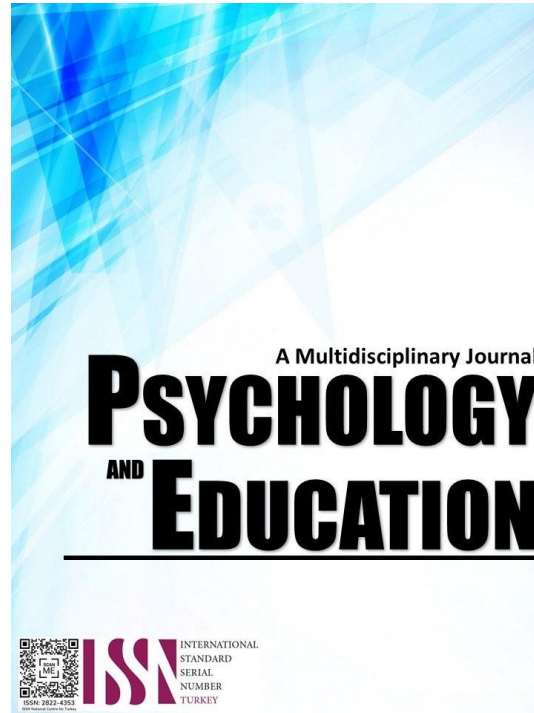


**DESIGN AND EVALUATION OF ELECTRONIC
STRATEGIC INTERVENTION MATERIAL (E- SIM)
IN THE NEW NORMAL**



PSYCHOLOGY AND EDUCATION: A MULTIDISCIPLINARY JOURNAL

2023

Volume: 12

Pages: 1076-1091

Document ID: 2023PEMJ1126

DOI: 10.5281/zenodo.8305148

Manuscript Accepted: 2023-28-8



Design and Evaluation of Electronic Strategic Intervention Material (E-SIM) in the New Normal

Mary Jane A. Dalisay*

For affiliations and correspondence, see the last page.

Abstract

Teaching students nowadays is challenging not only for the teachers but also for the other stakeholders. The pandemic situation makes the teaching-learning process different from the old ways of delivering quality education. Even before the pandemic, there are challenges that the Department of Education faces as it reflects its performance in international and national assessments for learners. PISA 2018, TIMSS 2019, and NAT 2018 results indicate the poor performance of Filipino learners. With all these challenges, it shows that the need for intervention is necessary. Identifying the least mastered competencies is the first step in providing intervention that should start at the school level. The least mastered competencies should be from the most essential competencies since they aid the new normal way of delivering learning (distance learning). This study aimed to design and evaluate the Electronic Strategic Intervention Material (E-SIM) in a computer/phone application and use the evaluation result to improve electronic learning applications for the new normal. This study intended to help low-performing students improve their scientific thinking skills and help Science teachers reteach the least mastered concepts in science 7, mainly to craft electronic learning material. The researcher designed the E-SIM application and evaluated it with the science teachers from Rizal High School. The ADDIE model approach was used to evaluate the learning application. The result of the evaluation helped the researcher to improve the design. Then the development of the application was made through the help of an IT expert. The implementation was next conducted on the grade 7 students and evaluated based on their experiences using the material. An overall evaluation was given to teachers to know their experience in using the sim in their remedial class. Based on the evaluation results, the E-SIM application is engaging, colorful, and interactive, and it helps the students learn the least mastered competencies. In learning gain, the students were given a pretest and posttest as part of the implementation of the E-SIM application. There was a positive result since all the participants got higher post-test scores after using the E-SIM application. The result of this study can encourage teachers to make learning materials that they think are needed by their students since teachers are the one who has direct interaction with the learners. E-SIM can be shared in teachers' training, and it can also be the basis for other teachers who want to design their own E-SIM applications.

Keywords: *strategic intervention material, new normal, electronic application*

Introduction

At the heart of the teaching-learning process, teachers always show passion for educating the minds of our youth to prepare them for the reality of the challenges in the society where they belong. It always starts with basic principles and concepts of different learning fields that the learners should apply in their daily lives. However, the reality of changing the capacity of the students to learn concepts and principles easily is somewhat different nowadays due to pandemic that leads educators to explore more teaching strategies or techniques and make new learning materials for the new normal.

As one of the subjects that teaches real-life concepts and principles that can be applied even in the simplest life activity, science is challenging to learn for other learners. This problem is reflected in the Programme for International Student Assessment (PISA) of the Organization for Economic Co-operation and Development (OECD) in 2018; it is a triennial international assessment administered to 15-year-old

learners near the end of their compulsory basic education. The DepEd participated in the 2018 cycle of the Programme for International Student Assessment (PISA), and the result was alarming since Filipino students attained an average score of 357 points in Scientific Literacy, which was significantly lower than the OECD average of 489 points (PISA 2018 Philippine National Report, 2019). It was also a challenge to improve the low performance of Grade 6 students in the National Achievement Test (NAT) last 2018, which shows a continuous decline in their performance for the last three years, putting them in the low mastery level (Albano, 2019). Science got the lowest mean percentile score (MPS) contained in Regional Memorandum 157, series 2019 of the Department of Education Cordillera Administrative Region (DepEd CAR) Office among the five core subjects.

Additional to this is the Trends in International Mathematics and Science Study (TIMSS) 2019 by the International Association for the Evaluation of Educational Achievement (IEA). It reveals that the



Philippines scored 297 in arithmetic and 249 in science, both lower than the country's 2003 ratings of 358 in math and 332 in science, which placed the Philippines last out of 58 countries (Bernardo, 2020). This indicates that Filipino students show limited understanding and knowledge of scientific concepts and science facts in science. These assessment results are a wake-up call to all educators and stakeholders to achieve one common goal: to have quality education for Filipino learners. These challenges in Philippine education were intensified due to COVID19 leading to the DepEd's program "Sulong EduKalidad" that promotes continuous delivery of quality education amidst the pandemic. It centers on the K-12 updates and review, improving the learner's environment and upskilling and reskilling teachers (Gonzales, 2019).

Every school year even before the pandemic, all public schools make sure that the student's learning is assessed every grading period through a summative test, also known as the periodical test. To identify the students' learning gained and determine what learning competencies students were able and were not able to master. In Pasig City, all schools received reports about the analyzed percentage of correct response of every school since it is a centralized exam. It will also be the basis for the mean percentage score of every subject area. In the Science area, the report showed that for two consecutive school years, 2018-2019 and 2019-2020 have the same competencies considered the least mastered. This gives a realization that an intervention must take place. Based on the result, the competency about the fertilization process got the lowest percentage of correct response for two consecutive years. It was followed by the competency about differentiating asexual and sexual reproduction regarding the number of individuals involved and similarities of offspring to parents.

Identifying the least mastered competencies will make the teaching-learning approach led to other teaching strategies or interventions. Based on the findings and conclusions from the NAT 2018, one of the recommendations is to conduct a Strategic Intervention Materials (SIMs) Development in core subject areas. The lesson content of the SIM is based on the least mastered competency from an assessment like a periodical test. As one of the core subject areas, science uses SIM as a learning material in remediation class.

Strategic Intervention Material is one of the learning materials used by teachers to accommodate the needs of low performing students. It caters for the different learning styles of the students from the features and divisions provided by the material. It is used to reteach

the lesson described as least mastered. According to the Division Memorandum 1033 (2017) from the division of Davao, the Strategic Intervention Material (SIM) is considered as a tool for remediation where low performing students can appreciate the process of learning from the least mastered concepts and skills. On the other hand, the distinctive features and parts of the SIM lacks the consideration of the learning trends to the learners, especially in the new normal. It cannot easily replicate and disseminate by the teachers. That is why the effectiveness of the SIM does not maximize and serve its real purpose which is to provide help to low performing students in a way that they appreciate learning a particular concept using different learning approaches. In the study of Dacumos (2016), he mentioned that the impact of SIM on educational practice is the promotion of autonomous learning and memory enhancement. However, it also showed that there are barriers in the use of SIM in Science class and that includes the preparation and implementation. During preparation, it emphasized the teacher's competence in crafting learning materials that is essential for effective learning.

