Contact Number: <u>09665517986</u>
References	
Name (SN, FN MI)	Affiliation/Contact Number
<u>Morales, Zarlie B.</u>	<u>Master Teacher/ 09998890288</u>
<u>Tuando, Roberta B.</u>	<u>Head Teacher/ 09652001011</u>
Student Details (if applicable)	
Degree Program: <u>Master of Arts in Education Major in Mathematics</u>	Department: <u>Graduate Program, School of Teacher Education</u>
Adviser's Name: <u>John Rainier P. Rizado, LPT, EdD</u>	Adviser's Email Address and Contact Number: <u>jp.rizado@ntc.edu.ph</u>

INDICATORS	ACTION TAKEN (to be accomplished by researcher)	COMPLIANCE (to be accomplished by reviewer)		COMMENTS (to be accomplished by reviewer)	REMARKS (to be accomplished by reviewer)
		Yes	No		
1. CONSENT AND CONFIDENTIALITY The research study					
1.1 provides guidelines on how to inform the participants on the purpose and output of the study	The researcher creates a letter of permission for data gathering and letter of consent for participants which both state the study's purpose and output. The letter of permission for data gathering is found in Appendix P page 95. The letter of consent for participants is found in Appendix Q page 96-100.				
1.2 provides plan on how participants will be informed on their inclusion to the study	The researcher inputs the data gathering procedure which states the study's plan in informing the participants on their inclusion to the research. The data gathering procedure is found in Chapter 2 Research Methodology page 24- 25.				
1.3 assures on the privacy and	The researcher				

security of sensitive data	inputs the data privacy consent in both diagnostic test and survey form instruments. The diagnostic test is found in Appendix C page 33- 34. The survey form is found in Appendix C page 35- 39.				
1.4 provides consent form to the participants of their voluntary participation in the study	The researcher creates a letter of consent for participants which states the checklist for allowing or not allowing the respondents to participates. The letter of consent for participants is found in appendix Q page 96- 100.				
1.5 addresses ethical issues in case there are sensitive issues involved in the study	The researcher inputs the data privacy consent in both diagnostic test and survey form instruments. The diagnostic test is found in Appendix C page 33- 34. The survey form is found in Appendix C page 35- 39.				
1.6 provides detailed arrangements to preserve confidentiality and anonymity of the participants and	The researcher inputs the data privacy consent in both				

potentially affected individual	diagnostic test and survey form instruments. The diagnostic test is found in Appendix C page 33- 34. The survey form is found in Appendix C page 35- 39.				
1.7 complies with Data Protection Law	The researcher inputs the data privacy consent in both diagnostic test and survey form instruments. The diagnostic test is found in Appendix C page 33- 34. The survey form is found in Appendix C page 35- 39.				
2. RESEARCH DESIGN & METHODOLOGY The research study					
2.1 addresses ethical and legal dimensions of the process of collecting, analyzing and storing the data	The researcher inputs the data gathering procedure which states the ethical and legal dimensions of collecting, analyzing and storing the data. The data gathering procedure is found in Chapter 2 Research Methodology page 24- 25.				
2.2 manifests no biases in	The researcher				

instruments or data collection tools	inputs the sampling technique and respondents of the study. Both states the selection of students handled from other teachers of Grade 10 and the selection of master teachers from other schools in the same SDO. The sampling technique and respondents of the study is found in Chapter 2 Research Methodology page 19- 21.				
2.3 provides scientific criteria of the selection of the participants	The researcher inputs the sampling technique and respondents of the study. Both states the scientific criteria of the selection of students and master teachers. The sampling technique and respondents of the study is found in Chapter 2 Research Methodology page 19- 21.				
2.4 provides details of data recording protocol (e.g. interview protocol,	The researcher inputs the data gathering				

observational protocol)	procedure which states the details of conducting diagnostic test and survey protocol. The data gathering procedure is found in Chapter 2 Research Methodology page 24- 25.				
2.5 suggests ways to on how to address potential risk during data collection	The researcher inputs the data gathering procedure which states the details of ways on how to address potential risk during data collection like monitoring of conducting of test. The data gathering procedure is found in Chapter 2 Research Methodology page 24- 25.				
2.6 presents the tool/s validated by experts accompanied by pieces of evidence	The researcher inputs letter to validators, research instruments validators' feedback, validation forms, and validators' profile. These can be found in Appendix D- H pages 40- 82.				

