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Research Article

Contextualized and Localized Supplementary E-Learning Materials in Science 8 Physics

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ABSTRACT

This study is in response to the current situation in the Philippines that aims to support students' learning needs even from the comfort of their own homes, as well as to improve the teaching and learning process through the use of contextualized and localized supplementary e-learning materials for students. This study aimed to develop, evaluate, and determine the effectiveness of contextualized and localized supplementary e-learning materials for Grade 8 students in Science (Physics) at a public national high school in Antipolo City during the school year 2021-2022. The study utilized both descriptive and experimental research designs. The developed materials were evaluated by twenty science experts and twenty science teachers from the City Schools Division of Antipolo. The participants of the study were thirty Grade 8 students. The data gathering instruments used in this study were the questionnaire checklist, pretest, and posttest. The study showed that the developed contextualized and localized supplementary e-learning materials in science 8 (Physics) helped in the improvement of the teaching and learning process. It is recommended that the materials be used accordingly and constantly modified for improvement.

Keywords: *Contextualized learning, E-learning materials, physics education*

Introduction

Science is one of the difficult subjects experienced by learners in both the private and state funded schools. The yearly consequences of the diverse accomplishment tests and achievement test in Science and Technology show that the said subject is reliably one of the base positions. It is also discovered that dealing with word problems is one of the least mastered abilities, particularly among grade eight students.

Among the field of sciences, Physics is one subject that students consider to be really difficult because the topics are abstract and cannot be easily understood by the learners. In addition to this, when compared to other lessons,

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although there are many relationships between main subjects and number of subjects to be learned, simply knowing definitions is not enough to learn the subject (Karaca, 2013). Theories and numerical expressions also make it difficult to understand Physics and to make a connection between the subjects (Ergul & Cigrik, 2013). McDermott (1993) mentioned that the problems occurring in Physics education are the result of traditional educational methods. Students who were taught using traditional education methods could not actively participate in the lesson and were merely passive listeners. Studies that aim on solving the difficulties students experience in Physics concentrate on what the students learn and how they learn it (Hoellwarth, Moetter & Knight, 2005).

To manage successful learning in Physics, there should be a learning environment where the level of the students' prior knowledge is known, real life events are discussed, students are both mentally and physically ready, and cognitive change is provided. At the same time, these learning environments should provide opportunities to students to consolidate the recently – learned notions (Guvercin, 2010). There is a need to teach Physics by using different student – centered education methods such as roleplay and experiment instead of the traditional methods to develop the students' cognitive learning and their performance in solving problems, relating the subject to real life events, getting rid of the boring mathematical processes, in other words the use of special methods, would protect students from memorizing and participate in the lesson willingly and with pleasure (Demir & Demir, 2014). For them to comprehend Physics which is hard to understand, using visuality like films, shapes, schemas, graphics, pictures and animations are needed to motivate students and attract their attention.

Teachers play a vital role in the implementation of the curriculum; their responsibility is to ensure that students attain national goals. Incidentally, the learners have their distinct characteristics which may manifest special learning needs. Equally alarming is the fact that despite teachers' best efforts, typical students are also learning that physics is boring and irrelevant to understanding the world around them (Wieman & Perkins, 2005). Learners expect materials and methods of instruction to be easily transferable to the real world. Thus, the task of the teacher includes, among others, to provide the materials and experiences to aid learning and meet the learner's expectations. However, these problems should be addressed through the utilization of contextualization and localization of instructional materials.

Diverse universal overviews or appraisals of the exhibition of Filipino students in Science and Mathematics in the TIMSS and PISA revealed that we rank low. The high performing nations, like Australia, Brunei, England, Japan, Taiwan, Thailand, Singapore, New Zealand and USA pursue a winding movement approach (Achieve, Inc., 2003). Since science instruction is one of the most important aspects in ensuring that quality education is provided to Filipino students, the Department of Education continuously improves the curriculum and instruction through revisions and training of teachers in the field. This reconstruction is stipulated in the Republic Act 10533 of the Philippines known as the "Upgraded Basic Education Act of 2013".

Contextualization and localization are presently arising hypothesis or methodology so as to pick up the objective of value instruction and logical proficiency that could address such gap in the development of education. Contextualization is growing new aptitudes, information, capacities and demeanors in understudies in exhibiting new topic in an important and significant setting.

Moreover Bandono (2008) explained that the advantages of localization and contextualizing the educational program are: social affectability, potential for personalization, simple accessibility of assets, direct relevance of materials to students, and responsibility for advancement process. All-encompassing learning procedure plans to assist understudies with understanding the significance of showing materials with it with regards to everyday (the setting of individual, social and social), so 21st century learners have the information and abilities

which are dynamic and adaptable to effectively build their own comprehension.

Furthermore, the ongoing COVID – 19 pandemic caused a largest disruption of education systems and interruption of the normal operation of schools where no direct interaction between the teacher and the learners in order to follow the safety protocols implemented by the Inter-Agency Task Force of the Department of Health. In line with this, there is a need to switch strategy from face-to-face teaching and learning process to remote teaching and on digital platforms where mobile phones, laptops and the likes are frequently utilized.

The reasons why the researcher wants to conduct this study is to further evaluate contextualized and localized material effectivity to the performance of the student in a form of e – learning in response to the current situation of the Philippines and in order to support the learning needs of the students even in the comfort of their home and improve the teaching and learning process with the assistance of the developed contextualized and localized supplementary e – leaning materials for the students.

Taking this context into consideration, the researcher aimed to conduct a study entitled Contextualized and Localized Supplementary e – Learning Materials in Science 8 (Physics). The purpose of which is to develop contextualized and localized supplementary e-learning materials and to determine whether utilizing such e-learnings materials in teaching be an effective way to increase the academic performance of the grade eight students in Science more specifically in Physics.