In "Sulong EduKalidad" of the Department of Education, it promotes the use of technology to reach out learners who cannot physically present their selves in school following the health protocol. Technology has walked into educational limelight and will play a big role in educating future generations that dictates the continuous change in the role of educators which is to provide knowledge in just one click (Pamaran, 2020). The Department of Education already promoting digital rise, it focuses on ICT-assisted teaching that aims to install digital board, television and provide laptops containing e-Learning resources that can be used by the teachers uploaded with Open Education Resources (OER) (Lopez, 2019).

However, there are challenges in the quality of learning materials, including the relevance of the content to society, teacher's skill in ICT-based materials development, access to quality content, and technical difficulties like slow or no internet access (Siribodhi, 2016). In the Inquirer.net (2020) article, Education Secretary Leonor Briones asks for support to free access on the Department's online education delivery platform designed as an alternative mode for the teaching-learning process during class suspensions and other similar circumstances known as DepEd Commons. DepEd Commons is online learning that DepEd developed as an alternative learning platform in different unfavorable conditions like during the pandemic, suspension of classes due to weather conditions, or when students are unable to attend



regular classes (The Informant, 2020). This response of the DepEd to provide continuous learning among students during the pandemic emphasizes the use of technological devices that contain ready-made learning materials. Designing and crafting learning materials appropriate to the specific needs of the learners is not an easy task, especially when dealing with low-performing students.

DepEd offered the MELCs as a major reference for all Schools, Schools Division Offices (SDOs), and Regional Offices (ROs) in determining and implementing learning delivery approaches that are tailored to the local context and diversity of learners while adapting to COVID-19's problems. The MELCs will be used to create learning activity sheets, self-learning modules, and other educational materials for use in schools. Furthermore, schools must follow the content of the MELCs and not create a new list of learning competencies for different learning areas (DepEd CALABARZON, 2020).

This study responds to the current situation education is in because of the COVID19 pandemic that hinders the continuous flow of educational practices. Many schools around the world stopped reducing physical contact that led to online schooling and teaching. This step to fill the gap in providing continuous education caused by the pandemic leads to the use of online teaching and technology devices that are somewhat not common in the Philippine educational setting. Experts in open and distance learning in UNESCO develop other information, communications technology, teacher-training platforms, and e-learning school models (Lee-Brago, 2020). However, online teaching is moving more on an experimental and unprecedented scale; it also includes assessment under trial and error that gives uncertainty for everyone because of the canceled schedule for assessment (Burgess & Sievertsen, 2020).

The researcher designed and evaluated Electronic Strategic Intervention Materials (E-SIM) that the learners can easily use to boost their interest in a particular topic and improve their higher-order thinking skills. It can be easily disseminated among the teachers to use in their remedial classes. Schreiner (2020) specified that the effectiveness of the lesson is the same as the effectiveness of the material used in teaching; teachers need to make an effective learning material to acquire the maximum learning potential of a student. Evaluating learning materials help to measure effectiveness, find problems it possesses and its solution, also it is critical in education since it measures the success of a teaching system or method

(F.LearningStudio, 2018).

This study aimed to design and evaluate the Electronic Strategic Intervention Material (E-SIM) in the form of a computer/phone application and use the evaluation result to improve electronic learning applications for the new normal. This study intended to help low-performing students improve their scientific thinking skills and help Science teachers reteach the least mastered concepts in Science 7, mainly to craft Electronic learning material. The use of E-SIM is applicable nowadays since it caters to the use of technological devices and as well as it promotes monotonous learning that is appropriate to avoid physical contact during the pandemic period.

Research Questions

This study aimed to determine whether the “Two become One” Electronic Strategic Material (E-SIM) can be used as effective electronic learning application for the new normal. Specifically, the study seeks to answer the following questions:

1. What is the result of the following in identifying least mastered competency of the Electronic Strategic Intervention Material (E-SIM) application?
 - 1.1 Second periodical test Analysis SY 2019-2020; and
 - 1.2 Mapping out the Most Essential Learning Competencies (MELCs) in the 2nd Quarter of Science 7
2. What are the desirable content and visual aesthetics in “Two become One” E-SIM in terms of the following dimensions?
 - 2.1. Content
 - 2.1.1 Lesson Objectives;
 - 2.1.2 Subject Matter;
 - 2.1.3 Presentation and Organization; and
 - 2.1.4 Usefulness?
 - 2.2 Visual Aesthetic
 - 2.2.1 Design and Layout (Visual Clarity); and
 - 2.2.2 Expressiveness and Creativity (Visual Richness)?
3. What needs to be developed in “Two become One” E-SIM as a learning application in the following dimensions?
 - 3.1 Relevance;
 - 3.2 Customization;
 - 3.3 Feedback;
 - 3.4 Thinking Skills;
 - 3.5 Usability;
 - 3.6 Engagement; and
 - 3.7 Sharing?
4. What is the effect perceived by the students after

using the “Two become One” E-SIM?

5. How may the evaluation of Grade 7 teachers on E-SIM in Science 7 be described in terms of its developed features and experience in using the E-SIM in remedial class?

6. Is there a significant difference between the pre-test and post-test result?

Literature Review

Philippine’s Science Education Assessment

As one of the subjects that teach real-life concepts and principles that can be applied even in the simplest life activity, science is challenging to learn for other students.

This problem was reflected in the Programme for International Student Assessment (PISA) 2018 Philippine National Report (2019). From the result of the PISA 2018 of the Organization for Economic Co-operation and Development (OECD), which is a triennial international assessment administered to 15-year-old learners who are near the end of their compulsory basic education, the Philippines rank last among the 79 countries who participated and second-lowest for Mathematics and Science.

In 1997, PISA was launched by the OECD, which is an international study that surveys its member and partner countries every three years involving performance in reading, mathematics, and science of 15-year-old learners for comparative data (Dela Cruz, 2019). The DepEd participated in the 2018 cycle of PISA, and the result was alarming since Filipino students attained an average score of 357 points in Scientific Literacy, which was significantly lower than the OECD average of 489 points (Philippine National Report, 2019). The mean score in science performance, which is 357, ranks 76; it is one of the lowest among PISA-participating countries and economies (Education GPS, 2021). Compared to all ASIAN countries, the Philippines performed significantly lower in Scientific Literacy.

Additional to this is the Trends in International Mathematics and Science Study (TIMSS) 2019 by the International Association for the Evaluation of Educational Achievement (IEA), which shows that the Philippines scored 297 in math and 249 in science, both scores are lower than how the country managed in 2003, which are 358 in math and 332 in science, making the Philippines rank last among 58 countries who participated (Bernardo, 2020). The TIMSS 2019

was the seventh cycle of the study and provided 24 years of trends. It serves as a valuable tool to monitor international trends in mathematics and science involving fourth and eighth grades. It has been conducted every four years since 1995 (IEA, 2019), and the Philippines got a 259 average scale score for international science achievement for fourth grade landed at the lowest rank (Mullis et al., 2019). It indicates that Filipino students show limited understanding and knowledge of scientific concepts and science facts in science.

It was also a challenge to improve Grade 6 students. Students' low performance in the National Achievement Test (NAT) last year has been steadily declining for the last three years, placing them in the low mastery level (Albano, 2019). Science received the lowest mean percentile score (MPS) among the five core subjects, as indicated in Regional Memorandum 157, series 2019 of the Department of Education Cordillera Administrative Region (DepEd CAR) Office. It was also a challenge to improve the low performance of Grade 6 students in the National Achievement Test (NAT) last 2018. It shows their continued performance decline for the last three years, putting them in the low mastery level (Albano, 2019). Science got the lowest mean percentile score (MPS) indicated in Regional Memorandum 157, series 2019 of the Department of Education Cordillera Administrative Region (DepEd CAR) Office among the five core subjects.