2.7 presents the results of reliability testing (Cronbach's alpha/reliability index)	The research inputs the research instruments which states the results of reliability testing. These can be found in the Chapter 21-24.				
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Endorsement of Adviser:

John Rainer P. Rizado, LPT, EdD

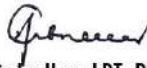
Full Name, Signature and Date

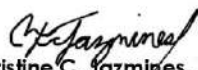
Research Office Remarks:

For Compliance
For issuance of Permit

Evaluated by:

Date:


Dennis G. Caballes, LPT, PhD, PostdocDean, School of Teacher Education
Undergraduate and Graduate Programs
Chair, Ethics Board

Vyrna R. Salcedo LPT, EdD
Program Head, Graduate Program

Nina Kristine C. Jazmines, LPT, MAEd
Program Head, BEEd, BSNEd, BECED

Linda Cangayao, LPT, M. Ed
Program Head, BSEd, BTLEd, BPED, CPTP**GPSOTE FACULTY-IN-CHARGE**

Elisiah U. Jocson, LPT, MAEd
Faculty In-charge, Social Studies

Jacquilyn M. Sales, LPT, MAEd
Faculty In-charge, STEM

Jennifer Fabros, LPT, MAEd
Faculty In-charge, Languages

Imelda Epino, LPT, EdD
Faculty In-charge, Educational Leadership

APPENDIX M**LETTER OF PERMISSION TO SDS FOR DATA GATHERING**

THE NATIONAL TEACHERS COLLEGE
Nepomuceno St, Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

October 14, 2024

Sheryl T. Gayola

Schools Division Superintendent
Department of Education- National Capital Region
Schools Division Office- Pasig City

Madam:

Good day!

I am one of the students at the National Teacher College currently taking Master of Arts in Education Major in Mathematics. I am writing a thesis titled **"ELECTRONIC STRATEGIC INTERVENTION MATERIAL (E-SIM) IN SOLVING BASIC OPERATIONS ON INTEGERS"** as a final requirement of the course. My thesis aims to develop a good-quality E-SIM that will help struggling students solve basic operations on integers. The final output will be a good quality E-SIM in solving basic operations on integers.

In line with this, I would like to ask permission from your kind office to allow me to conduct a survey in all junior high schools under SDO- Pasig City. The experts already validated my survey form. It is also reliable based on the value of Cronbach Alpha mentioned in my manuscript. My thesis has also passed the ethics review defense which is a school requirement before data gathering. The respondents of my study will be some master teachers in Mathematics in all junior high schools under SDO- Pasig City. Attached herewith are the thesis proposal, the E-SIM, the survey form, and the ethics review form.

Your approval of the above-mentioned request will be highly appreciated.

Thank you and God bless.

Sincerely yours,

EUGENE MONTEMAYOR BUGAYONG, LPT
Researcher

Noted by:

JOHN RANIER P. RIZADO, LPT, EdD
Thesis Adviser

Approved by:

SHERYL T. GAYOLA, EdD, CESO V
Schools Division Superintendent

APPENDIX N**LETTER OF ENDORSEMENT FROM SDS FOR DATA GATHERING**



Republic of the Philippines
Department of Education
 NATIONAL CAPITAL REGION
 SCHOOLS DIVISION OF PASIG CITY



Office of the Schools Division Superintendent

December 03, 2024

Eugene Montemayor Bugayong
 Researcher
 National Teachers College

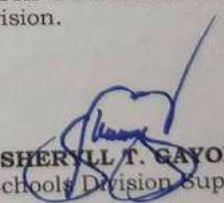
Sir:

This is to inform you that your request for permission to gather data relative to your study titled **"Electronic Strategic Intervention Materials (E-SIM) in Solving Basic Operations on Integers"** has been approved. All persons involved in this project are expected to observe the following fundamental research ethics:

- Ensure that the data to be gathered is correct, accurate, and validated;
- Properly cite all sources of information;
- Maintain integrity by avoiding plagiarism, fabrication and falsification of results;
- Protect the confidentiality and privacy of the participants;
- Explain clearly the objectives of the research to the participants; and
- Secure the consent of student participants and their parents (if applicable).

Please take note that participation of school shall be subject to the no disruption of classes policy stipulated in DepEd Order No. 9, s. 2005 entitled *Instituting Measures to Increase Engaged Time-On-Task and Ensuring Compliance Therewith*. Please coordinate with the Principal and School Research Coordinator for the success of this activity.

Furthermore, kindly provide this office with a copy of your completed research/project through the **Planning and Research Section** on the 3rd Floor, Office of the Schools Governance and Operations Division.


SHERYLL T. GAYOLA CESOV
 Schools Division Superintendent

sgod/jjr2024
 EXTERNAL/12.03.24




Address: Caruncho Ave., San Nicolas, Pasig City
 Tel: 641-88-85, 628-28-19
 Email: research.sdopasigcity@deped.gov.ph
 Website: www.depedpasig.ph

APPENDIX O**LETTERS OF PERMISSION TO SCHOOL HEADS FOR DATA GATHERING**

THE NATIONAL TEACHERS COLLEGE
Nepomuceno St, Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

January 20, 2025

Ma. Victoria M. Cuervo
Principal
San Joaquin Kalawaan High School
DEPED NCR- SDO Pasig

Madam:

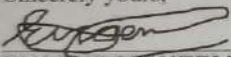
Good day!