Statement of the Problem

This study aimed to develop and evaluate a contextualized and localized supplementary e – learning materials in Science 8 (Physics) for grade 8 students in a public national high school in Antipolo City for school year 2021 - 2022.

Specifically, it sought to answer the following questions:

1. What were the topics in the identified least mastered skills/competencies in Science 8 (Physics) for the past three years that could be developed into contextualized and localized supplementary e – learning materials in Science 8 (Physics) as perceived by the Science experts and Science teachers?
2. What were the evaluations of Science experts and Science teachers on the developed contextualized and localized supplementary e - learning materials in terms of the following criteria?
   a. Content
   b. Appropriateness
   c. Usefulness
   d. Technical Quality
3. Was there a significant difference between the evaluations of Science experts and Science teachers on the developed contextualized and localized supplementary e - learning materials in Science 8 (Physics) in terms of the abovementioned criteria?
4. What was the performance of the grade 8 students in the pretest and posttest?
5. Was there any significant difference between the mean scores of the students in the pretest and posttest?
6. What were the comments and suggestions offered by the Science experts and Science teacher – respondents to further improve the developed contextualized and localized supplementary e-learning materials in Science 8 (Physics)?

Scope and Delimitation of the Study

The study focused on the development, evaluation and determining the effectiveness of contextualized and localized supplementary e – learning materials for Grade 8 students' performance in Science (Physics) in a public national high school in Antipolo City during the school year 2021-2022.

The student-respondents consist of thirty (30) students from the intervention class and were selected based on their lowest pretest score. Posttest was administered after the implementation of the materials to determine the efficacy of the developed contextualized and localized supplementary e - learning materials in Science 8 (Physics).

The developed contextualized and localized supplementary e – learning materials in Science 8 (Physics) were evaluated by the twenty (20) Science experts and twenty (20) Science

teachers from different public schools in the secondary level of the City Schools Division of Antipolo.

The contextualized and localized supplementary e - learning materials in Science 8 (Physics) were evaluated through the questionnaire-checklist by the Science experts and Science teachers in terms of content, appropriateness, usefulness and technical quality and were evaluated through the experimental research design utilizing one group of respondents, the pretest and posttest by the group of Grade eight (8) student-respondents.

Related Literature

E-Learning is the utilization of Information and Communication Technology (ICT) which aims to convey data for schooling where teachers and students are isolated by distance, time, or both to improve the student's learning experience and execution. E-learning was characterized as a bunch of directions conveyed by means of all electronic media, for example, the web, intranets, and extranets. Accordingly, by dispensing with the hindrances of time and distance, people would now be able to assume responsibility for their own deep learning (Almajali et al., 2016; Obeidat et al., 2016). Because of this, e-learning conditions diminish the expense of arrangement and accordingly increment incomes for scholarly establishments (Masa'deh et al., 2016)

The study of Petrova (2020) also showed that e-learning localization materials are important because learners easily understand and absorb the information faster and the retention of the lesson is enhanced, thus, localizing materials will be valued by the learners.

Castillo (2019) explained that localization can be done in all learning areas. It maximizes activities, materials, events and issues available in the local setting. In contextualized learning, teachers should use authentic materials and associate in the learners' experience or in real – life situation. Whenever students are educated why they are studying topics and how those concepts might be used in real-world contexts, their interest in homework increases substantially. This encourages students to learn more about their own cultural history in order to appreciate and comprehend that of others. Learning can become more meaningful and relevant if the curriculum is localized. Localization entails using local materials as both the subject and the object of training. Localization will also entail incorporating local culture into the curriculum.

Contextualized Teaching and Learning (CTL) encourages students in active learning while also supporting them in making sense of what they are learning. By focusing teaching and learning on real applications in a specific setting that is of interest to the student, contextualized instruction connects the learning of foundational skills with academic or occupational information. When concepts are given in context, many people learn better and faster and retain information longer

From the article of Belgado (2020), it stated that to responds to learners' requests for material to use in modular remote learning, the Contextualized Learning Instruction Kit (CLIK) Project was started by the Curriculum Implementation Division of the Schools Division of Puerto Princesa City, using its Learning Resource Management Resource Management System. In addition of Belgado that when students are exposed to teachings or topics with which they can identify or relate, they learn more effectively.

Conceptual Model of the Study

The conceptual model which steered the researcher in understanding this examination was based on the frameworks approach of Phillip's Coombs.

The conceptual model for the development of contextualized and localized supplementary e – learning materials in Science 8 (Physics) is presented in Figure 1.

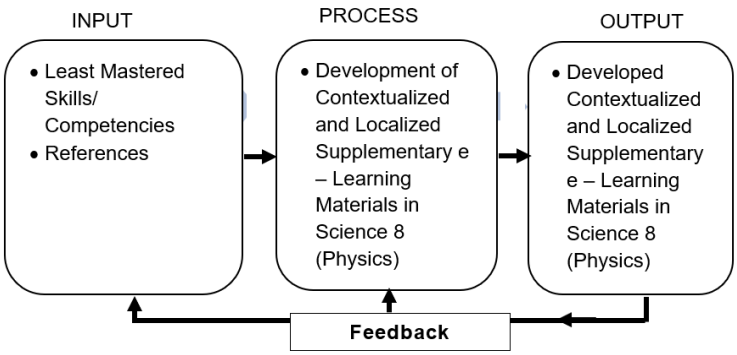

Figure 1. Conceptual Model for the Development of the Contextualized and Localized Supplementary e – Learning Materials in Science 8 (Physics)

There are three frames under Figure 1 conceptual paradigm. The first frame is the input which includes the identified least mastered skills/competencies based on the survey where Science experts and Science teachers served as respondents to be developed as contextualized and localized supplementary e – learning materials in Science 8 (Physics), references such as online references and applications need by the researcher to craft a contextualized and localized supplementary e – learning materials, reference books for the concepts of the identified topics.