The NAT scores for Grade 6 in 2017 and 2018 are 39.95 and 37.44, and for Grade 10, the score is 44.09 and 44.59, showing the lowest scores in history for Grade 6 and Grade 10, the MPS in 2018 was third to the lowest while 2017 is the lowest (Albano, 2020).

This was indicated in the presentation of the Department of Education Secretary Leonor Briones last June 29, 2019, entitled "Making the Pivot from Access to Quality." The presentation shows the mean percentage score by subject areas and 21st-century skills for Grade 6 and 10 for the SY 2016-2017 and 2017-2018, respectively. It shows the overall MPS scores of the National Achievement Test (NAT). In the NAT result of Grade 6 students, science subjects got an MPS score of 31.26 in 2018 and 29.05 in 2019, which is 2.21 lower than the previous year. In the NAT result of Grade 10 students, science subjects got the MPS score is 35.68 and 36.52, respectively, which is slightly higher than 0.84 from the previous year.

As one of the largest schools in the country from the Division of Pasig, Rizal High School also faces



challenges in the performance of the students in science subjects. The school's MPS result can determine what competency in the test items got low scores, which can be considered as least mastered skills. Based on the summarized statistics overall report given by the Division of Pasig (2019) regarding the MPS of RHS for SY 2018-2019 for the 2nd Quarter test in Science for Grade 7,8,9 and 10, got mean scores of 23.37 (38.95%), 22.08 (36.82%), 21.87 (36.45), and 26.73 (44.45%), respectively. The MPS shown in this grading did not reach the passing percentage score of 75%. The Department of Education set the mean percentage score (MPS) of 75%, which indicates the scores in exams reported as a percentage of items correctly answered by the student.

These assessment results are a wake-up call to all educators and stakeholders to achieve one common goal: to have quality education for Filipino learners. These challenges in Philippine education were intensified due to COVID19 leading to the DepEd's DepEd's program "Sulong EduKalidad" that promotes continuous delivery of quality education amidst the Pandemic. It centers on the K-12 updates and review, improving the learner's environment and upskilling and reskilling teachers (Gonzales, 2019).

The Department of education observed the increase of technological needs in delivering quality education even before the COVID19 existence. It recognized the need to improve human education in the face of the Pandemic, as well as in the future, and together, they will meet the challenges employing virtues, the "old normal" has given way to the "new normal" (Briones, 2021). In the released report entitled "Guideline on the use of the Most Essential Learning Competencies (2020), the descriptor "ENDURANCE" was deemed the key determining element in developing the criteria for selecting the most essential learning competencies. If a learning ability remains with learners long after a test or unit of study is done or helpful beyond a single exam or unit of study, it is termed enduring. Learning skills, reading comprehension, writing, map reading, and hypothesis testing are essential learning competencies in many professions and everyday life.

Designing Electronic Learning Materials

The Department of Education issued an order no. 08 series 2015, also known as the Classroom Assessment Policy Guideline, stated that there should be appropriate and enough instructional interventions to ensure that learners are prepared before giving the summative tests. Teachers should make an intervention like remediation or extra lessons for the

students who got a grade of 75 in any subject in a grading period.

Technology has walked into the educational limelight and will play a significant role in educating future generations that dictates the continuous change in educators' role, which is to provide knowledge in just one click (Pamaran, 2020). The Department of Education is already promoting digital rise; it focuses on ICT-assisted teaching that aims to install digital boards, television and provide laptops containing e-Learning resources that the teachers can use uploaded with Open Education Resources (OER) (Lopez, 2019).

However, there are challenges in the quality of learning materials, including the relevance of the content to society, teacher's skill in ICT-based materials development, access to quality content, and technical difficulties like slow or no internet access (Siribodhi, 2016). In the Inquirer.net (2020) article, Education Secretary Leonor Briones asks for support to free access to the Department's online education delivery platform designed as an alternative model for the teaching-learning process during class suspensions and other similar circumstances known as DepEd Commons. DepEd Commons is an online learning platform that DepEd developed as an alternative learning platform in different unfavorable conditions like when there is a pandemic, suspension of classes due to weather conditions, or when students are unable to attend regular classes (The Informant, 2020).

The cognitive science ideas that underpin e-learning theory outline how to use and create electronic educational technologies to help students learn more effectively. Studies conducted by Mayer and Moreno (2003a; 2007b) and Sweller (2005) cited by Learning-theories.com (2020) resulted in e-learning design principles. One of the highlights is the Multimedia principle which refers to the effectiveness of using only two as a combination of audio, visuals, and text than using only one or all of them. An article written by Sengupta (2019) points out that understanding the strength and weaknesses of learning theories can lead to combining learning theories with being applied in using eLearning, which provides the appropriate needs of the learners. It allowed simplifying the teaching strategy, which led to easy understanding of the student (Kapri, 2017).

Changes in the learning process must occur on time. The teaching method approaches to teaching that are focused on individualized learning include electronic learning apps for learning (e-learning). This method

encourages students to stay involved in the most significant learning environment possible (Abdullah, Mansor, and Rahman (2020).

E-learning has a broader reach and goes beyond computer network connectivity to electronic devices utilized offline. In contrast, online learning is limited to being linked to computer networks over the internet. So, when it comes to hurdles like internet connectivity issues and the breakout of COVID-19, which has sparked remote learning, e-learning is ideal for our unique situation. As a result, digital gadgets and other alternatives could be used during periods when the internet is available and reliable instruction can be supplied online when the internet is unavailable. So that students can learn successfully and efficiently, these changes and alternate explorations are required. So that students can learn successfully and efficiently, alternate exploration is required (Ananga, 2020). Because the lecture material is readily available and the lecturer's content delivery is highly accessible, students can learn at their own speed conveniently. As a result, it improves happiness and reduces stress (Adeoye, Adanikin A.F, and Adanikin A., 2020).

According to the study conducted by Ayu (2020), she cited the statement of Elyas (2018) which Lin and Lin (2015) supported it, which stated that e-learning using self-learning materials is stored on a computer so that lecturers and students can access it anytime and anywhere if needed, according to the characteristics of e-learning in higher education institutions. By harnessing the characteristics and resources of various digital technologies for learning materials, the learning can be considered a creative way to provide well-designed, student-centered, interactive, and facilitative learning environments to anyone, anywhere, anytime.

Evaluating Electronic Learning Materials

Developing learning material requires profound evaluation to identify validity and its effectiveness. In evaluation, there is a list of criteria that should be seen on the material developed. As the evaluation is conducted, it becomes a reference for further improvement of the materials. A specific evaluation method should be applied in making a learning material, and one the most used is the ADDIE Model.

ADDIE model is known to many people since it is used as a template when making instructional content, and they need to choose whatever the result of the ADDIE shows to (Ferriman, 2017). The ADDIE model consists of five phases: Analysis, Design, Development, Implementation, and Evaluation, which

instructional developers and designers commonly use. The analysis phase identifies the problem, goals, objectives, learning setting, prior skills, and learners' knowledge. The design phase includes specific objectives, assessment parts, activities, content, lesson plan, and platform selection. In the development phase, the designer/developer makes and organizes the content given during the design phase. It is also where it should be tested following correct procedures. The material should be revised based on feedback given from the test. In the implementation phase, the procedure should be developed by the facilitators and learners. This is also the phase where all the needed materials such as a book, hands-on equipment, software, and tools are in place, and it functions properly. The last phase is the evaluation; it consists of formative and summative evaluation. The summative evaluation includes specific criteria that will provide feedback from the users. The formative evaluation should be present in every phase from the users (Quigly, 2019).

