Conference Paper

Increasing the Learning Performance and Experiences of the Accreditation and Equivalency (A&E) Learners through MELMA (Mobile-based Enhancement Learning Material)

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Abstract

To make Alternative Learning System (ALS) more flexible and inclusive, the researchers aimed to explore the possibilities of utilizing mobile learning as a delivery mode and tool in increasing the delivery of instruction and enhancing learning experiences of its clienteles of the Accreditation and Equivalency (A&E) Program. This study is divided into three (3) folds composed of the following: (a) first phase – design and development of the Mobile-based Enhancement Learning Material (MELMA); (b) second phase – implementation and experiment of the developed learning material; and, (c) learning experience assessment. The researchers employed sequential mixed method research design and involved the use of both quantitative (content, technical and aesthetic acceptability level checklist; pre- and post-test; significance assessment questionnaire) and qualitative (document analysis; in-depth interviews) instruments. Three groups of respondents were also purposively selected composed of the following: (a) first phase – fifty (50) product validators; (b) second phase – fifteen (15) A&E learners; and, (c) third phase – ten (10) A&E learner and teacher-respondents. Using the Analysis, Design, Development, Implementation and Evaluation (ADDIE) Model, the analyzed data went through quantitative (mean, t-test, analysis of variance) and qualitative (consensual qualitative research) means. The first phase yielded acceptable and excellent ratings for the developed mobile learning material. The second phase showed a significant difference on the pre- and post-test results of the participating learners. It helped them increase their learning performance with the aid of the developed material. The third phase also revealed that there is a positive experience both from the teachers and learners because of the flexible learning and differentiated instruction designs.

Keywords: Accreditation & Equivalency (A&E) Program, Enhancement Learning Material, Mobile-based learning

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1. Introduction

The emergence of technology in the current education landscape provided a new horizon for its progress and development. It has shaped the situation in providing new learning milieus for the 21st century learners. Doors have opened in making learning available at different forms and modalities. It already crossed the boundaries of the impossibilities and making these possible. With this surfaced change, it has established a new horizon in the educational landscape bringing more significant changes to address meaningful and significant learning experiences.

This advent provided the world a clear view of seamless learning. It is a notion that highlights the act on connecting different learning efforts across various learning settings by leveling up mobile technologies to assist students in carrying out cross-space learning, anytime, anywhere [1]. Among the products of seamless learning are the mobile learning applications. It has taken the stage as one of the leading innovations in conveying new platforms in learning technologies. Mobile learning is a form of learning dealing with acquiring and obtaining educational content and information, focused on acquiring cognitive skills, or enhancing learning motivation through digital means in personal pocket devices, including smart phones [2], [3]. Correspondingly, it is learning involving the use of mobile technology, either alone or in combination with other information and communication technologies (ICT) to enable learning anytime and anywhere [4].

The needs for these technologies were brought out by various studies and literatures highlighting its significance in increasing learning experiences and student learning outcomes. This significance is not only exclusive to a particular learning group but also transcends adult learning. Mobile technologies are viewed as essential aspects of enhancing the overall learning experiences of both teachers and learners [5]. It also provides an easy access and learning viability for everyone as compared to computer-based instructions. Furthermore, mobile learning are relatively inexpensive opportunities (as the costs of mobile devices are lesser compared to computers and laptops) bearing multimedia content delivery and options, continuous and situated learning support, decrease in training costs, availability of communication options, and improving levels of literacy and numeracy for both young and adult learners [6], [7], [8], [9]. These research works show not only the needs but also how significant mobile learning is in adult learning.

Meanwhile, in the Philippines, current and innovative technologies are seen as an important facet towards its progress and development. It was evidently seen in

the mandates of its Constitution where it conveyed the full utilization of technology towards national benefits [10]. In relation with the education sector, technology integration is also magnified through the Philippine Education for All 2015 Plan of Action by citing that the country's education shall promote its full utilization at all learning areas [11]. It further stressed that the government, through its education department, is banking its resources to provide technologies to create better opportunities and improve access to education [12].

These matters are not only seen in the formal school system, but also in all programs of the education department including the Alternative Learning System (ALS). Among its learning modalities, broadcast learning and eSkwela offer a wide array of technology incorporation to its curriculum implementation. In Department of Education (DepEd) Division of Quezon, technology integration is also seen as a vital and important aspect in increasing its performance in the Accreditation and Equivalency (A&E) Test. Since there is a big need in increasing the performance in the said national tests [13], technology will play a crucial role in enhancing its delivery capacities.

