

Localized Module in Grade 9 - Algebra

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Abstract

This study aimed to enhance the mathematical performance of the learners through the use of localized module in grade 9 – Algebra, an intervention material in Mathematics 9 of Perez National High School, Perez, Quezon. One – group experimental design was used in this study to determine the effectiveness of the localized module in remediating the least – mastered competencies of the grade 9 learners. The descriptive design of research was also used to determine the level of acceptability of the localized module. The developed localized module is highly acceptable in terms of content, applicability, clarity and accuracy. Moreover, improvement in the performance of the learners in terms of pre – test and post -test was evident after the utilization of the localized module. Lastly, this study also concluded that there is significant difference between the performance of the learners before and after using the localized module since the difference was found significant and null hypothesis was rejected. Thus, the used of the localized module was effective in enhancing the performance of the learners.

This study recommends that teachers must maximize their potential in making more effective material by localizing module. Administrators must include the making of the development of localized learning modules in seminars and trainings for teachers. Learners can learn more effectively with the use of localized module for they can use it at their own pace. Lastly, for future researchers, they may use and improve the developed localized module and apply it in different locale and subjects to help improve learning.

Keywords: localized, module, intervention, grade 9, Algebra

1. Main text

Introduction

Learners learn best when all the necessary materials and resources needed for learning are present in

their learning environment. The presence of these materials and resources aids for greater motivation for learners to learn more effectively. The Department of Education do its best to provide all these learning resources and materials needed by the learners to learn. This time of pandemic where there is no conduct of face – to – face classes, printed modules, video lessons, online classes and lessons aired in televisions and radios are provided nationwide to help learners cope up with the new learning modalities. However, least – mastered competencies and left – behind learners still exists.

One of the factors that contribute to having least – mastered competencies and left – behind learners is the lack of access to these resources due to their location and financial status. For instance, learners living in the island have very limited access to learning resources like the internet to browse additional information and watch videos to help them in understanding the lessons due to poor signal and signal is only limited in the town proper. That is why even if learners have gadgets, they can't still use it as learning resources and materials. Aside from status of signal in their place, the financial status of the learners also contributes to poor performance of the learners. Many learners can't afford to buy gadgets like cellphone and laptops and even appliances like radio and television. That's why their learning resources and materials are only limited to what the teachers have given them. This is one of the most important reasons why teachers need to provide supplementary and intervention materials like learning modules that are localized so that learners are familiar and be able to relate their experiences and environment to make learning effective.

Learners learn when they see the application and relation of certain topics to their real-life situations and their environment. This is made possible by constructing learning modules that are localized to fully fit to the needs of the learners. The Republic Act No. 10533 also known as the Enhanced Basic Education Act of 2013 identifies the learning resources as one of the curriculum support systems in the teaching – learning process. Also, it mandates that DepEd shall make education learner-oriented and responsive to the needs, cognitive and adaptive to cultural capacity and diversity of learners, schools and communities, through enabling and allowing schools to localize and indigenize learning modules to enhance learning.

Learning will become effective when learning resources and materials are relevant to the learners and relates them to their own experiences. Estay, (2018). Localizing mathematics module improves teaching and learning of mathematics with specific communities or cultures. Utilizing the cultural context as a main substance to design integrated mathematics experience and materials may take the teaching more accessible and meaningful to every learner.

With these, the researcher believed that developing a localized module that can be used as supplementary and intervention module in Grade 9 Algebra is a must to address the least learned topics and improve learners' performances in Mathematics.

Theoretical Framework

Many consider Mathematics as a complex subject. It is a process wherein mastery of every step is needed in order to understand the succeeding topics. It is the reason why conducting intervention is a must because difficulties acquired from the previous topics may lead to continuous difficulties in the succeeding topics they are going to study.

In line with this, educators should try to encourage students to discover principles on their own as far as instruction is concerned. An active dialogue should take place between the educator and the learner. The educator's job is to express learning information into a format that is suitable to the current state of learners' understanding. Tolentino, (2020). Furthermore, it should let the learners relate their environment and their real-life experiences to make learning more meaningful and understandable for them by localizing modules.

