ACCEPTABILITY AND VALIDITY OF PER-C-PRO MOBILE APPLICATION IN TEACHING MATHEMATICS AS STREAMLINE FOR HYBRID LEARNING

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Abstract

The research study focused on the acceptability and validity of the Per-C-Pro Mobile Application in the Academic Performance of Grade 10 students at Upland Integrated National High School, School Year 2021–2022. The study aims to identify the level of validity and acceptability of the developed Per-C-Pro mobile applications in teaching mathematics at Upland Integrated National High School. The research involved fifteen (15) mathematics and ICT teacher respondents in this study, who are the experts in validating the designed Per-C-Pro mobile application and 40 Grade 10 students at Upland Integrated National High School in the District of Nagcarlan.

The descriptive method of research was employed in conducting this study, which involved the gathering of the essential data and information tested the hypothesis and answered the questions concerning the research problems of the study. Questionnaire in the form of a checklist was utilized in the gathering of needed information and in the completion of the investigation. The statistical treatments applied in the study consisted of mean and the 4 -point Likert Scale was applied to determine the level of validity and acceptability of the designed e-mobile application for teaching Mathematics. The t-test for independent samples was used to identify if there would be significant difference in the performance of Grade 10 learners in their pre-test and post-test.

Findings revealed the following: (1) The teachers evaluated the developed Per-C-Pro mobile applications in terms of objectives, discussion, practical exercise, and assignment. It was highly valid and acceptable, which implies that it has content that is useful in teaching mathematics. (2) The developed Per-C-Pro mobile applications are highly acceptable in terms of clarity, usefulness, language style, and illustration, which implies that they have characteristics that are effective for engaging students in learning. (3) Post-test is higher than pre-test, maybe because they have learned more after the discussion of the lesson and after using different materials for learning. (4) "There is no significant difference in the performance of students as to pretest and posttest," is rejected and calls for the acceptance of the alternative.

Keywords: Mobile Applications; Mobile Learning; Mathematics Education

1. Main text

Introduction

The COVID-19 pandemic is first and foremost a health crisis. Many countries have (rightly) decided to close schools, colleges, and universities. The crisis crystallizes the dilemma policymakers are facing between closing schools. The role of the educators and the parents became significant in the life of the learners. (Burgess and Sieversten, 2020)

School, instructors, and parents all play an important influence in a child's overall development. The child's first mentor is his or her parents, and the second is the instructor. Both have a significant role in the

development of a child's personality. The Department of Education (DepEd) emphasizes the critical role of parents and guardians in ensuring that their children's learning continues despite predicted disruptions as it prepares for the "new normal" in education brought on by the COVID-19 issue.

More so, mobile technologies have been gaining wider acceptance in education in recent years. School and government level initiatives have rolled out these technologies in the classroom (West 2013). Potential benefits of using mobile technologies for learning include facilitating learning across contexts, facilitating contextual learning, and providing personalization in both personal and collaborative environments (Cochrane 2010). These potentials make mobile technology seem an ideal tool for learning mathematics. in the new normal of education, various learning modalities were given emphasis depending on the majority of the students' needs and school's capacities to implement. While online learning is for those who have the access to internet and is for those who have computers to use, modular learning modality is mostly offered to students who have no means to sustain education at a distance leaving them with a little interaction to no interaction at all with their teachers. Students merely rely on printed instructions from their modules. Mobile learning represents a way to address several our educational problems. Devices such as smart phones and tablets enable innovation and help students, teachers, and parents gain access to digital content and personalized assessment vital for a post-industrial world. (West, 2013)

In response to this emergency, Department of Education developed the Basic Education Continuity Plan (BE-LCP) to make sure that learning opportunities are delivered to students in a safe manner using a variety of teaching strategies. Adoption of the Basic Education Learning Continuity Plan for School Year 2020-2021 (DO no.12, s. 2020). DepEd has promulgated issuance on flexible learning and materials, specifically, DepEd Order No. (DO) 21, s. 2019, or the Policy Guidelines on the K to 12 Basic Education Program. It sets forth Flexible Learning Options (FLOS), which includes alternative delivery modes and its corresponding learning resources that are responsive to the need, context, circumstances, and diversity of learners.

Similarly, the Schools Division of Laguna (SDO) in partnership with DepEd Regional offices made a great leap to digitize printed modules through tablet distribution to its learners. Soft copies were stored in the tablets. This aims to aid the smooth shift of classes from the traditional face-to-face to blended learning. This program intends to provide a much better learning resources for students in the confines of their home.