The five phases mentioned helps instructional design professionals to create eLearning projects in stages since it tackles eLearning development rather than learning behaviors, allowing the instructional designers to deepen their idea into the needs, learning objectives, and desired outcomes to develop a more suited eLearning source (Pappas, 2017).

Kathy Shrock (2021) modified a version of an educational learning application which only focused on the ability to customize the content or settings of the application and encouraged the inclusion of higher-order skills. The rubric includes relevance that shows the purpose and appropriateness of the application to the learners. Customization offers to freely develop the content and settings to achieve the needs of the students. Feedback gives a response to the students; thinking skills encourage the use of higher-order thinking skills. Engagement gives the students motivation to use the application, and sharing summarizes the students' performance that the teachers can export.

An article entitled "Guide to Successful Evaluation of Online Learning Materials" (2020) showed nine salient aspects that need attention in evaluating online materials. Content quality refers to the accurate and precise information supported by evidence that presents truths to learners. The connection between study content and tests refers to the learning gained through assessment; it should be measurable and usable after doing exercises or activities. Adaptive materials and feedback, the design of the learning

materials should fit the strength and weaknesses of the learner and provide interactive feedback so they can reflect on their performance. Motivation comes more from actual content and presentation methods that guide them towards knowledge. The Design and Presentations of Materials refer to the design (symbols, images, colors, infographics, audios, and interactivity). Interaction usability emphasizes the navigation of the learning material and understanding how to use the features easily or not; it should have clear instructions. Accessibility refers to whether the learners can see or use the materials via smartphones, tablets, and computers.

A study in 2005 was conducted by Carrie Avery, which was posted by STARS, University of Florida (2019), stating that aesthetics is also an essential factor in designing an informal website aside from usability, credibility, and satisfaction. It was suggested that there are two dimensions of aesthetics: the visual richness that shows a strong indication of aesthetic impression, and the second one is visual clarity.

Strategic Intervention Material for the New Normal

Education is for all; everyone deserves a better life by having a good education. School as an institution for learning provides an education that the learners can use to have a good living condition.

Strategic Intervention Material (SIM) is a learning intervention designed to provide activities for learners struggling to learn a particular lesson inspired by the constructivism approach. The study conducted by De Jesus (2019) about E-SIM entitled "Pump It Up" focuses on the topic of circulatory system where he identifies the perception of the students towards the use of E-SIM, it shows that the students enjoyed the use of the learning materials and should be used often. In accordance with that study, Dacumos (2016) revealed that using SIM is essential in achieving learners' required competencies that they cannot achieve in regular class discussions. Obstacles were encountered during the SIM implementation. The greatest goal of teaching is to give correct and effective instruction to practical. However, teachers encounter barriers that hinder them in achieving this goal such as creating and providing necessary learning materials appropriate for the learner's needs. This study found out that the teachers' view in utilizing SIM in Science class is used as a re-teaching and abridgment tool.

In line with the Division Memorandum 1033 (2017)

from the division of Davao, the Strategic Intervention Material (SIM) is considered a tool for remediation where low-performing students can appreciate learning from the least mastered concepts and skills. The use of SIM in managing a large number of students is effective in terms of mastery of science concepts and process skills (Alboruto, 2016). The content of the SIM must be evaluated by examining the lesson objectives, the subject matter; presentation and organization; and its usefulness (Dimalanta and Marimla, 2015).

DepEd offered the MELCs as a significant reference for all Schools, Schools, Division Offices (SDOs), and Regional Offices (ROs) in determining and implementing a learning delivery approach tailored to the local context and diverse learners adapting to COVID-19's problems. The MELCs will be used to create learning activity sheets, self-learning modules, and other educational materials for use in schools. Furthermore, schools must follow the content of the MELCs and not create a new list of learning competencies for different learning areas (DepEd CALABARZON, 2020).

Change and development in teaching methods may help MELC achieve its goals if they address the instructional needs of learners. Some teachers may face problems in this area, selecting which teaching method should be used and implemented in each class lesson to comply with the timeframe specified in the MELCs. As a result, teachers attempt to determine the most effective teaching methods or strategies to use in the teaching-learning process to ensure compliance following the MELC's rules (Ravina and Mendoza, 2021).

Teachers can flexibly integrate LCs without limits of horizontal alignment because the MELCs were organized in the list based on cognitive demand. This allows for greater curriculum flexibility. The timetable and time allotment of LCs in quarters are instructive in this regard. As previously said, a teacher is given the freedom to unpack the MELC according to the needs of students. As a result of this principle, the duration of LC is relative. However, what is expected is that the list of competencies is completed within the grade level provided (Guideline on the use of the Most Essential Learning Competencies, 2020).

Synthesis

The different challenges in science education together with the pandemic situation pushes our educational institution to maximize the use of e-learning

application. The application of electronic learning theory in making a learning material is prevalent nowadays. Developing a student-centered learning environment should maximize the learning experience of the student for learning to take place.

The goal of every teacher is to provide the learning process more accessible for the learners through the implementation of best practices in the classroom. Best practices implemented by the teacher are always based on the needs of the learners. That is why teachers need to identify the strengths and weaknesses of the students to come up with a better solution, like crafting a learning material based on what they need. Science is an essential part of the foundation for the education children. Science lesson gives students to develop their creativity. It helps them to understand the environment, and this will result in their better creative power. Science students must explore their environment and discover something new to them. A low-performing student has difficulty understanding a lesson or developing an appropriate learning environment. Therefore, teachers are bound to make a material that will help the low-performing students attain equal learning in the old normal or new normal way of teaching. In response to the problems faced under Covid-19 in learning delivery, the Department of Education has enhanced the identification of essential learning competencies, which has been further reduced into the most essential competencies (MELCs). The SIM should align to the latest learning guide to cater to the learners' needs nowadays and maximize its purpose.

Methodology

Research Design

The research design used in this study entitled "Design and Evaluation of Electronic Strategic Intervention Material Application in the New Normal is a type of formative evaluation research since the method used to create the E-SIM application was based on ADDIE model instructional design.

It is research in which the outcome and efficacy of a program (of intervention) is examined and when and where possible during the research enhanced with the aid of interim reports (What is Formative Research, 2021). Formative evaluations are carried out during the creation of a product or while it is still being shaped. The idea is to have an impact on design decisions as they are made. Formative research can learn what people think about a topic, figure out when a feature is

not working effectively and why, and make changes depending on what has been learned (Baxter, Courage, and Caine, 2015).

Methods and Techniques Used

A mixed method was used to evaluate the application as an intervention through adapted evaluation forms and a research-made questionnaire with open-ended questions, validated by Science and Information Technology (IT) experts. In a research study, the mixed method refers to both quantitative and qualitative research methods. It was evaluated by science teachers and selected grade 7 students at Rizal High School. The students were purposely selected since the low-performing students in science 7 are the target participant.

Population and Sample of the Study

The sampling technique used in this research was purposive sampling. The researcher purposely selects the respondents.

There are 25 selected Science Teachers in RHS from Grade 7-10. The science teachers were purposely selected as respondents since they are public school teachers familiar with making and using a SIM as a learning material in their remedial classes; they know the standard design of the said material and its purpose. Newly hired teachers are not included since they are not familiar with the learning material.

The Grade 7 students were purposely selected as another set of respondents since the analyzed competency as least mastered was based on Grade 7 Periodical test results from the school year 2018-2019 and 2019-2020, which became the focus lesson in the E-SIM. Only students who were identified as low-performing students participated in this study. Based on their written test results for this school year, the Grade 7 teachers identified 43 low-performing students who belong to the sections under learners with devices and connectivity. The respondents needed a device and connectivity to be able to use the intervention material. The researcher selected only 25 students for the remedial class since the other students participated in the other grade 7 science teachers' remedial classes.