This study is anchored in the Connection Theory of Siemens (2004) as cited by Hudson, et. al. (2015) which states that localization and contextualization is all about helping learners make the connection between the content they are learning and the context in which it will be used. Learners must first be made aware of how they are doing, depends on the skills that they already possessed. This refers to the gap between what is known and what is being learned, the Zone of Proximal Development. Learners are motivated and draw from previous experiences to give new meaning to what they are learning. The ideal connection process

would be three – fold. Learners review what they already know related to the new concept, they learn about and practice the new concept, and they tie what they have learned to their real – life scenario.

In addition, this study is also supported by the Constructivist Theory by Jean Piaget as cited by Hudson and Whisler, (2015). Contextualization and localization helps to promote authentic learning and increases learner's success by allowing them to make connections as they construct new knowledge. In contextualized and localized learning, learner uses new information they have learned, and organize and combine it with information they already know so that it makes sense to them.

Furthermore, contextualization is also anchored in Active Learning Theory as mentioned by Chickering and Gamson in the study of Hudson and Whisler, (2015). According to them, contextualization should be an integrative learning process of problem – based learning to encourage and stimulate a higher – level thinking on which learning is situational because knowledge and skill are taught in the context of how it will be used in real – world situation.

The theories above supports this study in the way that learning materials like localized module is important in students' learning most especially because it connects and relates concepts and topics to the context and environment of the learners. The utilization of localized module motivates the learners in learning Mathematics and having mastery on some topics. Applying localization in learning modules makes learning more effective for it provides more authentic and meaningful learning for learners for they can construct their own understanding of the content based on their experiences in their environment.

Statement of the Problem

This study aimed to determine the effect of the developed localized module in Grade 9 Algebra in the Mathematics Performance of grade 9 learners in Perez National High School, Perez, Quezon.

Specifically, it sought to answer the following questions:

1. What is the level of acceptability of the developed localized module in Grade 9 Algebra in terms of:

- 1.1. content;
 - 1.2 applicability;
 - 1.3 clarity; and
 - 1.4 accuracy?
2. What is the level of Mathematics performance of Grade 9 in terms of pre – test and post – test?
 3. Is there a significant difference between the Mathematics performance of grade 9 learners after using the developed localized module in terms of pre – test and post – test?

Research Methodology

Research Design

In this study, the descriptive method of research is used to attain the objectives put forward in this paper. This is used to determine the level of acceptability of the localized module in Grade 9 Algebra for learners living in the island.

According to Blanza (2021), descriptive research involves the description recording, analysis and interpretation of the present nature, composition of phenomenal processes. The focus is on the prevailing conditions on how a person, group or thing, behaves or functions at present situations. It often involves some type of comparison or contrast.

Moreover, this study also utilized a one – group experimental design to determine if there is significant difference between the pre – test and post -test scores of the learners to find out if the developed localized module significantly affect the performance of grade 9 learners in Perez National High School, Perez, Quezon for the school year 2021 – 2022. Experimental research is a type of research that attempts to influence a variable when properly applied. In this kind of research, the researcher relies on the detection of the effects of an intervention.

Respondents of the Study

The respondents of the study were the grade 9 learners of Perez National High School, Perez, Quezon for the School Year 2021 – 2022. Seventy – three (73) out of two hundred thirty – eight (238) grade 9 learners were chosen purposively as the respondents.

The researcher used the purposive sampling technique in the selection of the thirty- two (32) teacher – respondents. These teachers had been teaching Mathematics for at least three (3) years and they have enough experiences and expertise in teaching. They are the ones who validated the acceptability of the developed module.

A sample size of seventy – three (73) grade 9 learners were chosen purposively as respondents to determine the Mathematics performance of the grade 9 learners before and after using the developed localized module in Grade 9 Algebra. They are the ones who got a score lower than 75% during the summative test in the second grading period.

Research Procedures

The following steps served as the basis in gathering data for this study.

The researcher observed the possible problem within the community, continuously find an answer, and after the observation, a research problem was formulated.

Upon approval by the faculty of Graduate Studies and Applied Research of Laguna State Polytechnic University, Main Campus, the researcher, first sent a letter of approval to the Schools Division Superintendent. Upon approval, the researcher asked the permission of the Public Schools District Supervisor. Then, the approval of the principal of Perez National High School for the conduct of the research in the said school.