Consequently, these tablets as a learning resource paved the way for the researcher to improve teaching and learning Mathematics for junior high school students. The researcher who has been teaching for 10 years witnessed the struggles and challenges of educators and students in teaching and learning mathematical skills especially for modular learning modality. This impediment has stimulated timely and relevant innovations to tie the loose ends and bridge the gaps of learning.

In consonance with this, this research seeks to improve the teaching-learning process, especially in the teaching of mathematics subjects among the junior high school students in Upland Integrated National High School. The developed Per-C-Pro mobile learning application aims to enhance mathematics education, especially in enhancing the creative and critical thinking skills of the students in the context of the new normal. The development of Per-C-Pro mobile applications in teaching and learning mathematics continue the provision of quality basic education services to learners even in the event of a pandemic or not.

Theoretical Framework

This study adheres to the tenets set by Cognitive Theory of Multimedia Learning, Koole's FRAME Model of Mobile Learning, Games-based Learning, and Constructivism. Furthermore, it is anchored on the Analysis, Design, Development, Implementation, and Evaluation (ADDIE) model.

The in-depth principle of Cognitive Theory of Multimedia Learning of Mayer (2016) states that words and various multimedia are more conducive to learning compared to just text or graphics alone. The

emphasis of relevant cognitive pressing in attending to the essential material in the lesson, mentally organizing the material into a coherent cognitive representation and establishing connections towards their schema better increases engagement in mathematics learning. In the present study, the e-mobile learning application offers a full-course experience with varied multimedia resources which they can use as their primary references.

In connection to this, Mobile learning represents a way to address several our educational problems. Devices such as smart phones and tablets enable innovation and help students, teachers, and parents gain access to digital content and personalized assessment vital for a post-industrial world as suggested by West, D. M. (2013). As noted by Irwin Jacobs, the founding chairman of Qualcomm, Inc., "always on, always connected mobile devices in the hands of students has the potential to dramatically improve educational outcomes."

Relative to this, the present study aims to attract the interest of students in learning the rudiments of mathematics from theory into practice. It challenges them to attain mastery stated in the Most Essential learning Competencies (MELC) of PIVOT4A, the flagship program of DepEd Region IV-A CALABARZON.

The Framework for the Rational Analysis of Mobile Education (FRAME) model by Koole's (2006) describes mobile learning as a process resulting from the convergence of mobile technologies, human learning capacities, and social interaction. It addresses contemporary pedagogical issues of information overload, knowledge navigation, and collaboration in learning. This model is useful for guiding the development of future mobile devices, the development of learning materials, and the design of teaching and learning strategies for mobile education. Guided by these principles, the current study intends to consider these aspects to effectively design an efficient and effective e-mobile application in teaching Mathematics.

Moreover, the key concept is anchored from the theory of Constructivism by Jean Piaget. It states that rather than passively taking in information, learners generate knowledge. People develop their own representations and incorporate new information into their pre-existing knowledge as they encounter the world and reflect on it - 'schemas'. Also, Polakova and Klimova (2019) believe that Mobile devices allow learners the opportunity to collaborate in the creation of knowledge and the sharing of information among their peers. The advantage of mobile learning can be gained through collaborative, contextual, and constructivist learning environments. Teachers are responsible for helping and guiding learners throughout knowledge acquisition and for motivating them to develop their current skill level. In this case, learners are viewed as dynamic knowledge constructors. With on the same lens, this study firmly believes that students are not just merely blank slates to be fed on. Giving them modules and printed instructions written in their weekly home learning plan (whlp)/ learner's packet (leap) does not guarantee learning. This study supports the idea that students are active makers of knowledge.

Meanwhile, the present study employs the ADDIE model as its research paradigm. The ADDIE model is method as a framework in designing and developing e-mobile learning application in teaching Mathematics for junior high school students. This technique is beneficial to educators, instructional designers, and training developers since having clearly defined stages makes it easier to use towards effective educational platforms and materials.