Correspondingly, it is recommended that the aforementioned notions on technology should be of use as part of the enhancement learning sessions of ALS [14]. Also, developing eLearning materials in ALS, designed for computer-based instruction, should be converted and be used in mobile technologies to enable every implementing district and learners utilize such supplementary learning materials. Correspondingly, utilizing various resources, including mobile technologies, in the enhanced learning sessions (ELS) and supplementation activities in ALS is highly recommended [15].

Using mobile learning technology in ALS is a new perspective particularly in the locale. Though there have been mobile technologies utilized in ALS [16], [17], [18], [19], it only resided as a supplemental material blending with other multimedia resources and limited only with multiple choice-based short messaging service-type (SMStype). The advent of smartphone will pave way to the new generation of mobile learning in ALS. Since the division is striving to increase its performance in the A&E test, utilizing mobile technology could be a milestone for the cited objective. Essentially, this action on maximizing mobile learning has the potential capacities in addressing the realization of the goals of inclusive and accessible education for all learners [7]. Further, it is recommended that mobile learning should be used as supplemental learning tools through the students' own mobile devices as it is very much ideal for individualized and informal learning [20], [21].

Bringing this type of learning technology in ALS is a significant milestone for its program implementation. Its relevance and significance in creating an effective learning

environment is shown. This will further open new doors for its implementers and learners to capacitate themselves in improving the A&E program. Correspondingly, helping the program to bring more flexible learning delivery mechanisms for the learners will be the utmost significance of this research undertaking. This will help ALS in reaching more clienteles through various flexible learning delivery mechanisms towards addressing its aim to achieve lifelong learning and functional literacy for all of its learners.

Hence, with the surfaced situation, the researchers dwelled on analyzing the possibility of utilizing mobile learning technologies in ALS, particularly with the A&E program. This research study aimed to develop a mobile learning application designed as the Mobile-based Enhancement Learning Material (MELMA) for the A&E Program as a proposed tool and learning delivery mode. This will serve as a tool in increasing the performance of the A&E Test as incorporated in the Enhanced Learning Sessions (ELS) of the division. The developed application was subjected to the validation and evaluation process by its content, technical and aesthetic qualities. Correspondingly, it was tested and applied comparing the learners' performance under the mobile application and in the traditional flexible delivery mode (modular instruction) of the A&E program.

2. Objectives of the Study

This study is a threefold mixed method research. The first phase resided on the design and development of the Mobile-based Enhancement Learning Material (MELMA). The second phase focused on the implementation and experiment of the developed learning material. Lastly, the third phase assessed the learning performance and experiences of the learners who underwent MELMA.

First Phase: Design and development

1. What are the contents and features of the developed MELMA?
2. What are the testing results of the developed mobile application as assessed by the evaluators?
3. What are the validation results of the developed mobile application in terms of its content, technical and aesthetic qualities?
4. Is there a significant difference among the assessment results on the content, technical and aesthetic qualities of the developed mobile learning application?

Second Phase: Implementation and experiment

1. Is there a significant difference between the pretest and posttest scores of the experimental group that MELMA has been applied to?
2. Is there a significant difference between the pretest and posttest scores of the controlled group that conventional flexible delivery method (modular instruction) has been applied to?
3. Is there a significant difference between the posttest scores of the experimental group that MELMA has been applied to and the controlled group that conventional flexible delivery method (modular instruction) has been applied to?

Third Phase: Learning experience assessment

1. What is the level of significance of the developed mobile learning application as assessed by its end-users in terms of its functionality, safety, economy, aesthetics, workability, and efficiency based on their learning experience?
2. Is there a significant difference among the evaluation results on the significance of the developed mobile learning application as assessed by its end-users?
3. What are the experiences of the teachers and learners in using MELMA?

3. Materials and Methods

In this research undertaking, sequential mixed method research design is used. It involved the use of both quantitative (content, technical and aesthetic acceptability level checklist; pre- and post-test; significance assessment questionnaire) and qualitative (document analysis; in-depth interviews) data.