Four (4) evaluation phases were conducted during the design, development, implementation, and evaluation phases. In the design phase, 25 teachers evaluated the content and visual aesthetics of the E-SIM Design. The result was used to develop the E-SIM. In the development phase, which referred to the application

version of the E-SIM, the same respondents evaluated the material, and again the result was used to improve it further. In the implementation phase, 25 Grade 7 students were the respondents since they were the ones who used the E-SIM in their remedial classes. The last phase is the evaluation phase, where teachers can evaluate the E-SIM after using it in their remedial class or testing it on their low-performing students. An open-ended questionnaire was given to the science teachers to know their perceptions of the E-SIM application. The evaluation used in the design, development, and implementation phase are formative evaluations, while the last two evaluations are summative. Formative evaluation is usually done when a program or course is being developed or improved. At the end of a program or course, summative evaluation entails making judgments on its efficacy (“Formative and Summative Evaluation,”2021).

Results

Analysis Phase

Table 1. *Least Mastered Competencies for SY 2018-2019 and 2019-2020 (2nd Quarter) in Science 7.*

<i>Top 3 Least Mastered Competencies 2nd Quarter Periodical Test Rizal High School SY 2018-2019</i>		
<i>Competencies</i>	<i>% Correct</i>	
1 Describe the process of fertilization Differentiate asexual and sexual reproduction in terms of number of individuals involved, similarities of offspring to parents.	27.66	
2 Explain why cell is considered the basic structural	30.52	
3 and functional unit of all organism.	32.24	
<i>SY 2019-2020</i>		
1 Describe the process of fertilization Differentiate asexual and sexual reproduction in terms of number of individuals involved, similarities of offspring to parents.	34.27	
2 Describe the different ecological relationships found in ecosystem.	34.97	
3	36.07	

Source: Division of Pasig City, Report in 2nd Quarter Test Result in Science 7.

Table 1 shows the percentage of correct responses in the 2nd quarter tests in science 7 of Rizal high School from SY 2018-2019 and 2019-2020. Based on the result, the competency about the fertilization process got the lowest percentage of correct response for two consecutive years. It was followed by the competency about differentiating asexual and sexual reproduction in terms of the number of individuals involved, similarities of offspring to parents, consistently on the second spot for two years. The third spot for both years has different competencies.

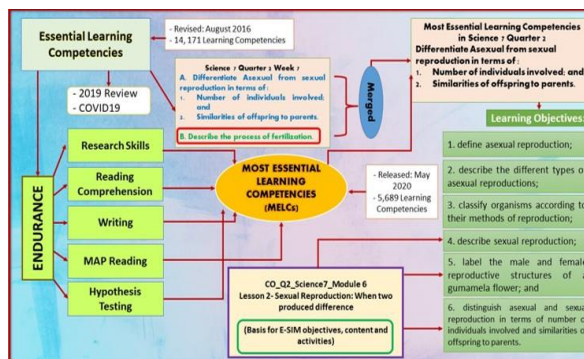


Figure 1. *The Most Essential Learning Competencies in Quarter 2 Science 7 Conceptual Map*

Figure 1 shows the mapping-out of the MELCs in connection to the objectives of the least mastered competencies of science 7 in Quarter 2 for the new normal. The result of mapping out the MELCs shows that the MELCs was based on the essential learning competencies (ELCs) from the revised version in August 2019 with 14,171 learning competencies. It was reviewed by the experts last year 2019 and considered the COVID19 situation. The ELCs were reduced using the descriptor ENDURANCE, which is the primary factor for the MELCs criteria. The competency is said to be enduring if it remains to the learner for a long time even after studying it and can be helpful in a single test. The learning competencies should include research skills, reading comprehension, map reading, writing, and hypothesis testing. The ELCs were reduced to 5,689 from 14,171 competencies in the MELCs crafted by the department of education curriculum experts, released in May 2020.

In science 7, competencies for quarter 2 of week 7 include differentiating asexual from sexual reproduction in terms of the number of individuals involved and similarity of offspring to the parents and describing the fertilization process. The two ESLs were merged/combined in the MELCs. The



competency about differentiating asexual from sexual reproduction regarding the number of individuals involved and similarity of offspring to the parents remained. Under this competency are the learning objectives found in quarter 2 module 6 of Science 7. The first three objectives are to define asexual reproduction; describe the different types of asexual reproductions and classify organisms according to their reproduction methods. The last three objectives are to describe sexual reproduction, label the male and female reproductive structures of a gumamela flower, and distinguish asexual and sexual reproduction in terms of the number of individuals involved and similarities of offspring to parents. The last three objectives became the basis of the E-SIM application in terms of the objectives, content and activities.

Design Phase

Table 2. Design Phase Evaluation Weighted Mean Result

Content	AWM	VI
Objective	3.76	Strongly Agree
Subject Matter	3.74	Strongly Agree
Presentation and Organization	3.79	Strongly Agree
Usefulness	3.81	Strongly Agree
<i>Visual Aesthetic</i>		
Visual Clarity	4.73	Strongly Agree
Visual Richness	4.71	Strongly Agree

Table 2 shows the result of the evaluation in the design phase. It shows the average weighted mean of each dimension of the E-SIM design. Regarding the content part of the E-SIM, which is divided into four dimensions, the respondents strongly agree with all of it based on the average weighted mean (AWM). The objectives of the E-SIM got an average weighted mean of 3.76, the subject matter got 3.74, presentation and organization got 3.79, and usefulness got 3.81. The subject matter got the lowest AVM while the usefulness got the highest regarding the E-SIM content. In the visual aesthetic, the visual richness is lower than the visual clarity.

The respondent teachers also mention some of their suggestions to improve the E-SIM design. The respondents gave only two suggestions.

“Your E-SIM is visually appealing, colorful and challenging. It would be better if you ask the evaluator to answer it in 1 hr. to determine if it is

attainable.”—Teacher #7

“The students will increase their knowledge as they play this E-SIM. I suggest make a game from easy round to a difficult one to enhance their knowledge about reproduction.”—Teacher #21

The researcher was able to reflect on the suggestions given and consider some changes in the E-SIM design.

Development Phase

Table 3. Develop Phase Evaluation Weighted Mean Result

	WM	VI
Relevance	3.72	Strongly Agree
Customization	3.76	Strongly Agree
Feedback	3.80	Strongly Agree
Thinking Skills	3.76	Strongly Agree
Usability	3.64	Strongly Agree
Engagement	3.64	Strongly Agree
Sharing	3.64	Strongly Agree
AWM	3.71	Strongly Agree

Table 3 shows the result of the evaluation in the development phase. It shows the weighted mean of each dimension of the E-SIM as it was developed into an application. The evaluation in this part is divided into seven dimensions. The respondents strongly agree with all of it based on the weighted mean (WM). Regarding its relevance, it got 3.72; customization got 3.76; feedback got 3.80 which is the highest, while thinking skills got 3.76, while usability, engagement, and sharing got 3.64 and considered the lowest. Overall, the average weighted mean of 3.71 resulted in the same value of interpretation.

The respondent teachers mention some of their suggestions to improve the E-SIM development into an application. The respondents gave five suggestions.

“It will be easier if the application is fit to the screen of any electronic device.”—Teacher 4

“You can include other competencies from the activities.”—Teacher #12

“I hope other grade seven teachers can use



it.”—Teacher #13

“It will be nice if it can use even without connectivity.” –Teacher #16

“Add more challenging activities.”—Teacher #21

The researcher was able to reflect on the suggestions given and consider some changes in the E-SIM application development.