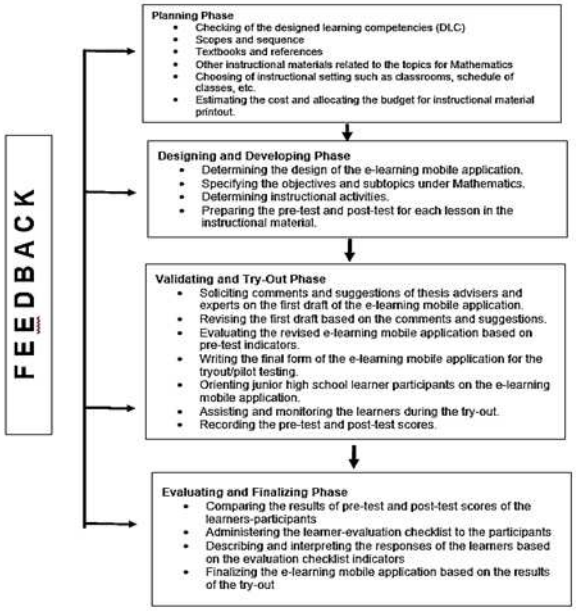

Figure 1. ADDIE Model in the Development of E-App

As shown in Figure 1, this study will adapt the ADDIE paradigm and is described as follows:

The model has four sequential boxes which represent the four stages and procedures that the study will follow for the development and validation of e-mobile application in teaching mathematics streamline for hybrid learning.

Statement of the Problem

The study aims to know the validity and acceptability of Per-C-Pro mobile applications in Mathematics. Specifically, the researcher will seek answers to the following questions:

1. What is the level of validity of the developed e-mobile applications based on the assessments of the Mathematics teachers in terms of:
   1.1 Objectives;
   1.2 Concepts;
   1.3 Practical exercises;
   1.4 Assignment?
2 What is the level of acceptability of the developed e-mobile applications based on the assessments of the Mathematics teachers and master teachers in terms of:
   2.1 Clarity;
   2.2 Usefulness;
   2.3. Language style;
   2.4 Illustrations?
3 What is the level of the student's performance in Mathematics 10 in terms:
   3.1 pretest;
   3.2 posttest?
3 Is there a significant difference on the performance of the students as to pre-test and posttest?

Research Methodology

The research was administered using quantitative method of research by the use of a questionnaire carefully developed to collect data about the validity and acceptability of the developed Per-C-Pro mobile application. For the Validity in terms of Objective, Concepts, Practical Exercises, and Assignment. For the Acceptability assessment in terms of Clarity, Usefulness, Language Style, and Illustrations. n this study, the numerical data came from the pretest and posttest scores as they use the e-mobile application in teaching mathematics for junior high school streamline for Hybrid learning. The data were treated using descriptive correlational methods, which were necessary to describe the characteristics and/or behavior of the population and the various aspect of facts.

The respondents of the study were from Nagcarlan District, the fifteen (15) mathematics and ICT teachers of the said district from three different secondary schools and forty (40) Grade 10 students of Upland Integrated National High School. This is based on the purposive sampling.

The researcher used to interpret the assessment of the respondents, the 5-point Likert scale was applied and interpreted as follows:

Table A

Five-Point Likert Scale

Rating	Scale	Remarks	Level of Validity	Level of Acceptability
5	4.20 – 5.00	Strongly Agree	Highly Valid (HV)	Highly Acceptable (HA)
4	3.40 – 4.19	Agree	Valid (V)	Acceptable (A)
2	2.60 – 3.39	Neutral	Moderately Valid (MV)	Moderately Acceptable (MA)
2	1.80 – 2.59	Disagree	Fairly Valid (FV)	Fairly Acceptable (FA)
1	1 – 1.79	Strongly Disagree	Not Valid (NV)	Not Acceptable (NA)

In addition, the researcher utilized the evaluation in the e-mobile application as the pre-test and post-test of the research and the results of the performance were interpreted using the Levels of Proficiency.

Level	Percent
Beginning	74 and below
Developing	75 – 79
Approaching Proficiency	80 – 84
Proficient	85 – 89
Advanced	90 and Above

Source: DepEd Order 73, S. 2012

The researcher ensured that ethical considerations as specified in the Research Manual of the school will be properly observed. The aims and objectives of the study will be properly conveyed comprehensively to the respondents. They are not obliged to contribute in the survey especially if doing so will be against their will. On the other hand, the instruments, or questionnaires, will be free from any degrading and discriminating statements or literature that may offend them. More so, the questionnaires only collected the significant information for the study and there no private or personal questions will be asked. The work from different authors, which was used in any part of this study will be properly referenced, cited, and quoted.