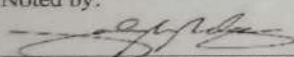
I am one of the students at the National Teacher College currently taking Master of Arts in Education Major in Mathematics. I am writing a thesis titled **"ELECTRONIC STRATEGIC INTERVENTION MATERIAL (E-SIM) IN SOLVING BASIC OPERATIONS ON INTEGERS"** as a final requirement of the course. My thesis aims to develop a good-quality E-SIM that will help struggling students solve basic operations on integers. The final output will be a good quality E-SIM in solving basic operations on integers.

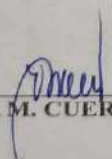
In line with this, I would like to ask permission from your kind school to allow me to conduct a survey/interview with some of the grade 10 students of the mentioned school. The experts already validated my survey form. It is also reliable based on the value of Cronbach Alpha mentioned in my manuscript. My thesis has also passed the ethics review defense which is a school requirement before data gathering. Attached herewith is the endorsement form from SDO Pasig.

Your approval of the above-mentioned request will be highly appreciated.

Thank you and God bless.

Sincerely yours,

EUGENE MONTEMAYOR BUGAYONG, LPT
Researcher

Noted by:

JOHN RANIER P. RIZADO, LPT, EdD
Thesis Adviser

Approved by:

MA. VICTORIA M. CUERVO
Principal



THE NATIONAL TEACHERS COLLEGE
Nepomuceno St, Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

January 27, 2025

School Heads
Junior High School
DEPED NCR- SDO Pasig

Sir/Madam:

Good day!

I am one of the students at the National Teacher College currently taking Master of Arts in Education Major in Mathematics. I am writing a thesis titled **"ELECTRONIC STRATEGIC INTERVENTION MATERIAL (E-SIM) IN SOLVING BASIC OPERATIONS ON INTEGERS"** as a final requirement of the course. My thesis aims to develop a good-quality E-SIM that will help struggling students solve basic operations on integers. The final output will be a good quality E-SIM in solving basic operations on integers.

In line with this, I would like to ask permission from your kind school to allow me to conduct a survey/interview with ONE of your master teachers in Mathematics. The experts already validated my survey form. It is also reliable based on the value of Cronbach Alpha mentioned in my manuscript. My thesis has also passed the ethics review defense which is a school requirement before data gathering. Attached herewith is the endorsement form from SDO Pasig.

Your approval of the above-mentioned request will be highly appreciated.

Thank you and God bless.

Sincerely yours,

EUGENE MONTEMAYOR BUGAYONG, LPT
Researcher

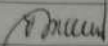
Noted by:

JOHN RANIER P. RIZADO, LPT, EdD
Thesis Adviser


THE NATIONAL TEACHERS COLLEGE
 Nepomuceno St, Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

Name: MA-VICTORIA M. CUERVO

School: SAN JOAQUIN-KATAVAAN HIGH SCHOOL

Signature: 

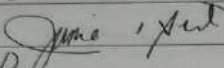
Please check (/)

☒ I will allow my handled teacher to participate in the study.

☐ I will not allow my handled teacher to participate in the study.

Name: JUNIE C. VEROT

School: DELA PAZ HS

Signature: 

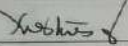
Please check (/)

☒ I will allow my handled teacher to participate in the study.

☐ I will not allow my handled teacher to participate in the study.

Name: MELISSA S. TARCENA

School: SANTOLAN HS

Signature: 

Please check (/)

☒ I will allow my handled teacher to participate in the study.

☐ I will not allow my handled teacher to participate in the study.

Name: MONETTE P. VEGA

School: MANGGAHAN HIGH SCHOOL

Signature: 

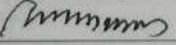
Please check (/)

☒ I will allow my handled teacher to participate in the study.

☐ I will not allow my handled teacher to participate in the study.

Name: Dr. Lorna C. Rodriguez

School: Sta. Lucia High School

Signature: 

Please check (/)

☒ I will allow my handled teacher to participate in the study.

☐ I will not allow my handled teacher to participate in the study.

**THE NATIONAL TEACHERS COLLEGE**
Nepomuceno St. Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

Name: Lazaro P. Torres Jr.
School: Kapitelyo High School
Signature: [Signature]
Please check ☒ ☐
☒ I will allow my handled teacher to participate in the study.
☐ I will not allow my handled teacher to participate in the study.

Name: GILBERT O. INOCENCIO
School: EUSEBIO HS
Signature: [Signature]
Please check ☒ ☐
☒ I will allow my handled teacher to participate in the study.
☐ I will not allow my handled teacher to participate in the study.