In determining the competencies in Grade 9 Algebra in the second grading period that needs intervention, the researcher asked for the permission of the school principal of Perez National High School to acquire a copy of the item analysis of the summative test of grade 9 in the second grading period. This served

as the ground for the development of the localized module.

The developed localized module was validated by selected mathematics experts to determine if the material is acceptable as an intervention material. The researcher used Google forms to gather the responses of the teacher experts. It is then revised based from the suggestions, comments and recommendations of the experts. Then, a validated forty – item test was used as pre – test before the distribution of the module. The developed module is carried out among the grade 9 learners who get a score lower than 75% of the total item of the summative test in Mathematics during the second grading period as module in the intervention program.

The same test was administered as post – test to determine if the m is effective as an intervention material. Lastly, data based on the information that were gathered will be tabulated, analyzed and interpreted by the researcher.

Research Instrument

The instruments used in the study was a researcher – made pre – test and post – test for determining the effectivity of the developed localized module on learner's performance in Mathematics. A table of specification was made before the test construction. It was tested to thirty grade 9 learners of Perez National High School who are not chosen as respondents to determine the reliability of the test. Changes were made based on the result of the test.

The localized module was developed as research instrument in remediating the least – learned competencies of the seventy- three (73) grade 9 learners. This instrument underwent a thorough process of development and evaluation.

Moreover, the researcher used a checklist questionnaire in evaluating the acceptability of the localized module and gather responses through google forms. The questionnaire was formulated based on the investigations and findings of other researchers discussed in the related literature and studies. Some questions were also adapted from other researches that are inclined with similar study. The questionnaire was presented

to the research specialist and language specialist for consultation. Modifications were done based from the suggestions and comments of the research and language specialist.

The instrument used in evaluating the learning material is a four – point rating scale adopted from the study by Watrin (2015). The degree values was determined and interpreted as follows: Highly Acceptable (3.26 – 4.00), Acceptable (2.51 – 3.25), Fairly Acceptable (1.76 – 2.5) and Not Acceptable (1.00 – 1.75).

Statistical Treatment of Data

In determining the effectivity of the module in Grade 9 – Algebra, the t- test for correlated samples is used to determine if there is significant difference in the scores of the learners in the pre – test and post – test. Learning is considered to have taken place if the difference is found significant.

The data collected to determine the level of acceptability of the developed localized module in grade 9 – Algebra was analyzed statistically using weighted mean and standard deviation.

The data gathered to determine the level of performance of the learners in the pre - test and post – test is obtained by the mean percentage score and was interpreted based on the rating scale below.

Mean Percentage Score	Descriptive Equivalent
96 – 100%	Mastered
86 – 95%	Closely Approximating Mastery
66 – 85%	Moving Towards Mastery
35 – 65%	Average
15 – 34%	Low
5 – 14%	Very Low
0 – 4%	Absolutely No Mastery

Results and Discussion

Sample Format Table

Table 1. Level of Acceptability of the Localized Module in Grade 9 – Algebra in terms of Content

STATEMENTS	MEAN	SD	REMARKS
<i>The activities are arranged in a manner that will be easy for the</i>	3.94	0.25	Strongly Agree

learners to understand the lesson.

Information is sufficient for an understanding of the least –
learned topics. 3.88 0.34 Strongly Agree

The intervention material uses familiar words and grammar. 3.94 0.25 Strongly Agree

The concept in the intervention material is easy to understand by
the learners living on the island. 3.88 0.34 Strongly Agree

Information is sufficient for the learners. 3.84 0.37 Strongly Agree

Overall Mean = 3.89

Standard Deviation = 0.17

Verbal Interpretation = Highly Acceptable

Table 1 presents the level of acceptability of the localized module in Grade 9 – Algebra in terms of content. The statements “the activities are arranged in a manner that will be easy for the learners to understand the lesson” and “the intervention material uses familiar words and grammar” obtained the highest mean ($M = 3.94$, $SD = 0.25$) remarked as Strongly Agree. On the other hand, the statement “information is sufficient for the learners” obtained the lowest mean of ($M = 3.84$, $SD = 0.37$) remarked as Strongly Agree.