Before gathering the data needed, the researcher constructed a letter to the Schools Division of Laguna Superintendent, District Supervisor, and selected school heads of public secondary schools in the District of Nagcarlan to ask permission in conducting this study. The researcher visited the selected schools and determined the ample time of the teachers and learners needed for the distribution and retrieval of the data and questionnaire require in this study. The researcher also used google forms for the sake of the respondent's availability and it will be easier for those students with the internet access. This have been an aid to the researcher to facilitate easy access to all respondents. The researcher makes sure that the objectives of the study and the content of the questionnaire will be explained clearly. Afterward, all data were recorded and

tabulated. The collected data was forwarded to the statistician for the application of statistical treatment. Finally, the final draft of this study will be written.

Results and Discussion

1. Validity of the Developed Per-C-Pro Mobile Applications in Terms of Objectives

Table 1. Level of Validity of the Developed Per-C-Pro Mobile Applications in Terms of Objectives

STATEMENT	MEAN	SD	VERBAL INTERPRETATION
1. Attainable, specific and clear.	4.50	0.63	Highly Valid
2. Relevant to the topic and can easily understand by the students.	4.50	0.63	Highly Valid
3. *Measurable and can clearly define the path of students'* understanding.	4.53	0.63	Highly Valid
4. Time-bound and anchored within the time frame.	4.33	0.71	Highly Valid
5. Focus on the different domain of learnings.	4.50	0.63	Highly Valid

Overall Mean = 4.47
Standard Deviation = 0.56
Verbal Interpretation = Highly Valid

Legend:

Scale	Range	Remarks	Verbal Interpretation
5	4.20-5.00	Strongly Agree	Highly Valid
4	3.40-4.19	Agree	Valid
3	2.60-3.39	Neutral	Moderately Valid
2	1.80-2.59	Disagree	Fairly Valid
1	1.00-1.79	Strongly Disagree	Not Valid

Table 1 illustrates the level of validity of the developed Per-C-Pro mobile applications based on the assessments of the mathematics teachers, Master teachers and ICT Teachers in terms of objectives. Among the statements on the table, "Measurable and can *clearly define the path of students' understanding*" yielded the highest mean score (M=4.53, SD=0.63) and was interpreted as Highly Valid. On the other hand, the statement "Time bound and anchored within the time-frame" received the lowest mean score of responses with (M=4.33, SD=0.71) yet was also interpreted Highly Valid. Their objective of the lesson was measurable based on the result.

Overall, the level of validity of the developed Per-C-Pro mobile applications based on the statement given in the level of validation of Per-C-Pro Mobile Application was interpreted Highly Valid.

The objectives of the lesson in the developed Per-C-Pro mobile applications were measurable.

Table 2. Level of Validity of the Developed Per-C-Pro Mobile Applications in Terms of Concepts

STATEMENT	MEAN	SD	VERVAL INTERPRTATION
1. Give insights and ideas that are clear, precise and understandable.	4.30	0.65	Highly Valid
2. Provide background of the concepts and information about the lesson proper.	4.40	0.67	Highly Valid
3. *Pose an opening question to develop student's critical thinking skills.*	4.40	0.67	Highly Valid
4. Incorporate student interests into the lesson.	4.37	0.72	Highly Valid
5. *Refine lessons based on student's feedback and evaluation.*	4.43	0.73	Highly Valid

Overall Mean = 4.38
Standard Deviation = 0.49
Verbal Interpretation = Highly Valid
Legend:

Scale	Range	Remarks	Verbal Interpretation
5	4.20-5.00	Strongly Agree	Highly Valid
4	3.40-4.19	Agree	Valid
3	2.60-3.39	Neutral	Moderately Valid
2	1.80-2.59	Disagree	Fairly Valid
1	1.00-1.79	Strongly Disagree	Not Valid

Table 2 illustrates the level of validity of the developed Per-C-Pro mobile applications based on the assessments of the mathematics teachers, Master teachers, and ICT Teachers in terms of Concepts. Among the statements on the table, "Refine lessons based on stud*ent's feedback and evaluation*" yielded the highest mean score (M=4.43, SD=0.73) and was remarked as Highly Valid. On the other hand, the statement "Give insights and ideas that are clear, precise and understandable" received the lowest mean score of responses with (M=4.30, SD=0.65) yet was remarked Highly Valid.

Overall, the level of validity of the developed Per-C-Pro mobile applications based on the assessments of the mathematics teachers, Master teachers and ICT Teachers in terms of Concepts attained a mean score of 4.38 and a standard deviation of 0.49 and was Highly Valid among the respondents.