Implementation Phase

Table 4. Implementation Phase Evaluation Weighted Mean Result

Item Statement	WM	VI
1. The E-SIM helped me understand the lesson on the process of fertilization.	2.04	Agree
2. The presentation of the E-SIM concepts are clear and fits my needs.	2.04	Agree
3. I could easily understand the explanations of the lesson provided by the SIM.	2.72	Agree
4. I can easily understand the instructions for activities and tasks given in the E-SIM.	3.44	Strongly Agree
5. The time allotment is adequate for each lesson.	2.88	Agree
6. Activities and tasks given in the SIM were very easy.	2.96	Agree
7. I enjoyed reading and doing all the activities provided in the E-SIM.	3.52	Strongly Agree
8. E-SIM used words and terms suited to my reading comprehension.	3.20	Strongly Agree
9. E-SIM inspired and encouraged me to learn more topics in Science.	3.56	Strongly Agree
10. I want to use SIM in regular classroom teaching next time.	2.92	Agree
AVM	2.93	Agree

Table 4 shows the perceived effect on the students on using E-SIM in their remedial class. Based on the result statement, numbers 1 and 2 got the lowest weighted mean of 2.04. Item one indicated if the E-SIM helped the student understand the lesson on the fertilization process, while item two indicated if the presentation of the E- SIM concepts is clear and fits their needs. Item 3,5,6, and 10 have "agree" as their value of interpretation. Item 3 stated if the students could easily understand the explanations of the lesson provided by the E-SIM. Item 5 refer to the time

allotment if it is adequate for each lesson. Item 6 stated if the activities and tasks given in the SIM were very easy. Item 10 stated if they want to use SIM in regular classroom teaching next time. Items 3,5,6 and 10 got a weighted mean of 2.72, 2.88, 2.96, and 2.92, respectively.

The VI "strongly agree" were shown in item 4, which stated that they could easily understand the instructions for activities and tasks given in the E-SIM that got 3.44; item 7 stated if they enjoyed reading and doing all the activities provided in the that got 3.52; item 8 stated if the E-SIM used words and terms suited to their reading comprehension that got 3.50. E-SIM; and item 9 stated if the E-SIM inspired and encouraged them to learn more topics in science that got 3.56 which is the highest among the WM.

Table 5. Pretest and Posttest Mean Percentage Score Result

Total Score	337	541
No. of Students	25	25
Mean	13.48	21.64
Mean Percentage	45%	72%

Pretest and posttest were also conducted in this phase as part of the assessment of using a learning material and to determine if learning occurred. Based on the score of the students, all of them got higher scores in posttest than pretest. The mean percentage score in pretest is 45% while the posttest got 72%.

Evaluation Phase

Table 6. Evaluation Phase Weighted Mean Result

	WM	VI
Relevance	3.72	Strongly Agree
Customization	3.76	Strongly Agree
Feedback	3.80	Strongly Agree
Thinking Skills	3.72	Strongly Agree
Usability	3.80	Strongly Agree
Engagement	3.68	Strongly Agree
Sharing	3.80	Strongly Agree
AWM	3.75	Strongly Agree



Table 6 shows the result of the evaluation after the implementation phase. It shows the average mean of each dimension of E-SIM as it developed into an application and were used in the remedial class. The evaluation in this part is divided into seven dimensions, the same as the evaluation in the development phase. The respondents strongly agree with all of it based on the weighted mean (WM). Regarding its relevance, it got 3.72, customization got 3.76, and feedback got 3.80; it has the same result in the development evaluation. Usability and sharing, got 3.80 and engagement got 3.68 which are higher than the previous development evaluation. However, thinking skills got 3.72, which is lower than the result from the previous evaluation. Overall, the AWM is 3.75, higher than the development phase evaluation, which is 3.71.

The respondent teachers mention some of their suggestions to improve the E-SIM development into an application after they experienced using it in their remedial classes or giving it to their low-performing students. The respondents gave four suggestions.

“The answer card should be access after the students tried all the activities.”—Teacher 4

“Some answers cannot easily drag to its place.”—Teacher #6

“It is better to maximize the whole screen.”—Teacher #8

“Try using it in a regular class discussion.”—Teacher #12

Table 7. Open-Ended Questionnaire Result

Coding Data from Open-Ended Questionnaire		
Interview Questions	Codes (From respondents' answers)	Interpretation
1. What can you say about the activities in the E-SIM concerning the least mastered competency?	Helps to understand the topic, help both students and teachers, It is to learn and follow, interesting activities	The respondents said that the E-SIM helps the students to understand the least mastered competency since the activities are exciting and it is easy to follow and learn. The same goes to the teachers.
2. What parts of the E-SIM do you like the most?	Colorful activities, activity card, I fill you-youfill me activity, interactive activities.	The respondents said that they like colourful and interactive activities, just like in the activity entitled I fill u-u fill me.
3. What parts of the E-SIM are not necessary or needed by the learners?	All needed, reference card	The respondents said that there is no part that is unnecessary, but others said that reference card is not needed.
4. What can you say about the design and features of the E-SIM?	Colorful and interactive, catching, interesting, pleasing to the eyes.	The respondents said that they liked the interactive activities and colourful design since it is pleasing in the eyes.
5. What do you think are the advantages of customizing the student's learning material into an electronic platform? How about the disadvantages?	Provides variety of activities, catches attention appropriate for the new generation, another strategy, unavailable device, additional technology exposure, poor connectivity.	The respondents said that the advantages of the E-SIM is it provides a variety of activities, catches attention and is appropriate for young learners.

6. What specific part of the E-SIM needed improvement? How can this learning material be improved?	the emojis, too easy activities, more encouraging feedback, better to have music or sound as background.	The respondents said that it needs to improve the emojis, the activities are too easy and to apply background music.
7. Describe what you feel when you explore the E-SIM? Why do you think that way?	Excited, happy, amazed	The respondents said that they were happy, excited and amazed when they explore the E-SIM.
8. What do you think are the skills that can develop through this learning material?	memory skills, observation, inference, patience, reading comprehension, critical thinking, organizing	The respondents said that the E-SIM could develop skills such as observation, inference, reading comprehension, memorization and critical thinking.
9. How can this E-SIM affect the teaching strategy of the teacher in teaching Science?	Another tool for teaching, new strategy, can easily distribute the copy of the application, alternative activity for low performing learners, can catch the attention of the learner.	The respondents said that the E-SIM can affect the teaching strategy in science since it can be a tool for teaching, can easily distributed among teachers and students, can provide activities for low performing students, and it can catch attention.
10. Why do you think educators should continue designing and developing learning materials for low-performing students?	To help students in distance learning, to catch the learners attention in remedial class, increase learning achievement, develops new method in teaching in the new normal.	The respondents said that E-SIM could help students during distance learning, it can catch attention in a remedial class, and it can develop a new method in teaching in the new normal.

From the data presented in Table 8, and with the responses from the teachers, four themes emerged. These are the following themes:

- The E-SIM can help students and teachers.
- The activities are interactive, engaging, and colorful, easy to use and follow.
- It is a new strategy in teaching a remedial class.
- *There are disadvantages to using the E-SIM application.*

The E-SIM can help students and teachers.

Based on the questions given, the teacher respondents mentioned that the E-SIM application could help students and teachers in the teaching-learning process.

“The activities will allow the students to fully understand the different concepts while using the E-SIM.” --Teacher #1

“The students will have an easy way of learning through E-SIM. The images, visuals of the E-SIM will be a great help to let the students fully understand the specific concept. The students will also enjoy while they are learning.” – Teacher #5

“To help the students understand the concept or topic. It also allows the students to visualize the concepts or topic by using E-SIM.” -- Teacher #10

“It can be one of the tools that can be used by teachers like me. I think it is not just applicable during remedial classes but also during regular classes.”—Teacher #7

“It will allow teachers to use this E-SIM as part of the different activities for the students. Teachers will also have an alternative way to let students understand concepts that may seem complex or confusing for them.” –Teacher #9

The activities are interactive, engaging, and colorful, easy to use and follow.