Name: MA. AMPARO G. SILVERA
School: UGONG PASIG NATIONAL HIGH SCHOOL
Signature: [Signature]
Please check ☒ ☐
☒ I will allow my handled teacher to participate in the study.
☐ I will not allow my handled teacher to participate in the study.

Name: ROWENA O. BIMAGIBA
Principal I
School: Rizal Experimental Station and Pilot School of Cottage Industries
Signature: [Signature]
Please check ☒ ☐
☒ I will allow my handled teacher to participate in the study.
☐ I will not allow my handled teacher to participate in the study.

Name: RICHARD T. CANTO
School: RIZAL HIGH SCHOOL
Signature: [Signature]
Please check ☒ ☐
☒ I will allow my handled teacher to participate in the study.
☐ I will not allow my handled teacher to participate in the study.

 THE NATIONAL TEACHERS COLLEGE
Nepomuceno St, Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

School Heads

Name: Annalyn M. Macasinas

School: Nagpayong High School

Signature: [Signature]

Please check (/)

☒ I will allow my handled teacher to participate in the study.

☐ I will not allow my handled teacher to participate in the study.

Name: CECKIA G. REGALA

School: PINAGBUHATAN HIGH SCHOOL

Signature: [Signature]

Please check (/)

☒ I will allow my handled teacher to participate in the study.

☐ I will not allow my handled teacher to participate in the study.

Name: COLT ARMEL A. DOMINON

School: SAGAO HIGH SCHOOL

Signature: [Signature]

Please check (/)

☒ I will allow my handled teacher to participate in the study.

☐ I will not allow my handled teacher to participate in the study.

Name: _____

School: _____

Signature: _____

Please check (/)

☐ I will allow my handled teacher to participate in the study.

☐ I will not allow my handled teacher to participate in the study.

Name: _____

School: _____

Signature: _____

Please check (/)

☐ I will allow my handled teacher to participate in the study.

☐ I will not allow my handled teacher to participate in the study.

APPENDIX P**LETTER OF PERMISSIONS TO ADVISERS AND MATH TEACHERS FOR DATA GATHERING**

**THE NATIONAL TEACHERS COLLEGE**
Nepomuceno St, Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

January 20, 2025

Math Teachers and Advisers
Grade 10
San Joaquin Kalawaan High School

Sir/Madam:

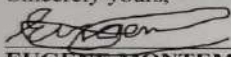
Good day!

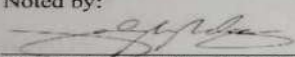
I am one of the students at the National Teacher College currently taking Master of Arts in Education Major in Mathematics. I am writing a thesis titled **"ELECTRONIC STRATEGIC INTERVENTION MATERIAL (E-SIM) IN SOLVING BASIC OPERATIONS ON INTEGERS"** as a final requirement of the course. The purpose of my thesis is to developed a good quality E-SIM that will help struggling students to solve basic operations on integers. In the end, the final output will be a good quality E-SIM in solving basic operations on integers.

In line with this, I would ask for your consent to allow your handled students to participate in the study. Here, they will answer the diagnostic test in solving basic operations on integers. The result of their diagnostic test will contribute to the development of a good quality E-SIM.

Your approval of the above-mentioned request will be highly appreciated.

Thank you and God bless.

Sincerely yours,

EUGENE MONTEMAYOR BUGAYONG, LPT
Researcher

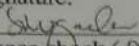
Noted by:

JOHN RANIER P. RIZARDO, LPT, EdD
Thesis Adviser

**THE NATIONAL TEACHERS COLLEGE**
Nepomuceno St, Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

Grade 10 Math Teachers

Name: Melenchie B. Lozada

Selected Handled Section: 10-Platinum

Signature: 

Please check (✓)

☒ I will allow my handled students to participate in the study.

☐ I will not allow my handled students to participate in the study.

Name: Mara Candad C. Penabaza

Selected Handled Section: 10-Titanium

Signature: 

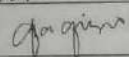
Please check (✓)

☒ I will allow my handled students to participate in the study.

☐ I will not allow my handled students to participate in the study.

Name: CRISTY F. AQUINO

Selected Handled Section: 10-Vanadium

Signature: 

Please check (✓)

☒ I will allow my handled students to participate in the study.

☐ I will not allow my handled students to participate in the study.

Name: Elvica C. Aralla

Selected Handled Section: 10-Magnesium

Signature: 

Please check (✓)

☒ I will allow my handled students to participate in the study.

☐ I will not allow my handled students to participate in the study.

**THE NATIONAL TEACHERS COLLEGE**
Nepomuceno St, Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

Name: RAYMOND O. DERILLO
Selected Handled Section: 10 - Fluorine
Signature: [Signature]
Please check ☒ (X)
☒ I will allow my handled students to participate in the study.
☐ I will not allow my handled students to participate in the study.