Table 2. Level of Acceptability of the Localized Module in Grade 9 –Algebra in terms of Applicability

STATEMENTS	MEAN	SD	REMARKS
It is developed for learners’ activities.	3.94	0.25	Strongly Agree
It motivates the learners to have positive attitudes towards Mathematics concepts.	3.88	0.34	Strongly Agree
It provides a variety of exercises and skills for mastery of concepts and skills.	3.81	0.40	Strongly Agree
The intervention material enables the user to develop learner’s thinking.	3.81	0.40	Strongly Agree
Activities are relevant to the topics.	3.94	0.25	Strongly Agree

Overall Mean = 3.88

Standard Deviation = 0.20

Verbal Interpretation = Highly Acceptable

Table 2 presents the level of acceptability of the localized module in grade 9 – Algebra. The statement “it is developed for learners’ activities” and “activities are relevant to the topics” obtained the highest mean of ($M = 3.94$, $SD = 0.25$) being remarked as Strongly Agree. On the other hand, the statements “it provides a variety of exercises and skills for mastery of concepts and skills” and “the intervention material enables the user to develop learner’s thinking” attained the lowest mean of ($M = 3.81$, $SD = 0.40$) remarked

as Strongly Agree.

Table 3. Level of Acceptability of the Localized Module in Grade 9 – Algebra in terms of Clarity

STATEMENTS	MEAN	SD	REMARKS
<i>The ideas and concepts are well expressed in the intervention material.</i>	3.91	0.30	Strongly Agree
<i>The intervention material relates to present learning on the different topics in Grade 9 – Algebra.</i>	3.88	0.34	Strongly Agree
<i>Topics are according to the level of the learners and encourage higher - order thinking skills.</i>	3.91	0.30	Strongly Agree
<i>The intervention material provides learners with clear concepts that also serve as their review materials.</i>	3.81	0.40	Strongly Agree
<i>The presentation and definition of the intervention material are easy-to-understand.</i>	3.75	0.44	Strongly Agree
Overall Mean = 3.85			
Standard Deviation = 0.23			
Verbal Interpretation = Highly Acceptable			

Table 3 displays the level of acceptability of the localized module in grade 9 – Algebra in terms of clarity. Among the statements above, “*the ideas and concepts are well expressed in the intervention material*” and “*topics are according to the level of the learners and encourage higher – order thinking skills*” yielded the highest mean score ($M = 3.91$, $SD = 0.30$) and was remarked as Strongly Agree. This is followed by the statement “*the intervention material relates to present learning on the different topics in Grade 9 – Algebra*” with the mean score of ($M = 3.88$, $SD=0.34$), remarked as Strongly Agree. On the other hand, “*the presentation and definition of the intervention material are easy – to – understand*” obtained the lowest mean score of ($M = 3.75$, $SD = 0.44$) being remarked as Strongly Agree.

Table 4. Level of Acceptability of the Localized Module in Grade 9 –Algebra in terms of Accuracy

STATEMENTS	MEAN	SD	REMARKS
<i>The topics are well – arranged to provide a sequence of understanding.</i>	3.88	0.34	Strongly Agree
<i>The intervention material provides sufficient repetition of learning through giving more examples.</i>	3.75	0.44	Strongly Agree
<i>The intervention material is appropriate to the age, maturity, and experience of the learner.</i>	3.72	0.46	Strongly Agree
<i>Exercises have clear instructions to learners.</i>	3.88	0.34	Strongly Agree

<i>The intervention material stimulates the learners' interest in learning Mathematics.</i>	3.88	0.34	Strongly Agree
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Overall Mean = 3.82

Standard Deviation = 0.27

Verbal Interpretation = Highly Acceptable

Table 4 presents the level of acceptability of the developed localized module in grade 9 – Algebra. Among the statements above, “*the topics are well – arranged to provide a sequence of understanding*”, “*exercises have clear instructions to learners*” and “*the intervention material stimulates the learners' interest in learning Mathematics*” obtained the highest mean score of (M = 3.88, SD = 0.34) being remarked as Strongly Agree. On the other hand, the statement “*the intervention material is appropriate to the age, maturity, and experience of the learner*” yielded the lowest mean of (M = 3.72, SD = 0.46) with remarks of Strongly Agree.