The second frame refers to the process of developing contextualized and localized supplementary e – learning materials in Science 8 (Physics).

The third frame refers to the developed contextualized and localized supplementary e – learning materials in Science 8 (Physics) based on the identified least mastered skills/competencies as perceived by the Science experts and Science teachers.

The conceptual model of the evaluation of the Science experts and Science teachers on the developed contextualized and localized supplementary e – learning materials in Science 8 (Physics) is presented in Figure 2.

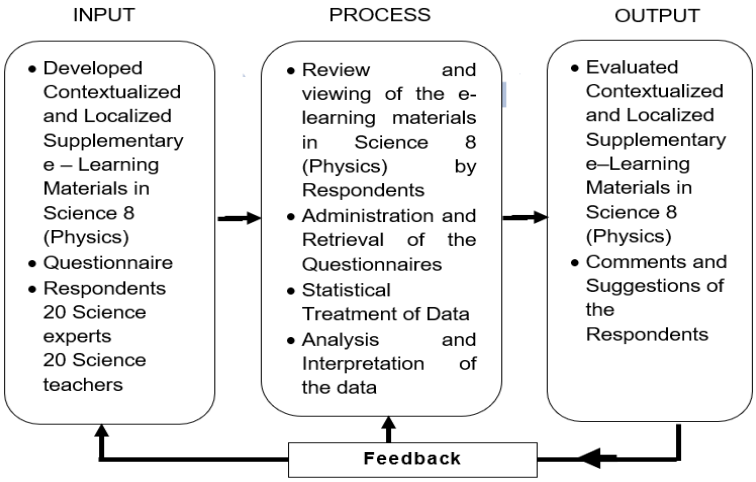

Figure 2. Conceptual Model for the Evaluation of the Contextualized and Localized Supplementary e–Learning Materials in Science 8 (Physics)

The second frame refers to the process undertaken in analyzing the information gathered. The presentation of the contextualized and localized supplementary e – learning materials in Science 8 (Physics) to the Science experts and Science teachers for review of the

contextualized and localized supplementary e – learning materials, administration of the questionnaire to the Science experts and Science teacher respondents, the retrieval of the questionnaire, checking so that no question was left unanswered, statistical treatment of data and analysis and interpretation of the data and revision and finalization of the materials based on the comments and recommendations of Science experts and Science teachers

The third frame refers to the output. These are the evaluated contextualized and localized supplementary e - learning materials in Science 8 (Physics)

The conceptual model of the validation of contextualized and localized e – learning materials in science 8 (physics) are presented in Figure 3.

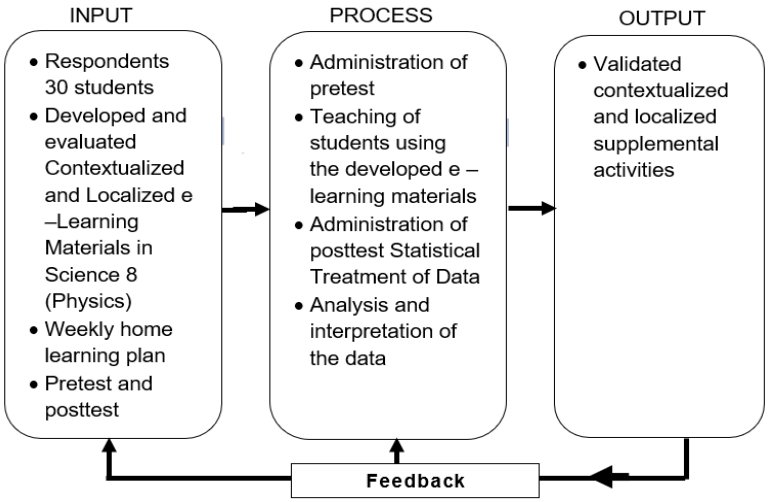

Figure 3. Conceptual Model for the Validation of the Contextualized and Localized Supplementary e – Learning Materials in Science 8 (Physics)

The conceptual model for the validation of contextualized and localized supplementary e – learning materials in Science 8 (Physics) consists of three frames. The first frame is the input which includes thirty (30) grade 8 students as the respondents, the developed and evaluated contextualized and localized supplementary e – learning materials in Science 8 (Physics), the weekly home learning plan, pretest and the posttest.

The second frame consists of the administration of the pretest, teaching the students using the developed contextualized and localized supplementary e – learning materials in Science 8 (Physics), administration of the posttest, statistical treatment of data and analysis and interpretation of the data.

The third frame refers to the output which consists of the validated contextualized and localized supplementary e – learning materials in Science 8 (Physics).

Methods

In the assessment of contextualized and localized supplementary e – learning materials in Science 8 (Physics), the researcher used the descriptive – experimental evaluative technique. It is intended to assess cautiously the value of the present examination as characterized by Calmorin (2010). This strategy is important in giving certainties based on logical decisions along these lines giving fundamental information about the idea of the articles and people, for closer perception into the practices, conduct, techniques, and methods while having a huge impact in the advancement of instruments for the estimation of numerous things, and figuring of approaches in the nearby, national, or worldwide level. Then again, the one shot pretest-posttest for experiment gathering and exploratory under test technique have been used in the assessment of the created intuitive materials.

Henceforth, the distinct evaluative technique and the pretest-posttest for experimental group under trial strategy are the most fitting strategies utilized by the researcher in finishing this investigation.

Sources of Data

The study focused on the development, evaluation and determination of the effectiveness of contextualized and localized supplementary e – learning materials for Grade 8 students' performance in Science 8 (Physics) in a public national high school in Antipolo City for the school year 2021 - 2022.