Name: Glen Christopher M. Serrano
Selected Handled Section: 10 - Krypton
Signature: [Signature]
Please check ☒ (X)
☒ I will allow my handled students to participate in the study.
☐ I will not allow my handled students to participate in the study.

Name: EUGENE M. BUGAYONG
Selected Handled Section: 10 - Copper
Signature: [Signature]
Please check ☒ (X)
☒ I will allow my handled students to participate in the study.
☐ I will not allow my handled students to participate in the study.

**THE NATIONAL TEACHERS COLLEGE**
Nepomuceno St, Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

Grade 10 Advisers

Name: Melenshie B. Lozada
Handled Section: 10 - Platinum
Signature: [Signature]
Please check (/)
☒ I will allow my handled students to participate in the study.
☐ I will not allow my handled students to participate in the study.

Name: Leah D. Terrenal
Handled Section: 10 - Titanium
Signature: [Signature]
Please check (/)
☒ I will allow my handled students to participate in the study.
☐ I will not allow my handled students to participate in the study.

Name: Jhester C. De Leon
Handled Section: 10 - Vanadium
Signature: [Signature]
Please check (/)
☒ I will allow my handled students to participate in the study.
☐ I will not allow my handled students to participate in the study.

Name: Marife T. Tibayan
Handled Section: 10 - Magnesium
Signature: [Signature]
Please check (/)
☒ I will allow my handled students to participate in the study.
☐ I will not allow my handled students to participate in the study.

 THE NATIONAL TEACHERS COLLEGE
Nepomuceno St. Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

Name: Raymond D. Derilo
Handled Section: 10 - Fluorine
Signature: [Signature]
Please check ()
☒ I will allow my handled students to participate in the study.
☐ I will not allow my handled students to participate in the study.

Name: Racel B. Escandon
Handled Section: 10 - Krypton
Signature: [Signature]
Please check ()
☒ I will allow my handled students to participate in the study.
☐ I will not allow my handled students to participate in the study.

Name: Luzelle S. Medel
Handled Section: 10 - Copper
Signature: [Signature]
Please check ()
☒ I will allow my handled students to participate in the study.
☐ I will not allow my handled students to participate in the study.

APPENDIX Q

CONSENT FORMS TO PARTICIPANTS

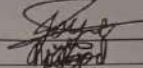
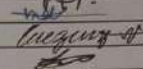
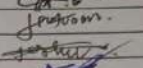
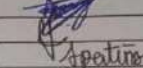
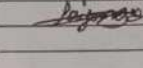
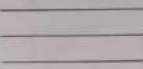
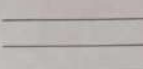
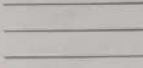
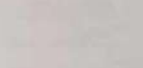
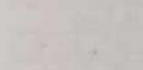
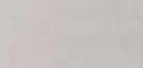
Data Privacy Consent

The researcher will assure the privacy and security of any sensitive data. In case there are sensitive issues involved in the study, the researcher will address those ethical issues. All information and responses to be filled up by the participants will be remained confidential and anonymous under the Data Privacy Act. These information and responses will be protected from any illegal leakage under the Data Protection Law.

I hereby allow/ authorize the researcher to use, collect, and process the information for legitimate purposes specifically for research, and allow authorized personnel to process the information.

Grade and Section: 10- Platinum

Respondent's Name	Signature
1) Alas, Samantha Allijah T.	
2) Apelada, Alexandra Leigh T.	
3) Del Agua, Joemarie G.	
4) GABRIEL, LORIE NICOLE	
5) LIMES, JASMINE C.	
6) Lalas, Rica C.	
7) Ulan, Lioel A. Baraga A.	
8) Sarabala, Just Mac D.	
9) Marthin B. Bumanlag	
10) Amerante, Mary Joy S.	
11) Caon, Ramzel V.	
12) Atero, Kaygey L.	
13) Cailles, Krystal Antonette	
14) Munsod, Charice Anne C.	
15) Delapena, Sherwin F.	
16) Marcupia Abdullah B.	
17) VINARAO JOHN MELVIN S.	
18) De Rojas, Samuel S.	
19) Enriquez, Raven Kenneth S.	
20) Miranda, Eloisa	
21) Marquez, Krystina, N.	
22) Labalan, Jeffrey A.	
23) Orlain, Iziantel Ashlei	
24) Trapago, Stephanie M.	
25) Jorge Denmark D. Garcia	

26)	Joyce Augustin Osuna	
27)	Noah Gabriel C. Pusod	
28)	Manda, Cristof R.	
29)	Maulate, John Suteris T.	
30)	Mahag John Leo M.	
31)	Reyes, Creecha B.	
32)	Solo, Hazelyn C.	
33)	Silva, Vassina G.	
34)	Pintucan, Patrick	
35)	Viat, Nashel P.	
36)	CRUZ, ALLEN HARRIE M.	
37)	ESTANANTO JUSTINE R.	
38)	Patino Lawrence A.	
39)	Payang, Rhoyen R.	
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Data Privacy Consent

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I hereby allow/ authorize the researcher to use, collect, and process the information for legitimate purposes specifically for research, and allow authorized personnel to process the information.