Based on the teachers' responses after using the E-SIM application, it is considered interactive, engaging, and colorful, which is pleasing to the eyes.

"I am interested most in the E-SIM is the interactive activities just right to catch the students' attention and at the same time, learn from those topics." --Teacher #2

"All the activities are interesting."--Teacher #5

"They are helpful to students since they are interactive."-- Teacher #6

"Contrast of colors use are correct, pleasing to the eyes."--Teacher #10

"The activities are interesting and could help the students learn more about this least mastered skills competency."--Teacher #4

It is a new strategy in teaching a remedial class.

Based on the teachers' responses after using the E-SIM application, it can be a new strategy in teaching remedial topics since it is in electronic form.

"The advantages are it would easily catch the student's attention since we are in the technology generation. Once the student's attention is caught, the chances of him/her learning the topic is high which will then give positive results, especially in a remedial class." -- Teacher #3

"Because there are different types of students and developing different approaches/activities or learning materials would cater most of these types of students. For them to learn more and understand well the topics." --Teacher #4

"Varieties of learning materials are important to students' understanding of the learning concepts and it is important for us teachers since we will be exposed to more techniques." --Teacher #9

There are disadvantages in using the E-SIM application.

Based on the teachers' responses after using the E-SIM application, there are disadvantages in using the E-SIM application.

"It would help catching the attention of the learners but not all of them have internet connection."--Teacher #1

"The only disadvantage that I can think of is the time students are exposed to the gadget." --Teacher #3

"The students will be more interested in learning the topics/disadvantage is that not all of them have access to gadgets." --Teacher #7

"Advantage: a lot of interactive activities can be done, the disadvantage: not all students have gadgets." -- Teacher #10

Pre-test and Post-test: Paired T-test Result

	Mean	Std. Deviation	St. Error Mean	Paired Differences		t	df	Sig.(2-tailed)
				95% Confidence Interval of the Difference				
				Lower	Upper			
Pair								
Pretest – Posttest	-8.160	2.764	.553	-9.301	-7.019	-14.761	24	.000

Table 8. Paired Samples Test

Pre-test and post-test were weakly and positively correlated ($r=.268, p<0.001$). The null hypothesis was rejected since there is a significant difference between pretest and posttest ($t_{24}=-14.761, p<0.001$).

Discussion

The research's principal goal is to evaluate the self-concept, self-esteem, self-efficacy, and academic achievement of senior high school students. The purpose of this research is to explore the effect of these expectations on their academic success. Thus, this analysis used the descriptive-correlational analysis approach to define the respondents' profile in terms of self-concept, self-esteem, self-efficacy, and academic success. The research also established the magnitude of impacts that occur between and within the variables in this study. Specifically, it established a substantial influence between the respondents' self-concept, self-esteem, and self-efficacy on their academic success.

Conclusion

The pandemic situation greatly affects science education, which presents challenges in its alignment with the learners' current needs in learning science competencies. In the Philippines, the K to 12 Basic Education Curriculum was implemented to keep level with global trends. However, due to the pandemic, the Department of Education released the Most Essential Learning Competencies (MELCs) to focus on the

essential concepts and principles in science that a learner should comprehend even through distance learning. The use of MELCs is one of the new normal ways to deliver learning concepts among the students.

The MELCs also serves as the guide of the teachers freely design any learning material with the combination of competencies indicated if it serves its purpose in reaching learners even during the pandemic. Crafting a new version of the strategic intervention material to apply to the needs of learners nowadays is not an easy task. However, the great demand for the global performance of our education became a challenge to the educational institutions. The result of the PISA 2018 and TIMMS 2019 showed that our country needs to level up the quality of education so that our learners can be globally competitive and be ready to face the reality of life. As a teacher who directly delivers the learning competencies through teaching, the researcher decided to design and evaluate an E-SIM application, which realized the pros and cons of crafting electronic learning materials. It should always serve its purpose by analyzing the needed content of the material and the situation of the learners and the teachers who will use the material. Collaboration with other professionals like software engineers and IT experts was a great help in improving the quality of the learning material that can be used in teaching. The application development took much time to fix all the changes based on every evaluation conducted. However, it became more user-friendly since the evaluation results came from the end users like the teachers and students.

In this study, the e-learning theory proved its effectiveness during distance learning. The said learning theory aims to have a learning and teaching interaction digitally. The use of technological devices like cellphone and laptops dramatically helps deliver the learning material to the target learners. E-learning is a learning theory that promotes digital learning materials like the E-SIM application. It is considered a creative way to provide well-designed, student-centered, interactive, and facilitative learning environments to anyone, anywhere, anytime. Based on the participants' feedback, the E-SIM possesses the advantages of e-learning.

This study helps low-performing students improve their scientific thinking skills, help Science teachers reteach the least mastered concepts in science 7, and most especially provide a basis in crafting electronic learning material. The use of E-SIM is applicable nowadays since it caters to the use of technological devices and as well as it promotes monotonous

learning that is appropriate to avoid physical contact during the pandemic period. The collected data during the evaluation of the application showed that the use of E-SIM application in remedial classes was effective since most of the response of the end-users is positively interpreted. There are some suggestions and recommendations for further development of the application, which is good since it gives space for improvement. There are no such thing as perfect learning materials for teaching. It continuously varies depending on the needs of the learners.

References

- A Guide to Successful Evaluation of Online Learning Materials. (2018, January 17). F.learningstudio.com. Retrieved from <https://www.flearningstudio.com/evaluation-online-learning-materials/>
- Abdullah, N., Mansor, N.A., & Rahman, H.A. (2020). Towards electronic learning features in education 4.0 environment: literature study. *Indonesian Journal of Electrical Engineering and Computer Science*, 19(1),442. DOI: 10.11591/ijeecs.v19.i1.pp442-450
- Adeoye, I. A., Adanikin, A. F., & Adanikin, A. (2020). COVID-19 and e-Learning: Nigeria tertiary education system experience. *International Journal of Research and Innovation in Applied Science*, 5(5), 30. <http://repository.elizadeuniversity.edu.ng/bitstream/20.500.12398/1063/1/researchgateEmailing28-311.pdf>
- Albano, E. (2020, November 26). Senior high school students score lowest in national assessment history. *Manila Times*. Retrieved from <https://www.manilatimes.net/2020/11/26/campus-press/senior-high-students-score-lowest-in-national-assessment-history/801503>
- Albano, E. (2019, September 26). Grade 6 NAT scores at low mastery level. *The Manila Times*. Retrieved from <https://www.manilatimes.net/2019/09/26/campus-press/grade-6-nat-scores-at-low-mastery-level/621772>
- Alboruto, V.M. (2016). Beating the numbers through strategic intervention materials: Innovative science teaching for large classes. De Jesus, R.G. (2019).
- Almarabeh, H., Amer, E.F., & Sulieman, A. (2015). The effectiveness of multimedia learning tools in education. *Research gate*. 5(12), 761-764. Retrieved from https://www.researchgate.net/publication/290429349_The_Effective_ness_of_Multimedia_Learning_Tools_in_Education
- Ananga, P. (2020). Pedagogical considerations of e-learning in education for development in the face of COVID-19. *International Journal of Technology in Education and Science (IJTES)*, 4(4), 310-321. <https://files.eric.ed.gov/fulltext/EJ1271209.pdf>
- Ayu, M. (2020). Online learning: Leading e-learning at higher education. *The Journal of English Literacy and Education*, 7(1), 47-54. file:///C:/Users/Win%2010/Downloads/document.pdf
- Avery, C. (2005). Only Screen Deep? Evaluating Aesthetics, Usability, And Satisfaction In Informational Websites. *Electronic Theses and Dissertations, 2004-2019*. 278. <https://stars.library.ucf.edu/etd/278>
- Baxter, K., Courage, C., and Caine, K. (2015). Chapter 5-choosing a