Thirty (30) students in the intervention class were utilized as the student respondents. Those students were considered under low proficiency level as reflected on their pretest result and will be given posttest after the utilization of contextualized and localized supplementary e – learning materials in Science 8 (Physics).

The respondents who evaluated the e-learning materials were twenty (20) Science experts and twenty (20) Science teachers from the selected public secondary schools of the City Schools Division of Antipolo. The Science experts were the Science Department Heads, Head Teachers and Master Teachers major in Physics who are knowledgeable in evaluating instructional materials and developing curriculum and grammar experts. The respondents were chosen based on the Purposive Sampling. As cited by Crossman (2020), the purposive sample is a non-probability sample that is chosen based on the characteristics of a population and the objective of the study. It is also known as judgmental, selective, or subjective sampling. Researchers use purposive sampling when they want to open a particular subset of people, as all study participants are selected because they fit a specific profile (Foley, 2018).

The contextualized and localized supplementary e – learning materials in Science 8 (Physics) were evaluated through the survey questionnaire by the Science experts and Science teachers, and were validated through the experimental research design utilizing one group of respondents, the pretest and posttest by the group of grade eight student-respondents.

The evaluation criteria used by the Science experts and Science teachers on the developed contextualized and localized supplementary e–learning materials in Science 8 (Physics) were in terms of content, appropriateness, usefulness and technical quality.

Table 1 shows the distribution of the respondents of the study.

Table 1. Distribution of the Respondents

Respondents	Number	Total
A Students		30
1. Grade 8	30	
B Science experts		
1. Science department head		
2. Master teachers	20	40
3. Head teachers		
c. Science teachers	20	
Grand Total		70

Data Gathering Instrument

The data gathering instruments used in this study were the validated survey questionnaires and the pretest and posttest scores.

The first survey questionnaire was for the evaluation of the least mastered skills to be localized and contextualized as to the following ranking: 1 as the most priority and 8 as the least priority.

The second survey questionnaire was for the evaluation of the developed Contextualized and Localized Supplementary e – Learning Materials in Science 8 (Physics) as to the following criteria: content, appropriateness, usefulness, and technical quality as the first part and the

second part referred to the comments and suggestions for the improvement of the developed e – learning materials.

To determine the effectiveness of the developed contextualized and localized supplementary e – learning materials in Science 8 (Physics), the researcher used the pretest and posttest of the group.

Data Gathering Procedure

To conduct the study, the researcher first sought the approval of the Superintendent of the Division of Antipolo City through a request letter to allow her to administer the questionnaires to the science teachers and experts.

While waiting for the start of intervention class, the researcher consulted the adviser and critic for checking of the survey questionnaires. Upon checking, the researcher administered the first survey questionnaire on ranking least mastered skills/competencies and accomplished by the Science experts and Science teachers and retrieved for consolidation. After consolidation, the researcher crafted the contextualized and localized supplementary e – learning materials in Science 8 (Physics) and pretest and posttest and consulted her adviser and critic for checking.

Following the developed Contextualized and Localized Supplementary e – Learning Materials in Science 8 (Physics), the evaluation and validation by the two groups of respondents – Science experts and Science teachers were done. The second survey questionnaires were accomplished and retrieved by the researcher via Google Forms.

In creating the group for student-respondents, the researcher conducted 15-item pretest via zipgrade application for the selection of the 30 respondents. After the implementation of the Contextualized and Localized Supplementary e – Learning Materials in Science 8 (Physics), the researcher conducted the 15-item posttest via Google Forms.

Statistical treatment of the gathered data followed afterwards in order to evaluate the utilization of the Contextualized and Localized Supplementary e – Learning Materials in Science 8 (Physics).

Statistical Treatment of Data

For a vivid logical analysis of the data collected, the statistical tools utilized in this study are shown below. All the data were processed using Microsoft Excel 2019.

Weighted Mean. This was used to describe the evaluation of the two groups of respondents on the developed contextualized and localized supplementary e – learning materials in Science 8 (Physics) in terms of content, appropriateness, usefulness and technical quality.

Table 2 shows the descriptive value of a 4-point scale to interpret the weighted mean scores of the respondents.

Table 2. Scale, Range, and Verbal Interpretation

scale	range	Verbal interpretation
4	3.50-4.00	Strongly Agree (SA)
3	2.50-3.49	Agree (A)
2	1.50-2.49	Disagree (D)
1	1.00-1.49	Strongly Disagree (SD)

Frequency, Percentage and Mean. This was applied to get the level of students' performance in pretest and posttest.

Table 3 shows the score points and descriptors of the students' performances in pretest and posttest.

Table 3. Score and Descriptors for the Performance of the Student-Respondents

Scores	Descriptors
14-15	Highly Proficient
12-13	Proficient
8-11	Nearly Proficient

Scores	Descriptors
4-7	Low Proficient
0-3	Not Proficient

Independent sample t-Test. This was used to determine the significant difference between the evaluations of the two groups of respondents on the developed contextualized and localized supplementary e – learning materials in Science 8 (Physics).

Paired t – test. This was used to determine the significant difference between the mean scores of the pretest and posttest of the Grade 8 students.

Results and Discussion

Least Mastered Skills/Competencies in Science 8 (Physics)

Table 4 presents least mastered skills/competencies of Science 8 (Physics) as perceived by Science experts and Science teachers.