Sequential mixed method is a design in which quantitative and qualitative are sequentially done for data gathering. Specifically, this research used an explanatory sequential mixed method to collect quantitative data in the first phases of the study and then the results are used to build towards collecting qualitative data [22]. It is typically a "QUAN-qual" model that gives weight more on the quantitative approach and employs qualitative approach to magnify the former [23]. It is used to provide a general picture of the research problem through quantitative data and run a thorough analysis on the data through qualitative approach towards refining, extending and explaining the general picture [24], [25].

The researchers resorted in having a threefold or multistrand mixed method research strategy. This is in correspondence with some mixed methods conducted in the locale [26] and in line with rationales presented by literatures [27], [28], [29]. The first phase is composed of quantitative and qualitative in nature, with much weight on the former. The second phase is a pure quantitative while the third one is a mixed of quantitative and qualitative with weight on the latter. Thus, making it this threefold, multistrand research a sequential mixed method one.

First Phase: Design and development

In this phase, the researchers designed and developed the mobile learning application. This phase followed the Analysis, Design, Development, Implementation and Evaluation (ADDIE) Model as a specific instructional model. Under analysis, the researchers conducted the following: (a) learners' analysis need; (b) instructional analysis; (c) creating instructional goals; and, (d) analysis of learning objectives. It is followed by the design phase which is constituted of the following: (a) design assessment; (b) courseware media and design; and, (c) instructional strategy. For the third part, the development phase, the researchers specifically followed the following sequence: (a) prototyping; (b) identifying technical specifications; (c) design walkthrough; (d) page and content design; (e) scripting; (f) graphic creation and presentation; and, (g) finalization of application. It is followed by the testing phase as the implementation of the study which corresponds to the following measures: (a) unit testing; (b) integration testing; (c) system testing; and, (d) acceptance testing. Lastly, for the evaluation phase, the researchers conducted the acceptability level testing and final revision of the developed application.

There are fifty (50) product evaluators for the first phase of the study. Purposively selected, these are composed of content validators (ALS implementers and leaders), technical validators (application and instructional materials developers) and aesthetic validators (digital and visual artists). With the use of a validation checklist [14], [30], the developed application was subjected for content, technical and aesthetic evaluations. For data analysis, mean and analysis of variance were used.

Second Phase: Implementation and experiment

After the development of the mobile application, the researchers proceeded in its implementation. First, the researchers sought permission from the teachers and learners to be involved in this study. Secondly, an orientation was conducted highlighting its purpose, significance, and implementation plan. For thirty (30) days, the implementation was conducted as the first attempt to test the material. The implementation is only limited to one lesson in Learning Strand 2: Critical Thinking and Problem Solving, *Ang Ecosystem*, with pretest and posttest taken from the existing session guides and learning materials with 20 items each.

Before the implementation, a pretest was conducted for thirty (30) learners undertaking the modular instruction as their conventional flexible learning delivery mode. After the pretest, they are divided into two, one group who will take MELMA, and the other one for the modular instruction. Those under MELMA are receiving instructions and assessment activities in their mobile phones. After the conduct of the lesson, they are assessed using the posttest. Data collected was subjected to analysis using both t-test independent and dependent measures. The experiment design employed are patterned from research works on mobile learning experiments [31], [32], [33].

Third Phase: Learning experience assessment

In this phase, the researchers simply analysed the significance assessment and experience of the respondents. For the significance assessment, the researchers explored how significant the developed learning application is based from their experiences. It was assessed using an evaluation checklist comprised of functionality, safety, economy, aesthetics, workability, and efficiency determinants [34], [35]. After which, the researchers conducted an in-depth interview with the identified, purposively selected ten (10) respondents to qualitatively define and analyze their learning experience. In this phase, mean and analysis of variance were used for the quantitative data while consensual qualitative research technique for the qualitative data.

4. Results and Discussion

The researchers dwelled on a threefold phase of research study. Each phase has its own specific problems. Hence, specific discussion of results is presented in the succeeding sections.

First Phase: Design and development

4.1. Contents and features of the developed mobile-based enhancement learning material (MELMA)

The contents and features of the developed MELMA were primarily identified through the results of the documentary analyses, literature reviews and interviews. The qualitative data gathered were summarized categorically in order to construct the general outline of the target application.