Grade and Section: 10- Titanium

Respondent's Name

- 1) Biana Indrick F. Asan
- 2) Glycan L. Bando
- 3) Gabriel Neil Francisco
- 4) Leirah Kim R. Gonzales
- 5) Arianna Sanchez Bernabe
- 6) Gerahee Kyle Xue Vartian S.
- 7) Salcedo, Shenna Jade S.
- 8) Kirt Warren Pedrosa D.
- 9) Eidiana S. Mavuna
- 10) Balbuena, Isel Kaye
- 11) Quite, Cathlyn Joy
- 12) Penciano, Jhane Lorraine
- 13) Dela Cruz, Joshua J.
- 14) Santos, Charles Louisie S.
- 15) Ashley Nicole Mabait
- 16) Egan taca Steven Martin B
- 17) Planes, Rich Russel A.
- 18) Gabriel A. Olivera III
- 19) Diane P. Lauban
- 20) Erica Joyce G. Robles
- 21) Chloe Jillianne F. Mantrel
- 22) Ace Charles A. Samson
- 23) JARREN KIEL SANTOS
- 24) Cassandra M. Crue
- 25) Ashley Nicole S. Zabala

Signature

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26) JAZZ R. ESTRERA	not
27) KEINIE D.C. NAGURA	same
28) Mary Rose Vinas	same
29) Jaycee C. Santos	same
30) Shayne Heart Dub	same
31) Jengil C. Ramirez	J. Ramirez
32) Mark Adreon T. Teybn	Mark
33) Prince Naraah O. Sta Ana	Prince
34) Tulagan, Asherah Monique	Asherah
35) Clark Segunial	Clark
36) Nhica Ugadkan	Nhica
37) Nelson Nunez	Nelson
38) Althea Madsam	Althea
39) Angelica Post	Angelica
40)	
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Data Privacy Consent

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I hereby allow/ authorize the researcher to use, collect, and process the information for legitimate purposes specifically for research, and allow authorized personnel to process the information.

Grade and Section: 10 - Vanadium

Respondent's Name

- 1) Amos, Jaira
- 2) Audrey Mae Hidas
- 3) Mamavag, John Daniel
- 4) Simbarte, John Cyrus C.
- 5) OCEL, SHIEN ADRIAN
- 6) Laporta Vincent Hector D.
- 7) Javelosa, Charles Guan G.
- 8) Bautista, Maricelip Ragan C.
- 9) Condon James Angelo C.
- 10) Javier, Precious Remon I.
- 11) Rafols, Cristha Mae M.
- 12) Aguineldo, Pia Joana M.
- 13) Agub, Ma. Andrea D.
- 14) Leopardo, Yvan P
- 15) Mark Laurenz Castillo
- 16) Rhein Francis Echapate
- 17) De la Cruz Mary Andrea
- 18) Espino, Kirel mae D.
- 19) NOVA, Roy Matthew S.
- 20) Mark Louie S. Borbon
- 21) Charl John M Garcia
- 22) John Stephen C. Manosa
- 23) Diazino, Dyzelle Jade A.
- 24) Bahingawan Junald Kim
- 25) Aivanat. Trumata T

Signature

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- 26) Valencia, Lorian Ayecia
- 27) Asuncion, Dylia R.
- 28) Montano, Princess Kyla
- 29) Polong, Justine Harold L.
- 30) Videna, Sobelle A. Lorenzo
- 31) Sherra Cathleen Abraham
- 32) Daria, Jan Rae V.
- 33) Baylon, Vincent A.
- 34) Agula, Leonell H.
- 35) Bernudo, Nathan B.
- 36) Lagromia, Jivelle
- 37) Decenorio, Menstar
- 38) Rediga, Cheska Nicole
- 39) Sales, Raiza Mae Catuday
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[Handwritten signatures and marks corresponding to the list items above]

Data Privacy Consent

The researcher will assure the privacy and security of any sensitive data. In case there are sensitive issues involved in the study, the researcher will address those ethical issues. All information and responses to be filled up by the participants will be remained confidential and anonymous under the Data Privacy Act. These information and responses will be protected from any illegal leakage under the Data Protection Law.

I hereby allow/ authorize the researcher to use, collect, and process the information for legitimate purposes specifically for research, and allow authorized personnel to process the information.