Table 4. Least Mastered Skills/Competencies in Science 8 (Physics) as Perceived by the Two Groups of Respondents

No	Least mastered skills/ competencies	Topic	Rank
1	Investigate the relationship between the amount of force applied and the mass of the object to the amount of change in the object's motion	Law of acceleration	2
2	Infer that when a body exerts a force on another, an equal amount of force is exerted back on it	Law of interaction	1
3	Identify and explain the factors that affect potential energy and kinetic energy	Factors that potential energy and kinetic energy	4
4	Investigates the effect of temperature on the speed of sound	Effect of temperature on the speed of sound	3
5	Explain of hierarchy of colors in relation to the energy of visible light	Hierarchy of colors in relation to the energy of visible light	5
6	Infer the relationship between current and voltage	Relation between current and voltage	6
7	Explain the advantages and disadvantages of series and parallel connections in home	Series and parallel circuits	8
8	Explain the functions of circuit breakers, fuses, earthing, double insulation, and the other safety devices in the home	Function of circuit breakers, fuses, earthing, double insulation and other safety devices in the home	7

The table shows that the most least mastered skill/competency based on the response of Science experts and Science teachers was the "Infer that when a body exerts a force on another, an equal amount of force is exerted back on it." which ranked 1st and the least priority was "Explain the advantages and disadvantages of series and parallel connections in homes." which was ranked 8th.

It further shows that the second in rank was "Investigate the relationship between the amount of force applied and the mass of the object to the amount of change in the object's motion", third in rank was "Investigates the effect of temperature on the speed of sound", fourth in rank was "Identify and explain the factors that affect potential energy and kinetic energy" and fifth in rank was "Explain the hierarchy of colors in relation to the energy of visible light."

This implies that the five least mastered skills/competencies necessitate supplementary instructional materials and hence were

used to develop contextualized and localized e – learning materials in Science 8 (Physics).

Evaluations of Science Experts and Science Teachers on the Developed Contextualized and Localized Supplementary e – Learning Materials in Science 8 (Physics)

Content. Table 5 presents the evaluation of the Science experts and Science teachers on the developed Contextualized and Localized Supplementary e – Learning Materials in Science 8 (Physics) in terms of content.

Table 5. Respondents' Evaluations on the Developed Contextualized and Localized Supplementary e – Learning Materials in Science 8 (Physics) in Terms of Content

NO	**Content**	Science Experts		Science Teachers	
	The content of the developed contextualized and localized e-learning materials:	WM	VI	WM	VI
1	Are well illustrated and easily understood	3.70	SA	3.90	SA
2	Has educational value in the time of new normal	3.85	SA	3.85	SA
3	Are free of gender bias and other stereotypes	4.00	SA	3.85	SA
4	Are based on the most essential learning competency	3.85	SA	3.90	SA
5	Are presented logically and organized	3.75	SA	3.70	SA
	Overall Weighted Mean	3.83	SA	3.84	SA
	Standart Deviation	0.21		0.21	

It can be observed in Table 5 that both Science experts and Science teachers responded **strongly agree** on the content of the developed Contextualized and Localized Supplementary e – Learning Materials in Science 8 (Physics) as shown by the overall weighted means of 3.83 and 3.84 respectively and standard deviation of both 0.21.

This means that the content of the developed contextualized and localized supplementary e – learning materials in Science 8 (Physics) covers the most essential learning competencies as prescribed by the Department of Education which are well organized and logically presented and are appropriate during the time of new normal learning. Also, it means that the materials are appropriate to any gender of target students.

This supports the study of Navalta (2019) wherein it was explained that contents and skills must be comprehensible, topics were aligned with the Department of Education standard, and content were presented logically and orderly sequence.

Appropriateness. Table 6 presents the evaluation of the Science experts and Science teachers on the developed Contextualized and Localized Supplementary e – Learning Materials in Science 8 (Physics) in terms of appropriateness.

Table 6. Respondents' Evaluations on the Developed Contextualized and Localized Supplementary e – Learning Materials in Science 8 (Physics) in Terms of Appropriateness

NO	**Appropriateness**	Science Experts		Science Teachers	
	The developed contextualized and localized e-learning materials:	WM	VI	WM	VI
1	Are appropriate to the level of students' understanding	3.70	SA	3.60	SA
2	Can be grasped easily in the given time limit	3.70	SA	3.75	SA
3	Built a good foundation for the subject defined in the essential learning competencies	3.85	SA	3.95	SA
4	Can be accomplished within the given time limit	3.70	SA	3.60	SA

NO	**Appropriateness**	Science Experts		Science Teachers	
	The developed contextualized and localized e-learning materials:	WM	VI	WM	VI
5	Are appropriate to the learners' interest	3.70	SA	3.70	SA
	Overall Weighted Mean	3.73	SA	3.72	SA
	Standart Deviation	0.36		0.30	

Based on the data, the Science experts and Science teachers **strongly agree** on the appropriateness of the developed Contextualized and Localized Supplementary e – Learning Materials in Science 8 (Physics) as reflected in the overall weighted mean of 3.73 and 3.72 and standard deviation of 0.36 and 0.30 respectively.

It means that the content of the developed contextualized and localized supplementary e – learning materials in Science 8 tr e(Physics) can be easily grasp and are within the target learners' level of understanding. They can be done by the learners within the time frame and are interesting to the students.

This implies that the developed contextualized and localized supplementary e-learning materials in Science 8 (Physics) was suitable for the students. It is appropriate to the student's skills and the ability for the activities that could be accomplished in time and aligned with the essential learning competencies.

This supports the study of De Lara (2017) that lessons must be contextualized and localized to improve the curriculum's responsiveness, conformity, reflection, and flexibility to the demands of learners, particularly 21st century learners who require holistic and skillful development. According to the findings, it is more acceptable for students to have learning resources that are localized and contextualized.

Usefulness. Table 7 presents the evaluation of the Science experts and Science teachers on the developed Contextualized and Localized Supplementary e – Learning Materials in Science 8 (Physics) in terms of usefulness.