The study reveals that in terms of discussion, developed Per-C-Pro mobile application is highly valid. Understanding the content and the discussion from the material may varied depending on the perspective of the respondents, nonetheless both mathematics teachers, Master teachers and ICT Teachers highly accept it which implies that it is useful for teaching mathematics.

Table 3. Level of Validity of the Developed Per-C-Pro Mobile Applications in Terms of Practical Exercise

STATEMENT	MEAN	SD	VERVAL INTERPRTATION
1. *Gives questions that can deepen students' higher order thinking skills.*	4.47	0.63	Highly Valid
2. Engages the learners in a more fruitful learning experience.	4.40	0.67	Highly Valid
3. Allows students to think out of their comfort zone.	4.43	0.68	Highly Valid
4. Interactive and promotes collaborative learning.	4.53	0.73	Highly Valid
5. Connect the learners in a real-world situation.	4.53	0.57	Highly Valid

Overall Mean = 4.47
Standard Deviation = 0.45
Verbal Interpretation = Highly Valid
Legend:

Scale	Range	Remarks	Verbal Interpretation
5	4.20-5.00	Strongly Agree	Highly Valid
4	3.40-4.19	Agree	Valid
3	2.60-3.39	Neutral	Moderately Valid
2	1.80-2.59	Disagree	Fairly Valid
1	1.00-1.79	Strongly Disagree	Not Valid

Table 3 illustrates the level of validity of the developed Per-C-Pro mobile applications based on the assessments of the mathematics teachers, Master teachers, and ICT Teachers in terms of Practical Exercise. Among the statements on the table, "Interactive and promotes collaborative learning" and "Connect the learners in a real-world situation" yielded the highest mean score (M=4.53, SD=0.73, 0.57) and were remarked as Highly Valid. On the other hand, the statement "Engages the learners in a more fruitful learning experience" received the lowest mean score of responses with (M=4.40, SD=0.67) yet was remarked Highly Valid.

Overall, the level of validity of the developed Per-C-Pro mobile applications based on the assessments of the mathematics teachers, Master teachers and ICT Teachers in terms of Practical Exercise attained a mean score of 4.47 and a standard deviation of 0.55 and was Highly Valid among the respondents.

Practical exercise is one of the most important parts of the teaching-learning process. Responses shows that the developed Per-C-Pro mobile applications provides activities that can help the students connected into the real-world exercises which are integrated with their lessons, and it is measurable.

Table 4. Level of Validity of the Developed Per-C-Pro Mobile Applications in Terms of Assignment

STATEMENT	MEAN	SD	VERVAL INTERPRTATION
1. Purposeful and relevant to the lesson.	4.37	0.61	Highly Valid
2. Considers the learning objectives.	4.33	0.80	Highly Valid
3. *Focus on the students' interest and allow them to challenge their selves on* doing their assignment.	4.57	0.57	Highly Valid
4. Conveys a meaningful situation that are connected with the lesson.	4.67	0.48	Highly Valid
5. Allow the students to see the purpose for their study and some definite objectives to be achieved.	4.67	0.55	Highly Valid

Overall Mean = 4.52
Standard Deviation = 0.41
Verbal Interpretation = Highly Valid
Legend:

Scale	Range	Remarks	Verbal Interpretation
5	4.20-5.00	Strongly Agree	Highly Valid
4	3.40-4.19	Agree	Valid
3	2.60-3.39	Neutral	Moderately Valid
2	1.80-2.59	Disagree	Fairly Valid
1	1.00-1.79	Strongly Disagree	Not Valid

Table 4 illustrates the level of validity of the developed Per-C-Pro mobile applications based on the assessments of the mathematics teachers in terms of Assignment. Among the statements on the table, "Conveys a meaningful situation that relate to the lesson" and "Allow the students to see the purpose for their study and some definite objectives to be achieved" yielded the highest mean score (M=4.67, SD=0.48, 0.55) and were remarked as Highly Valid. On the other hand, the statements "Considers the learning objectives" received the lowest mean score of responses with (M=4.33, SD=0.80) yet was remarked Highly Valid.

The assignment in the developed Per-C-Pro mobile applications were measurable.

Overall, the level of validity of the developed Per-C-Pro mobile applications based on the assessments of the mathematics teachers, Master teachers and ICT Teachers in terms of Assignment attained was Highly Valid among the respondents.