There are three (3) major contents of the developed MELMA. These are the Enhancement Learning Materials, About ALS, and About this App. The first part is divided into four (4) parts which are listed as follows: (a) Item Rationalization; (b) Practice Test; (c) Weekly Assessment; and, (d) Feedback/ Inquiries. The content materials for this developed application focused on the second learning strand of the A&E Program, which is the Critical Thinking and Problem Solving. Each of the subjects under the item rationalization section has five (5) sets of questions with ten (10) item each, summing up to fifty (50) item questions. This made the item rationalization consisted of 100 items. Practice test, on the other hand, consisted of twenty (20) item each, making a total of forty (40) items. Lastly, the weekly assessment has twenty (20) items.

Considering various recommendations of local studies and reports [13], [14], [15], [36], [37], it stressed that there should be a focus on the second learning strand. Likewise, it stressed that there should be an effective conduct and implementation of the enhanced learning sessions (ELS) of ALS in DepEd Division of Quezon where these materials will be used. Hence, these literatures served as the backbone of this research undertaking in identifying the needed contents of this mobile application.

Aside from the contents, the researcher has identified the features of the developed mobile application for its effective content and material presentation. The features were presented in Table 1.

Depicted in Table 1 are the identified features of the developed application. The researcher categorized it into two (2), the content and technical features. The former has four (4) identified features while the latter has eight (8). The content features include the rationalization feedbacks, practice test activities, weekly assessment activities, and feedback and inquiry page. The technical features include the log in page,

Table 1: Features of the Developed MELMA.

Area	Features	Function
Content Features	1. Rationalization Page	Provides learners to review and enhance their learning at their own pace and time
	2. Practice Test	Provides learners with various practice test activities in LS2
	3. Weekly Assessment	Allows learners participate in the assessment activities in a flexible delivery setting
Tech-nical Features	4. Feedback and Inquiry Page	Allows learners raise queries to their teachers through mobile platforms
	5. Log In Page	Permits the teachers to intend the application to a particular learning group
	6. User Identification Page	Enable learners submit their names to their teachers as they answer the weekly assessment activities
	7. Section Back and Exit Buttons	Allows the user to go back or exit a particular page/section
	8. Scrollable Page	Permits the user to scroll up and down the page if the content is too long
	9. Weekly Updates (Contents and Features)	Allows teachers to update all the contents particularly the practice test and the weekly assessment activities
	10. Easily Transferrable	Enable the application to be transferred through Bluetooth, SHAREit, Messenger, and Email
	11. User-Friendly Interface	Linear layout for easy navigation Single button/ tabs per page/ section Can work on portrait and landscape orientations
	12. Mobile-Friendly Application	Small file size and can be updated in both WiFi and mobile data Works on Android and its earlier versions Does not need internet connection in doing the activities

user identification page, section back and exit buttons, scrollable pages, weekly automatic updates, easily transferable, user-friendly interface and mobile-friendly. Also, presented in the table are its specific functions of the developed MELMA.

The identified characteristics were taken from the recommendations of various research undertakings on providing a new learning environment though mobile learning technology [38]. With the technical features identified, the developed application is also perceived to be providing more meaningful learning experiences to the learners [5]. Moreover, this also conforms to some research findings [8] that mobile learning

is a significant act in enhancing the learning capacities of adult learners, like the ones enrolled in the A&E Program of ALS. Accordingly, these technologies helped adult learners to widen their access to various opportunities in learning and maximize their chances in acquiring the essential digital skills of the 21st century.

4.2. Testing results of the developed mobile-based enhancement learning material (MELMA)

The data presented below are the gathered technical specifications of the developed MELMA based on the testing and validation of the concerned respondents.

Table 2: Technical Specifications of the Developed MELMA Based on the Testing Results.

Area	Specification	Description
Technology	Mobile Technology	The technology used for cellular communications commonly characterized as a handheld device
Form	Mobile Learning Application	A type of electronic learning (eLearning) following the principles of seamless learning
Medium	Smart Phones	A mobile phone with advanced operating systems combining the features of a computer and a handheld device
Type	Hybrid (Content Delivery, Assessment Instruments, Performance Support, Social Learning)	How the application is presented and delivered as a learning platform
Architecture	Hybrid Application	Mobile interface is presented as a native app but is developed through the web (a cross-platform development)
Authoring Tools	Combination (Make Me Droid, Basics of HTML5)	Utilized the features of the online application builder and aided through scripting some designs, layout and parts
Operating System (OS)	Android	Can be used also in earlier versions of Android and in iOS (through application conversion)
File Size	5.1mb	Small file size to allow for installation and utilization even with local and/or cheap smartphones
Updates	Anytime	Can be updated anytime through WiFi or Mobile Data Connection (does not need third party plug-ins)
Physical Appearance	Orientation; High Contrast; Screen Reader, Keyboard Support, Haptic Feedback, App Switch Support	Liquid display; Light and dark contrast; All applicable