Table 7. Respondents' Evaluations on the Developed Contextualized and Localized Supplementary e – Learning Materials in Science 8 (Physics) in Terms of Usefulness

No	**Usefullness**	Science Experts		Science Teachers	
	The developed contextualized and localized e-learning materials:	WM	VI	WM	VI
1	Are helpful to the students	3.85	SA	4.00	SA
2	Increase students' interest	3.85	SA	3.80	SA
3	Improve students' critical thinking skills	3.85	SA	3.95	SA
4	Used practical applications in real-life situations	3.85	SA	4.00	SA
5	Develop students to become an independent learners	4.00	SA	3.95	SA
	Overall Weighted Mean	3.88	SA	3.94	SA
	Standart Deviation	0.15		0.30	

It can be seen in Table 7 that Science experts and Science teachers **strongly agree** on the usefulness of the developed Evaluation of Experts and Teacher Respondents on the developed Contextualized and Localized Supplementary e – Learning Materials in Science 8 (Physics) as shown in the overall weighted mean of 3.88 and 3.94, and standard deviation of both 0.15.

This indicates that the developed materials helped the students to become more interested in learning the subject since it used practical situations in presenting the lesson. It also means that the students learn to learn for themselves which contributed to the development of their critical thinking.

This supports the study of Manuel (2019) that educators can use contextualization and

localization of science teachings to improve students' academic performance. They can embrace and invest their time to be creative, forward-thinking, and proficient in utilizing community resources, design real-life experiences for learners to relate concepts to situations that are relevant and become proficient in their chosen careers as specified by K to 12 programs.

Thus, the contextualized and localized e-learning materials developed is extremely useful, beneficial to students, and provides practical applications in real-life situations that help students become self-directed learners.

Technical Quality. Table 8 presents the evaluation of the Science experts and Science teachers on the developed Contextualized and Localized Supplementary e – Learning Materials in Science 8 (Physics) in terms of technical quality.

Table 8. Respondents' Evaluations on the Developed Contextualized and Localized Supplementary e – Learning Materials in Science 8 (Physics) in terms of Technical Quality

No	**Technical Quality** The developed contextualized and localized e-learning materials:	Science Experts		Science Teachers	
		WM	VI	WM	VI
1	Are transferable and easy to share	3.60	SA	3.95	SA
2	Are easy to access by the students	3.70	SA	3.85	SA
3	Are formatted and can be open in all related applications	3.85	SA	3.90	SA
4	Can easily access by the students with clarity of the copy	3.85	SA	3.90	SA
5	Are small size files	3.70	SA	3.80	SA
	Overall Weighted Mean	3.74	SA	3.88	SA
	Standart Deviation	0.35		0.22	

According to the Table 8, Science experts and Science teachers evaluated the developed Contextualized and Localized Supplementary e – Learning Materials in Science 8 (Physics), which received an overall weighted mean score of 3.74 and 3.88, and standard deviation of 0.35 and 0.22 respectively in terms of technical quality, which is verbally interpreted as **strongly agree.**

This shows that the principle of technology in developing the supplementary e – learning materials were followed such as accessibility, transferability and having the right length of file.

This implies that the developed contextualized and localized supplementary e-learning materials in Science 8 (Physics) is transferable and easy to share. It can be formatted and opened in all related applications. Students can easily access it with a clear copy.

In the study of Khan et al. (2020), the findings suggest that e-learning allows students to connect with their teachers, fellow students, and engage with their study materials at their comfort and flexibility of time. The easy access of study resources is found to be one of the major reasons for the students to choose for e-learning. In additional, e-learning technology facilitates knowledge access, resulting in students developing a good attitude toward it.

Summary. Table 9 introduces the summary of the evaluation of the two groups of respondents on the developed Contextualized and Localized Supplementary e-Learning Materials in Science 8 (Physics) in terms of content, appropriateness, usefulness, and technical quality.

Table 9. Summary of Respondents' Evaluations on the Developed Contextualized and Localized e-Learning Materials in Science 8 (Physics)

	Criteria	Science experts		Science teachers	
		Overall weighted mean	VI	Overall weighted mean	VI
a	Content	3.83	SA	3.84	SA
b	Appropriateness	3.73	SA	3.72	SA
c	Usefulness	3.88	SA	3.94	SA
d	Technical Quality	3.74	SA	3.88	SA
	Grand Weighted Mean	3.80	SA	3.85	SA

As reflected in Table 9, the two groups of respondents had particular same evaluations on the developed Contextualized and Localized Supplementary e – Learning Materials in Science 8 (Physics) regarding its content, appropriateness, usefulness and technical as revealed by the grand weighted means of 3.80 and 3.85, respectively. Table 9 evidently indicates that the respondents **strongly agree** in all its criteria and indicators.

This implies that the developed supplementary materials are well – organized and well prepared and possess the quality of a good e – learning material.

Test of Significant Difference between the Evaluations of Science Experts and Science Teachers on the Developed Contextualized and Localized Supplementary e-Learning Materials in Science 8 (Physics)

The statistical data results of the difference between the evaluation of the two groups of respondents on the developed Contextualized and Localized Supplementary e – Learning Materials in Science 8 (Physics) are shown in Tables 10 -13 and the summary in Table 14.