Table 5. Level of Mathematics Performance of Grade 9 – Learners in Terms of Pre – test and Post – test

	Mean	Mean Percentage Score	Descriptive Equivalent
Pre – test	13.01	32.53%	Low
Post – test	25.85	64.62%	Average

A 40 – item pre – test is given to the learners before the intervention material is administered to them. Table 5 presents the mean percentage score of the pre -test which is 32.53% and has a descriptive equivalent of *low*. This implies that the grade 9 selected learners have little knowledge on the topics included in the pre -test. Then, the intervention material is given to them followed by the administration of the post – test. The post – test garnered a mean percentage score of 64.62% with descriptive equivalent of *average*. It indicates that the scores in the post – test are higher than the scores in the pre-test. Thus, teachers must develop acceptable intervention module to be given to the learners that will give them the opportunity to explore various ideas and concepts that would enrich their understanding of varied subject matter that sharpen their competencies.

Table 6. Significant Difference in the Mathematics Performance of Grade 9 – Learners in Terms of Pre – test and Post – test

Test	Mean	Difference	t – Value	P - value p < 0.05	Verbal Interpretation
Pre-test	13.01				
Post - test	25.85	-12.84	31.05	0.00	Significant

Table 6 shows that the computed value ($t = 31.05$, $p = 0.00$) is less than alpha at 0.05 level of significance which signifies that there is a significant difference between the pre-test and post – test scores in the level of performance as reflected in the difference between the pre – test and post -test scores which is -12.84. Since that the difference between the pre -test and post – test is significant, the hypothesis that there is no significant difference between the Mathematics performance of grade 9 learners in terms of pre – test and post – test after using the localized module is rejected. This means that the utilization of the intervention material was effective in remediating the least – mastered competencies and it enhances the learning of the learners in Mathematics. The localized module helps the learners in achieving better performance in Mathematics, specifically in Algebra. It aids in learning and mastering concepts and can be used as review and additional learning material.

Summary of Findings

Different significant points were found after the conduct of the research. Based on the different findings of the study, the following findings are hereby enumerated based on the statement of the problem:

1. The localized module is highly acceptable in terms of content, applicability, clarity and accuracy.
2. The learners' obtained a mean percentage score on the pre-test that falls under descriptive equivalent of low and on the post – test with a descriptive equivalent of average.
3. The computed t – value and p – value of the difference between the pre – test and post – test implies that the difference is significant. This indicates that there is a significant difference between the pre - test and post – test mean scores of the learners before and after the administration of the localized module in grade 9 – Algebra and that the null hypothesis is being rejected.

Conclusion

The study concluded that there is a significant difference between the performance of the learners before and after using the localized module. Thus, the hypothesis that there is no significant difference between the pre – test and post – test scores of the learners after using the localized and contextualized intervention material was rejected which implies that learning occurred after the utilization of the module, and it is effective in enhancing the performance of the learners.

Recommendations

1. The officials of the Department of Education may provide more trainings and seminars that will encourage teachers to develop localized module to help the left - behind learners and maximize the teachers' potential in making more effective learning modules.
2. School heads and master teachers can include the making and implementation of localized module in their annual improvement plan. This can be a topic in the learning action cell, focused group discussions and in – service trainings so that teachers may be aware and encourage to develop localized module for the better learning of the learners.
3. Mathematics teachers should develop learning materials like modules that are localized to enhance learners' performances and make learning more relevant to them by relating it to their environment and experiences at the same time learn more about their localities and make it known to other learners of another locale.
4. The localized module can be used by the learners at their own pace and time. They can enhance their knowledge and skills of their least – mastered competencies by using the developed intervention module at the same time make themselves more familiar to their locale.
5. Future researchers may conduct similar studies on the use of localized module in Mathematics to provide further evidence of its efficiency. Similar studies may also be conducted using other locale and other subjects to strengthen learners' performances.

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