Grade and Section: 10 - Magnesium

Respondent's Name _____

- 1) BATUQUIN, ALEXUS ANNIE S.
- 2) ADRIANO, PHOEBELA GLAZE H.
- 3) CANADA, ANGELYN T.
- 4) LACADA, CZARINA MICHAELA
- 5) Desales, Jean Princess B.
- 6) Alex shon Magaxo
- 7) Pio C. Diada
- 8) Tagalog Paul Jannart H.
- 9) Balansay, Kurt J.
- 10) Bautista, Ken, Cyrus C.
- 11) Xyris Regan Cumadig
- 12) ~~Benito~~ Ratis, Razel B.
- 13) Mark angile Dela paz
- 14) Martinez, Laika E.
- 15) CRUZ, ELLOISA ANN R.
- 16) Dibnisio, Samantha
- 17) balao, Princess Mae T.
- 18) Buenavente, Art Gilbert V.
- 19) Cavilan Khris IVON
- 20) Buenaventura Jam Benic
- 21) tagarta Larry F.
- 22) Olivero Jace Marshall G.
- 23) Daque, Jairoh
- 24) Caquista, Allen Jay M.
- 25) Guillapio, denisse M.

Signature _____

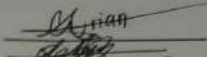
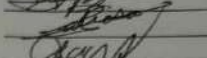
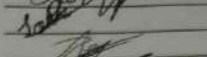
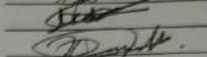
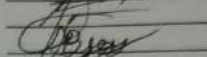
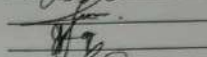
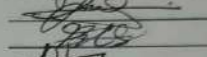
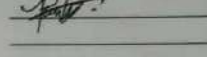
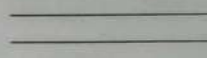
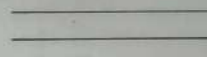
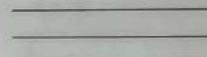
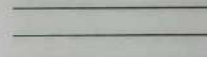
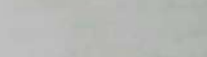
~~Miguel~~
~~Pio Diana~~
~~Alejo~~
Ct.
~~Fernando~~
~~Pio Diana~~
~~Beto~~
~~Rosendo~~
~~comodoro~~
~~Juan~~
~~Eduardo~~
~~Mano?~~
~~Hernandez~~
~~Joao~~
~~Constante~~
~~Alfonso~~
~~Juan~~
~~Armando~~

26)	Rin, Mark John A.	
27)	Olivera, Aizel T.	
28)	Melano, Justine O.	
29)	Parado, Jeanne M.	
30)	Samaniego, Princess E.	
31)	Gallardo, Princess Ge-ann	
32)	Colorico, Sheryl S.	
33)	Dasigo, Choe Junielle M.	
34)	Piastro, Kurt Lorenze C.	
35)	Lopez, Rein Justine G.	
36)	ALBUERO, STEPHANIE	
37)	Manabli, Migs I.	
38)	Bernier, Francis John R.	
39)	Cartena, Vince Neil	
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26) Valerie Chen M. Tlongco	<i>Valerie</i>
27) MICHAELA CRUZ	<i>M. Cruz</i>
28) Rhoilyn C. Devera	<i>Rhoilyn</i>
29) Geron Mark M. Consencino	<i>Geron Mark</i>
30) Ewardni Alexsian Zhamvel R.	<i>Ewardni</i>
31) ENRICH P. Reyes	Enrich
32) Jhon Mark Lasam	<i>Jhon Mark</i>
33) Raulh Cristian Pinturan	<i>Raulh</i>
34) Don Mervic M. Udae	<i>Don Mervic</i>
35) Gabriel N. Septina	<i>Gabriel</i>
36) Ashton Jacob R. Lorca	<i>Ashton</i>
37) <i>Dionela Xin Morado</i>	<i>Dionela</i>
38) John Philip G. Laram	<i>John Philip</i>
39) Vince Mathias A. Blapoz	<i>Vince</i>
40) Leo Andrei M. Sanchez	<i>Leo Andrei</i>
41) <i>seymore aliangar</i>	<i>seymore</i>
42) Zander O. Decastro	<i>Zander</i>
43) Carlos . Kristian Rey R.	<i>Carlos</i>
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- 26) Tareit John Adria T.
- 27) Torres, Daphne Louise C.
- 28) Marquez, Cater Ana Maria A
- 29) MARLON CHRIS JAVIER C.
- 30) John Luis Castillo
- 31) Chavez, Cyrus James B.
- 32) Alyssa Mae T. Murni
- 33) Liam Van Minor
- 34) Chester Brix Cruz
- 35) Enrico Vitto
- 36) Dominic R. Bolina
- 37) Ilander Retayer
- 38) Randell Pandan
- 39) Jamice Teodoro
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[Handwritten signatures and marks corresponding to the list items]