Table 10. Test of Significant Difference between the Evaluations of the Two Groups of Respondents on the Developed Contextualized and Localized Supplementary e-Learning Materials in Science 8 (Physics) in Terms of Content

Groups	n	OWM	Standard Deviation	Computed t Value	Critical t value (0.05, 38df)	Decision	interpretation
Science Experts	20	3.83	0.21	0.15	2.02	Fail to reject the H_0	not significant
Science Teachers	20	3.84	0.21				

Note: n – number of samples; df – Degrees of Freedom
s – standard deviation; H_0 – Null Hypothesis
α – level of significance; OWM – Overall Weighted Mean

As can be seen in Table 10, the computed t value of 0.15 is less than the critical t value of 2.02, resulting in the null hypothesis failing to be rejected. Accordingly, at the 0.05 level of significance and with 38 degrees of freedom, it can be concluded that there is no statistically significant difference between the evaluations of the Science experts and Science teachers on the contextualized and localized supplementary e-learning materials in Science 8 (Physics) in terms of content. It also revealed that there is no difference between the standard deviations of the two groups of respondents.

As a result, it implies that the two groups of respondents strongly agreed that the content was organized in a logical and systematic manner. It was unanimously agreed upon that the content was clear and logical.

Table 11. Test of Significant Difference between the Evaluations of the Two Groups of Respondents on the Developed Contextualized and Localized Supplementary e-Learning Materials in Science 8 (Physics) in Terms of Appropriateness

Groups	n	OWM	Standard Deviation	Computed t Value	Critical t value (0.05, 38df)	Decision	interpretation
Science Experts	20	3.73	0.36	0.09	2.02	Fail to reject the H_0	not significant
Science Teachers	20	3.72	0.30				

Note: n – number of samples; df – Degrees of Freedom
s – standard deviation; H_0 – Null Hypothesis
α – level of significance; OWM – Overall Weighted Mean

As shown in Table 11, the computed t value of 0.09 is less than the critical t value of 2.02, resulting in the null hypothesis failing to be rejected, as opposed to the alternative hypothesis. With 38 degrees of freedom and a 0.05 level of significance, it is possible to conclude that there is no statistically significant difference between the evaluations of Science experts and Science teachers on the contextualized and localized supplementary e-learning materials in terms of appropriateness of the materials, there is a small difference between the standard deviations of experts and teachers, according to the results of the study, which came out to be 0.06.

This implies that both respondents strongly agreed that the material is appropriate to students' knowledge and interest, easily understood, completed in a reasonable time frame, and provides a solid foundation for the subject defined in the most essential learning competency.

Table 12. Test of Significant Difference between the Evaluations of the Two Groups of Respondents on the Developed Contextualized and Localized Supplementary e-Learning Materials in Science 8 (Physics) in Terms of Usefulness

Groups	n	OWM	Standard Deviation	Computed t Value	Critical t value (0.05, 38df)	Decision	interpretation
Science Expert	20	3.88	0.15	1.28	2.02	Fail to reject the H_0	not significant
Science Teachers	20	3.94	0.15				

Note: n – number of samples; df – Degrees of Freedom
s – standard deviation; H_0 – Null Hypothesis
α – level of significance; OWM – Overall Weighted Mean

In contrast to the alternative hypothesis, the computed t value of 1.28 is less than the critical t value of 2.02, resulting in the null hypothesis failing to be rejected, as shown in Table 12.

It is possible to conclude that there is no statistically significant difference between the evaluations of Science experts and Science teachers on the contextualized and localized supplemental e-learning materials in terms of usefulness of the materials using 38 degrees of freedom and a 0.05 level of significance. Moreover, according to the study's findings, there is no difference between the standard deviations of Science experts and Science teachers.

Essentially, this means that both respondents strongly agreed that the material is helpful and increased student interest. It also improves students' critical thinking skills with real-life applications and assist students become self-directed learners.

Table 13. Test of Significant Difference between the Evaluations of the Two Groups of Respondents on the Developed Contextualized and Localized Supplementary e-Learning Materials in Science 8 (Physics) in Terms of Technical Quality

Groups	n	OWM	Standard Deviation	Computed t Value	Critical t value (0.05, 38df)	Decision	interpretation
Science Experts	20	3.74	0.35	1.52	2.02	Fail to reject the H_0	not significant
Science Teachers	20	3.88	0.22				

Note: n – number of samples; df – Degrees of Freedom
s – standard deviation; H_0 – Null Hypothesis
α – level of significance; OWM – Overall Weighted Mean

Table 13 shows that the calculated t value, which is 1.52, is less than the critical t value, which is 2.02. This means that the null hypothesis was not rejected in favor of the alternative hypothesis. With 38 degrees of freedom and a 0.05 level of significance, it's possible to say that there is not a statistically significant difference between how Science experts and Science teachers rate contextualized and localized supplemental e-learning materials in terms of technical quality.

Also, the results show that there is a small difference between the standard deviations of Science experts and Science teachers, which was 0.35 and 0.22 respectively. This means that both respondents strongly agreed that the material is transferable and accessible to students who need it. As a result of its small file size, the material is well-formatted and can be viewed in any related computer program and application.

Table 14. Summary of Test of Significant Difference between the Evaluations of the Two Groups of Respondents on the Developed Contextualized and Localized Supplementary e-Learning Materials in Science 8 (Physics)

		Science experts		Science teachers		$T_{computed}$ value	decision	interpretation
		OWM	s	OWM	s			
a	Content	3.83	0.21	3.84	0.21	0.15	Fail to reject the H_0	Not Significant
b	Appropriateness	3.73	0.36	3.72	0.30	0.09	Fail to reject the H_0	Not Significant
c	usefullness	3.88	0.15	3.94	0.15	1.28	Fail to reject the H_0	Not Significant
d	Technical Quality	3.74	0.35	3.88	0.22	1.52	Fail to reject the H_0	Not Significant

Table 14 presents the summary of the results of the test on the test of significant difference on the evaluation of Science experts and Science teachers respondents on the developed contextualized and localized supplementary e-learning materials in Science 8 (Physics).