Assignment is another important of teaching-learning processes which could help assess the post knowledge of the students regarding the lesson. The result of the study shows that assignment from the developed material is highly acceptable which implies that it can be used effectively for teaching mathematics.

2. Acceptability of the Developed Per-C-Pro Mobile Applications in Terms of Clarity

Table 5. Level of Acceptability of the Developed Per-C-Pro Mobile Applications in terms of Clarity

STATEMENT	MEAN	SD	VERBAL INTERPRETATION
1. Constructive and innovative.	4.47	0.51	Highly Acceptable
2. Uses appropriate information, concepts and instructions.	4.40	0.72	Highly Acceptable
3. Differentiate texts to make key words more digestible.	4.47	0.63	Highly Acceptable
4. Share resources and references with the students for the checking of reliability of the lesson.	4.30	0.75	Highly Acceptable

5. Puts information that are specific, enough and do not bombard the students.	4.57	0.57	Highly Acceptable

Overall Mean = 4.44
Standard Deviation = 0.42
Verbal Interpretation = Highly Acceptable

Legend:

Scale	Range	Remarks	Verbal Interpretation
5	4.20-5.00	Strongly Agree	Highly Acceptable
4	3.40-4.19	Agree	Acceptable
3	2.60-3.39	Neutral	Moderately Acceptable
2	1.80-2.59	Disagree	Fairly Acceptable
1	1.00-1.79	Strongly Disagree	Not Acceptable

Table 5 illustrates the level of acceptability of the developed Per-C-Pro mobile applications based on the assessments of the mathematics teachers, Master teachers and ICT Teachers in terms of Clarity. Based on the statement given in the level of acceptability of Per-C-Pro Mobile Application was interpreted Highly Acceptable. The clarity of the lesson in the developed Per-C-Pro mobile applications were measurable.

Overall, the level of acceptability of the developed Per-C-Pro mobile applications in terms of Clarity attained a mean score of 4.44 and a standard deviation of 0.42 and was Highly Acceptable among the respondents.

The level of clarity of the material may varied based on the style and approach of the teachers. Just like the coherency of the teachers, information, concept, and ideas from the learning materials should also coherent and clear. Finding shows that it is highly valid and acceptable which implies that it is clear and understandable for both the educators and the learners.

Table 6. Level of Acceptability of the Developed Per-C-Pro Mobile Applications in Terms of Usefulness

STATEMENT	MEAN	SD	VERBAL INTERPRETATION
1. Content is appropriate for the learners.	4.30	0.60	Highly Acceptable
2. Usable according to the goals and objectives of the lesson.	4.20	0.81	Highly Acceptable
3. Provide a source of information and can give definite concepts for the learners with regards of their subject matter.	4.37	0.61	Highly Acceptable
4. Cultivate st*udent's learning, interest and motivation.*	4.67	0.55	Highly Acceptable
5. Accessible and can be used for hybrid learning.	4.70	0.47	Highly Acceptable

Overall Mean = 4.45
Standard Deviation = 0.40
Verbal Interpretation = Highly Acceptable

Legend:

Scale	Range	Remarks	Verbal Interpretation
5	4.20-5.00	Strongly Agree	Highly Acceptable
4	3.40-4.19	Agree	Acceptable
3	2.60-3.39	Neutral	Moderately Acceptable
2	1.80-2.59	Disagree	Fairly Acceptable
1	1.00-1.79	Strongly Disagree	Not Acceptable

Table 6 illustrates the level of acceptability of the developed Per-C-Pro mobile applications based on the assessments of the mathematics teachers, Master teachers, and ICT Teachers in terms of Usefulness.

Among the statements above, "Accessible and can be used for hybrid learning" yielded the highest mean score (M=4.70, SD=0.47) and was remarked as Highly Valid. This is followed by "*Cultivate student's* learning, interest and motivation" with the mean score (M=4.67, SD=0.55) and were also remarked as Highly Acceptable. On the other hand, the statements "Usable according to the goals and objectives of the lesson" received the lowest mean score of responses with (M=4.20, SD=0.81) yet were remarked Highly Acceptable. The usefulness of the developed Per-C-Pro mobile applications was acceptable.

Overall, the level of acceptability of the developed Per-C-Pro mobile applications based on the assessments of the mathematics teachers, Master teachers, and ICT Teachers in terms of Usefulness attained a mean score of 4.45 and a standard deviation of 0.40 and was Highly acceptable among the respondents.