- user experience research activity. ScienceDirect. <https://doi.org/10.1016/B978-0-12-800232-2.00005-5>
- Briones, L. (2019, June 29). Making the pivot from access to quality. Magna Anima Teachers College. Retrieved from <https://magna-anima.com/advantages/research-and-development>
- Burgess, S.&Sievertsen, H. (2020, April 1). Schools, skills, and learning: The impact of COVID-19 on education. Retrieved from <https://voxeu.org/article/impact-covid-19-education>
- CRTL. (2021). Formative and Summative Evaluation. Retrieved from <https://crtl.umich.edu/tstrategies/tsfse>
- Dacumos, L.N. (2016). Perspective of secondary teachers in the utilization of strategic intervention material in increasing learning proficiency of students in science education. *Asten journal of teacher education*. 1(2), 1-15. Retrieved from <http://po.pnuresearchportal.org/ejournal/index.php/asten/article/view/293>
- Department of Education, (2013). K to 12 Curriculum Guide Grade 3-10. Retrieved from <http://www.deped.gov.ph/sites/default/files/page/2014/Final%20Science%20CG%203-10%2005.08.2014.pdf>
- Department of Education-Region IV-A CALABARZON. (2020). DM. no. 89 s.2020: Clarifications on the use of most essential competencies (MELCs) and other related issues. Retrieved from <https://drive.google.com/file/d/1ilcXB39bG41bw-nHYd16TsQIXdyqfm4U/view>
- Dela Cruz, R. (2019, December 5). Deped to improve education quality after PH's poor PISA ranking. Philippine News Agency. Retrieved from <https://www.pna.gov.ph/articles/1087967>
- De Jesus R. (2019). Improving the latest mastered competencies in Science 9 using "pump it up!" electronic strategic intervention material. Retrieved from <https://www.dlsu.edu.ph/wp-content/uploads/pdf/conferences/research-congress-proceedings/2019/li-II-011.pdf>
- Dimalanta, G. O.&Marimla, A.S. (2015). Development and evaluation of strategic intervention material in science v. *Research journal of social science*, 8(12), 1-6.
- E-Learning Theory (Mayer, Sweller, Moreno). (2020). *Learning-theories.com*. Retrieved from <https://www.learning-theories.com/e-learning-theory-mayer-sweller-moreno.html>
- IEA's Trends in International Mathematics and Science Study TIMSS 2019. (2020). IEA TIMSS AND PIRLS. Retrieved from <https://www.iea.nl/sites/default/files/2021-01/TIMSS%202019-International-Results-in-Mathematics-and-Science.pdf>
- Ferriman, J. (2017, April 3). Three instructional design theories. *Elearninglearning.com*. Retrieved from <https://www.elearninglearning.com/addie/theory/?open-article-id=6397578&article-title=3-instructional-design-theories&blog-domain=learndash.com&blog-title=learndash>
- Gonzales, E. (2019, December 29). Year-end report: Deped 2019: The quest for quality education continues. *Manila Bulletin*. Retrieved from <https://mb.com.ph/2019/12/29/year-end-report-deped-in-2019-the-quest-for-quality-education-continues/>
- Guideline on the use of the Most Essential Learning Competencies. (2020). Retrieved from <https://commons.deped.gov.ph/MELCS-Guidelines.pdf>
- IGIGlobal. (2021). What is formative evaluation research. Retrieved from <https://www.igi-global.com/dictionary/client-perspective-health/11417>
- Kapri, U.C. (2017). Impact of multimedia in teaching of Science. *Ijariie-issn*. 3(4), 2395-4396. Retrieved from http://ijariie.com/AdminUploadPdf/IMPACT_OF_MULTIMEDIA_IN_TEACHING_OF_SCIENCE_ijariie6298.pdf
- Lee-Brago, P. (2020, March 12). COVID-19 affects 363 million students worldwide. *The Philippine star*. Retrieved from <https://www.philstar.com/headlines/2020/03/12/2000138/covid-19-affects-363-million-students-worldwide>
- Lopez, M. (2019, November 18). Deped's digital rise program: Includes television for each classroom and laptop for each teacher. *Deped tambayan.com*. Retrieved from <https://depedtambayan.org/deped-digital-rise/>
- Mullis, I., Martin, M., Foy, P., Kelly, D., & Fishbein, B. (2020). TIMSS 2019 International Results in Mathematics and Science. TIMSS and PIRLS International Study Center. Retrieved from Boston College, TIMSS & PIRLS International Study Center website: <https://timssandpirls.bc.edu/timss2019/international-results/>
- Pamaran, M.D. (2020, April 23). Education post-covid-19 will be largely virtual—but is the Philippines ready?. *Abs-cbn.com*. Retrieved from <https://news.abs-cbn.com/ancx/culture/spotlight/04/23/20/education-post-covid-19-will-be-largely-virtual-but-is-the-philippines-ready>
- Pappas, C. (2017, September 2). E-learning course design: 7 instructional design theories & models to consider. *Elearningindustry.com*. Retrieved from <https://elearningindustry.com/how-learning-theories-affect-elearning>
- Philippines: Students Performance (PISA) 2018. (2021). *Education GPS, OECD*. Retrieved from <https://gpseducation.oecd.org/CountryProfile?primaryCountry=PHL&threshold=5&topic=PI>
- Philippines National Report. (2019). PISA 2018. Retrieved from <https://www.deped.gov.ph/wp-content/uploads/2019/12/PISA-2018-Philippine-National-Report.pdf>
- PLDT, smart make deped commons and other education services free to
- Subscribers. (2020, May 4). *Inquirer.net*. Retrieved from <https://business.inquirer.net/296448/pldt-smart-make-deped-commons-and-other-education-services-free-to-subscribers>
- Policarpio, J. (2010). Strategic intervention material: A closer look. Retrieved from <https://tsoktok.blogspot.com/2011/08/sim-101-basic-of-developing-strategic.html>
- Ravina, J.D., & Mendoza, J. P. (2021). Teaching approach in science, their use and effectiveness on most essential learning competencies (melcs) distribution. *International Journal of Multidisciplinary Research (IJMR)*. DOI: 10.36713/epra2013
- Schreiner, Erin. (2020, May 13). How to Design Teaching Material. *classroom.synonym.com*. Retrieved from <https://classroom.synonym.com/design-teaching-material-5762889.html>
- Sengupta, D. (2019, August 25). How Learning Theories Affect



eLearning?. Elearningindustry.com. Retrieved from <https://elearningindustry.com/how-learning-theories-affect-elearning>

Shrock, K. (2021). Assessment and Rubrics. Kathy Shrock's Guide to Everything. Retrieved from <https://www.schrockguide.net/assessment-and-rubrics.html>

Siribodhi, T. (2016). Challenges in quality: Development of learning materials. Retrieved from <https://www.seameo.org/v1/library/dlwelcome/publications/paper/Bangladesh/Challenges%20in%20Learning%20Materials.Tinsiri.pdf>

SunStar Cebu. (2020 May 22). DepEd revises curriculum for school year 2020-2021. Retrieved from <https://www.sunstar.com.ph/article/1857430/Cebu/Local-News/DepEd-revises-curriculum-for-school-year-2020-2021>

TIMSS 2019. (2019). IEA. Retrieved from <https://www.iea.nl/studies/iea/timss/2019>

Quigly E. (2019). ADDIE: 5 steps to effective Training [Web log post]. Retrieved from <https://www.learnupon.com/blog/addie-5-steps/>

Affiliations and Corresponding Information

Mary Jane A. Dalisay

Rizal High School

Department of Education - Philippines