It is depicted in the table that the computed t-values associated with the computed t-values for content: 0.15, appropriateness: 0.09, usefulness: 1.28, and technical: 1.52 are all lesser than the computed critical t value of 2.0, thus, the null hypothesis is accepted. There is no significant difference between the evaluation of Science experts and Science teachers on the developed contextualized and localized supplementary e-learning materials in terms of content, appropriateness, usefulness and technical quality.

This implies that the two groups of respondents **strongly agreed** that the developed

contextualized and localized supplementary e-learning materials provide comprehensive content and aligned with the curriculum as prescribed by the Department of Education, appropriate to the level of the students, useful for students learning even in home, and technically easy to access by the students.

The findings were supported by the study of Manuel (2019), which states that contextualized and localized instructional materials played a vital role in educational reform. It does not only address the local needs of the students but elicit an increased academic performance. Furthermore, it showed positive effects in the performance of the learners as an effective strategy of imparting life-long learning abilities among students.

Performance of the Grade 8 Students in the Pretest and Posttest

Tables 15 presents the level of performance of the grade eight students based on the pretest and posttest scores.

It is revealed in Table 15 that 23 out of 30 or 77% of respondents have low proficient performance and 7 out 30 or 23% of respondents have not proficient performance before using the developed e – learning materials.

Table 15. Performance of the Grade 8 Students in the Pretest and Posttest on the Developed Contextualized and Localized Supplementary e-Learning Materials in Science 8 (Physics)

Score	Description	Grade 8 performance			
		Before		After	
		Frequency	Percentage	Frequency	Percentage
14-15	Highly Proficient	0	0	5	17
12-13	Proficient	0	0	10	33
8-11	Nearly proficient	0	0	11	37
4-7	Low proficient	23	77	4	13
0-3	Not proficient	7	23	0	0
	Total	30	100	30	100
	Mean	4.83		10.83	
	Standard Deviation	1.66		2.73	
	interpretation	Low Proficient		Nearly Proficient	

After the utilization of the developed contextualized and localized supplementary e – learning materials, the respondents with not proficient performance has reduced into 0 out 30 or 0% of the respondent and for the low proficient, it was reduced to 4 out of 30 or 13% of the respondents. Also, 11 or 37% have nearly proficient, 10 or 33% proficient and 5 or 17% have highly proficient.

This means that the developed contextualized and localized supplementary e – learning materials helped to improve the performance of the respondents as reflected in the result of the means of pretest and posttest of 4.83 and 10.83 respectively.

This implies that the student – respondents learned better with the use of the developed e – learning materials.

Test of Significant Difference between the Pretest and Posttest Mean Scores of the Grade 8 Students

Table 16 shows the significant difference in the performance of the Grade 8 students in the pretest and posttest before and after the utilization of the developed contextualized and localized supplementary e – learning materials in Science 8 (Physics).

As shown from Table 16, the computed t value of 16.87 is greater than the critical t value of 2.05. At level of significance equal to 0.05, the statistical decision is to reject the null hypothesis. Therefore, there is sufficient evidence to support that there is a significant difference between the mean scores of the pretest and posttest of the grade eight students.

Table 16. Test of Significant Difference between the Pretest and Posttest Mean Scores of Grade 8 Students

	n	OWM	s	Computed Value	Critical t value	Decision	Interpretation
Pretest	30	4.83	1.66	16.87	2.05	Reject the H_0	significant
Posttest	30	10.83	2.73				

The significant difference in the pretest and posttest scores gained by the grade 8 students show that the students improve their performance after the utilization of the developed contextualized and localized supplementary e-learning materials in Science 8 (Physics).

The findings prove also that the developed contextualized and localized supplementary e-learning materials in Science 8 (Physics) can be an effective teaching material for both teachers and students.

Comments and Suggestions of the Respondents to Improve the Developed Contextualized and Localized Supplementary e-Learning Materials in Science 8 (Physics)

Here are some comments and suggestions of the Science experts and Science teacher respondents:

A. Comments:

1. Activities are suited to the students' needs in new normal.
2. The material is very comprehensive and appropriate to the level of the learners.
3. The materials are very timely and relevant.
4. Materials are very useful.
5. The materials are very informative and helpful for the students to easily understand the lesson.
6. The provided e – learning materials are well layout and very interactive to the students.
7. Contextualization and localization is a one way to engage learners more in achieving the competency. It also helps learner's to deepening their understanding on the lesson.
8. Information given in the materials are essential for students that increases their comprehension.
9. It is engaging and intellectual discussion for the students and teachers as well.
10. All of the presentation is well organized and sequence of the lessons are visible.

B. Suggestions:

1. Make sure that this will be used accordingly and it will not distract students in learning.
2. Applications of new strategies should be included to attract more students' attention.
3. Can still modify the materials based on the context of every student.

Improve the quality of the graphics.

Conclusion

Based on the findings of the study, the following conclusions were drawn:

1. The identified least mastered skills/competencies of Grade 8 students could serve as basis for the development of contextualized and localized supplementary e – learning materials in Science 8 (Physics).
2. Both the Science experts and Science teachers agreed that the contextualized and localized supplementary e – learning materials in Science 8 (Physics) are acceptable in terms of content, appropriateness, usefulness and technical quality.
3. The contextualized and localized supplementary e – learning materials in Science 8 (Physics) could support the students to learn more effectively.
4. The contextualized and localized supplementary e – learning materials in Science 8 (Physics) could serve as an aid in teaching students.

Recommendation

In view of the findings and conclusions, the following recommendations are hereby proposed:

1. Teachers may be encouraged to develop more contextualized and localized supplementary e – learning materials for students learning.
2. The utilization of Contextualized and Localized Supplementary e – Learning Materials

in Science 8 (Physics) is recommended to increase students' performance.

3. Teachers and future researchers are encouraged to conduct parallel study in other subject areas to increase students' performance.

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