26) Nedera, Arian C.	
27) Igban, Scheliden E.	
28) Salvador, Michael D.	
29) Nolasco, Kacy Daniza H.	
30) Cabarbes, Cris Allen S.	
31) QUEVEDO RAY Allen E.	
32) Ramos, Jaedan Miksacl N.	
33) Abueva, Rannielle Rye	
34) SARBODA, ALEXIS S.	
35) Batusan, Jesson James C.	
36) ABUDA JR, GANNI ELVIN A.	
37) PANERA, Janna Nicole G.	
38) Garcia, Riana Franchesca E.	
39) SUBALDO, REICH ISAAC C.	
40) Kalinga, Paulo Neo M.	
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THE NATIONAL TEACHERS COLLEGE
Neponuceno St, Quiapo Manila
GRADUATE PROGRAM
SCHOOL OF TEACHER EDUCATION

January 27, 2025

Master Teachers
Junior High School Mathematics
Schools Division Office- Pasig City

Sir/Madam:

Good day!

I am one of the students at the National Teacher College currently taking Master of Arts in Education Major in Mathematics. I am writing a thesis titled **"ELECTRONIC STRATEGIC INTERVENTION MATERIAL (E-SIM) IN SOLVING BASIC OPERATIONS ON INTEGERS"** as a final requirement of the course. The purpose of my thesis is to developed a good quality E-SIM that will help struggling students to solve basic operations on integers. In the end, the final output will be a good quality E-SIM in solving basic operations on integers.

In line with this, I would ask for your consent to participate in the study. Here, you will answer the survey form about determining the criteria for designing (planning) the E-SIM. Also, you will evaluate the developed E-SIM based on its content quality. Your expertise and experience in the field of teaching and research will contribute to the development of a good quality E-SIM.

Your approval of the above-mentioned request will be highly appreciated.

Thank you and God bless.

Sincerely yours,

EUGENE MONTEMAYOR BUGAYONG, LPT
Researcher

Noted by:

JOHN RANIER P. RIZARIDO, LPT, EdD
Thesis Adviser


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Name: RIZA R. NOCETO, EDD
School: San Joaquin - Kalawaan High School
Signature: [Signature]
Please check (/)
☒ I will participate in the study.
☐ I will not participate in the study.

Name: DARIEL J. OJERA
School: DELA PAZ HIGH SCHOOL
Signature: [Signature]
Please check (/)
☒ I will participate in the study.
☐ I will not participate in the study.

Name: VILMA F. PADRIQUELA
School: SANTOLAN HIGH SCHOOL
Signature: [Signature]
Please check (/)
☒ I will participate in the study.
☐ I will not participate in the study.

Name: Marceline A. Echalin
School: Manggahan High School
Signature: [Signature]
Please check (/)
☒ I will participate in the study.
☐ I will not participate in the study.

Name: Abelardo C. Lantoria
School: Sta. Lucia High School
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Please check (/)
☒ I will participate in the study.
☐ I will not participate in the study.

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Name: PHILIP L. LOPEZ
School: Kapitolyo High School
Signature: [Signature]
Please check (/)
☒ I will participate in the study.
☐ I will not participate in the study.

Name: Remedios M. Uddalla
School: Eureka HS
Signature: [Signature]
Please check (/)
☒ I will participate in the study.
☐ I will not participate in the study.

Name: JIMBOY C. CABATERO
School: UGUNG PASIA NATIONAL HIGH SCHOOL
Signature: [Signature]
Please check (/)
☒ I will participate in the study.
☐ I will not participate in the study.

Name: GERRY O. PUTAC JR.
School: RESPECI
Signature: [Signature]
Please check (/)
☒ I will participate in the study.
☐ I will not participate in the study.

Name: JAMIE B. LANDILORAR
School: RIZAL HIGH SCHOOL
Signature: [Signature]
Please check (/)
☒ I will participate in the study.
☐ I will not participate in the study.

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Name: DEBORAH D. MARGARDO

School: MENAYENS HIGH SCHOOL

Signature: [Signature]

Please check (/)

☒ I will participate in the study.

☐ I will not participate in the study.

Name: ROCHELLE B. LARANANG

School: PINAGBUHATAN HIGH SCHOOL

Signature: [Signature]

Please check (/)

☒ I will participate in the study.

☐ I will not participate in the study.

Name: LEAH C. MESINA

School: SAGAO HIGH SCHOOL

Signature: [Signature]

Please check (/)

☒ I will participate in the study.

☐ I will not participate in the study.

Name: _____

School: _____

Signature: _____

Please check (/)

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Name: _____

School: _____

Signature: _____

Please check (/)

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