Table 7. Level of Acceptability of the Developed Per-C-Pro Mobile Applications in Terms of Language Style

STATEMENT	MEAN	SD	VERBAL INTERPRETATION
1. Clear, specific and precise.	4.33	0.71	Highly Acceptable
2. Uses language that are easy to understand by the learners and teachers.	4.43	0.63	Highly Acceptable
3. Uses everyday language to explain advanced concepts	4.53	0.73	Highly Acceptable
4. Uses sentences that can expound student's knowledge.	4.67	0.48	Highly Acceptable
5. Uses words wisely, direct and appropriate for each lesson.	4.50	0.63	Highly Acceptable

Overall Mean = 4.49
Standard Deviation = 0.44
Verbal Interpretation = Highly Acceptable
Legend:

Scale	Range	Remarks	Verbal Interpretation
5	4.20-5.00	Strongly Agree	Highly Acceptable
4	3.40-4.19	Agree	Acceptable
3	2.60-3.39	Neutral	Moderately Acceptable
2	1.80-2.59	Disagree	Fairly Acceptable
1	1.00-1.79	Strongly Disagree	Not Acceptable

Table 7 illustrates the level of acceptability of the developed e-mobile applications based on the assessments of the mathematics teachers, Master teachers and ICT Teachers in terms of Language Style. Among the statements below, "Uses sentences that can e*xpound student's knowledge*" yielded the highest mean score (M=4.67, SD=0.48) and was remarked as Highly Acceptable. On the other hand, the statements "Clear, specific and precise" received the lowest mean score of responses with (M=4.33, SD=0.71) yet were remarked Highly Acceptable.

Overall, the level of acceptability of the developed Per-C-Pro mobile applications based on the assessments of the mathematics teachers, Master teachers and ICT Teachers in terms of Language Style attained a mean score of 4.49 and a standard deviation of 0.44 and was Highly Acceptable among the respondents.

Appropriateness of the language is necessary in teaching the students. Simple, clear and understandable language could help the learners comprehend their lesson easier. This study reveals that in terms of language style, developed Per-C-Pro mobile application is highly acceptable which implies that it learners are able to get the ideas and lesson they are needed.

Table 8. Level of Acceptability of the Developed Per-C-Pro Mobile Applications in terms of Illustrations

STATEMENT	MEAN	SD	VERBAL INTERPRETATION
1. Readable and visible.	4.53	0.63	Highly Acceptable
2. Depict and explain what is described in the lesson.	4.33	0.61	Highly Acceptable
3. Uses colors and patterns that are appropriate in the lesson.	4.60	0.50	Highly Acceptable
4. Graphics and design are applicable on the system of application.	4.27	0.69	Highly Acceptable
5. Uses pictures, audio and visual materials that are helpful for the studying processes of the learners.	4.27	0.69	Highly Acceptable

Overall Mean = 4.40
Standard Deviation = 0.44
Verbal Interpretation = Highly Acceptable
Legend:

Scale	Range	Remarks	Verbal Interpretation
5	4.20-5.00	Strongly Agree	Highly Acceptable
4	3.40-4.19	Agree	Acceptable
3	2.60-3.39	Neutral	Moderately Acceptable
2	1.80-2.59	Disagree	Fairly Acceptable
1	1.00-1.79	Strongly Disagree	Not Acceptable

Table 8 illustrates the level of acceptability of the developed Per-C-Pro mobile applications based on the assessments of the mathematics teachers, Master teachers and ICT in terms of Illustrations. Among the statements, "Uses colors and patterns that are appropriate in the lesson" yielded the highest mean score (M=4.60, SD=0.50) and was remarked as Highly Valid. On the other hand, the statements "Graphics and design are applicable on the system of application" and "Uses pictures, audio and visual materials that are helpful for the studying processes of the learners" received the lowest mean score of responses with (M=4.27, SD=0.69) yet were remarked Highly Valid.

Overall, the level of acceptability of the developed Per-C-Pro mobile applications based on the assessments of the mathematics in terms of Illustrations attained a mean score of 4.40 and a standard deviation of 0.44 and was Highly Acceptable among the respondents.

Illustration is another important part of making instructional and supplementary materials. It is helpful for catching the attention of the students and engage them on learning. Finding shows that the developed Per-C-Pro mobile applications use appropriate visuals and illustrations that could bring more aesthetic for the materials.

3. Students' Mathematics Performance in Terms of Pre-Test and Post-test

*Table 9. Level of Students' Mathematics Performance in terms of Pre-*Test and Post-test

	N	Minimum	Maximum	Mean	Std. Deviation	Remarks
PRETEST	40	67.00	91.00	80.0250	6.08271	Approaching Proficiency
POSTTEST	40	75.00	91.00	84.2000	4.46755	Approaching Proficiency

Legend:

Level	Range	Remarks
5	90 and above	Advanced
4	85-89	Proficient
3	80-84	Approaching Proficiency
2	75-79	Developing
1	74 and below	Beginning

Table 9 illustrates the level of students' Mathematics Performance in terms of Pre-Test and Post-test. As per the pre-test, out of forty (40) students, the level of students' students' Mathematics

Performance was approaching proficiency with a mean score and standard deviation of (M=80.02, SD=6.08).

As per the post-test, out of forty (40) students, the level of students' students' Mathematics Performance was also approaching proficiency with a mean score and standard deviation of (M=84.20, SD=4.47).

Findings show there are changes in the level of students' mathematics performance in terms of pre-test and post-test. The post-test is higher than the pre-test, maybe because they have learned more after the discussion of the lesson and after using different materials for learning. The Per-C-Pro mobile application helps students to improve learning, but they need more practice so there will be a mastery of the topic, which will give a better result.

Table 10. Significant Difference on the Performance of the Students as to Pre-test and Post-test

	Mean	t statistic	p-value	Analysis
Pre-test	80.03	6.711	0.000	Significant
Post-test	84.20			

Table 10 presents the significant difference on the performance of the students as to pre-test and post-test.

There is an observed significant difference on the performance of the students as to pre-test and post-test as evidenced by the t statistics. The statistics are within the rejection region signified by the critical value. The computed p-values (P=0.00), which are less than the significance alpha 0.05 implies the significance of the test.

From the findings above, it can be inferred that at 0.05 level of significance, the null hypothesis "There is no significant difference on the performance of the students as to pre-test and post-test" is rejected.

Summary of Findings

The following were the significant findings of the investigation:

1. Level of validity of the developed e-mobile applications based on the assessments of the mathematics teachers and master teachers

   Findings shows that the level of validity of the developed Per-C-Pro mobile applications in terms of objectives, discussion, practical exercise, and assignment is highly valid and acceptable which implies that it has contents that are useful in teaching mathematics.
2. Level of acceptability of the developed e-mobile applications based on the assessments of the mathematics teachers and master teachers

   The result of the study reveals that developed Per-C-Pro mobile applications is highly acceptable in terms of clarity, usefulness, language style and illustration which implies that it has characteristics that are effective for engaging the students in learning.
3. Level of students' mathematics performance in terms of pre-test and posttest

   Finding shows there are changes on the level of students' mathematics performance in terms of pre-test and posttest. Post-test is higher than pre-test maybe because they have learned more after the discussion of the lesson and after using different materials for learning.
4. Significant difference on the performance of the students as to pre-test and posttest.

   There is an observed significant difference on the performance of the students as to pre-test and posttest as evidenced by the t statistics. The statistics are within the rejection region signified by

the critical value. The computed p-values of 0.00, which are less than the significance alpha 0.05 implies the significance of the test.

Conclusion

Based on the foregoing findings, the following conclusion was drawn.

From the result of the study, it shows that in terms of pre-test and post-test findings of the study shows significant different therefore, the researcher concludes that the null hypothesis stating that "There is no significant difference on the performance of students as to pre-test and post-test" is rejected calls for the acceptance of the alternative.

Recommendations

In light of the conclusion drawn from the findings, the following recommendations are hereby given.

1. It is highly recommended that the school should support the development of other e-mobile applications that could possibly help the teachers to sustain the learning of the students in the new learning modalities.
2. It is suggested for the teachers to let the students explore other mobile applications and platforms that could help them get more learning resources and allow them to reconnect on the virtual world by integrating their technological skills in their learning experiences.
3. Moreover, it is suggested that the teachers continuously engage their students in different alternative learning materials that could help them cultivate their own knowledge and learning experiences using these educational materials.
4. Furthermore, continual enhancement and modification on the developed e-mobile applications for learning should also be given prioritize so that student will be involve in advance learning using various technological tools.
5. Lastly, for the future researchers, it is highly recommended to test the effectivity of the supplementary materials in other aspects of learning. It may use to test whether it can help enhancing student's academic engagement, academic performance, cognitive ability and much more.

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