Basically, MELMA is a mobile learning application utilizing the smartphones as its medium. However, it is a combination of various types of mobile learning. MELMA is a combination of content delivery (classic delivery of courseware that are page-based, and enable users access and study when they want to), assessment instruments (designed for quick assessment that can serve as records of learning performance), performance support (access a particular material for task completion), and social learning (application that allows for social interaction and collaboration towards learning) [39]. The mobile learning application is designed under the hybrid application architecture (build up and function are same with native apps but data interfaces are through web) [39]. This architecture aided the researcher to continuously upload and update the content and learning activities to the application. Its authoring tools are also a combined one utilizing the present features of the Make Me Droid as an online application builder aided with the scripting from basic HTML5.

4.3. Validation results of the developed mobile-based enhancement learning material (MELMA)

Based from the evaluation results for the level of acceptability of the developed mobile learning application, it received a high validation rating for its content, technical and aesthetic qualities. The researcher summarized the validation results to get the overall rating of the developed material. This is to identify the general acceptability level of the developed application to let the readers and users easily recognize its overall rating as anchored on some studies which the researchers ventured into [14], [34], [35], [40], [41].

Table 3 shows the summarized acceptability results for the overall evaluation rating of the developed MELMA. Each rating for the content, technical and aesthetic qualities are likewise presented.

The data presented that the developed MELMA is of excellent level. It received a mean rating of 4.27 interpreted as excellent. The content quality received the highest rating among the three (3) criteria. The evaluators gave it a 4.46 mean score categorized under the excellent mark. Meanwhile, the technical quality and the aesthetic quality both received the same mean score of 4.17 dubbed as good. This only show that the developed mobile learning application has content, technical and aesthetic qualities.

The content quality of the developed learning application received a high mean score. This should be highlighted for it consist the most important aspects in developing

Table 3: Acceptability Rating of the Developed MELMA based on the Validation Results.

Criteria	WM	VI	R
Content Quality	4.46	E	1
Technical Quality	4.17	G	2.5
Aesthetic Quality	4.17	G	2.5
Total	**4.27**	**E**	—
Legend:			
WM: Weighted Mean 4.21 – 5.00: Excellent (E)			
VI: Verbal Interpretation 3.41 – 4.20: Good (G)			
R: Rank 2.61 – 3.40: Average (A)			
1.81 – 2.60: Inadequate (I)			
1.00 – 1.80: Poor (P)			

mobile learning applications [42]. Likewise, its elements should be well presented to make it more effective [43]. It should also augment the learning process to enable more significant learning experiences for the learners [44]. On the other hand, technical quality should not pose as threats for its complexities to its end-users [42]. It should be technically effective too to make it as the framework in delivering the essence of technology-aided learning materials [14], [44], [45]. Correspondingly, making the mobile learning application more relevant is through making its visuals and illustrations presented effectively, hence, aesthetic quality is needed [46]. It is also noted that this action will make the learning transmission more meaningful and significant [47]. Thus, making the aesthetic quality an important element and aspect of the design and development process for instructional materials.

4.4. Significant difference among the assessment results on the acceptability level of the developed MELMA

The researcher also identified the significance difference among the assessment results on the mean scores of the acceptability level of the developed learning application. This consisted of the mean ratings of the content, technical and aesthetic qualities of the developed MELMA. Presented in Table 4 is the result of the statistical testing using the one-way Analysis of Variance (ANOVA).

Because the computed value of F is 3.864 and it does not exceed the 5.79 tabulated value at $\alpha = 0.05$ level, the researcher fails to reject the null hypothesis. This means that there is no significant difference among the assessment results on the content, technical and aesthetic qualities of the developed MELMA.

Table 4: Significant Difference Among the Acceptability Rating of the Developed MELMA .

Variable	SS	df	MS	F-Value	F Crit	Decision
Between	0.17	2	0.087	3.684	5.79	No significant difference
Within	0.12	5	0.024		$\alpha = 0.05$	
Total	0.29	7				

This implies that the validators have evaluated the mobile learning application in a consistent manner. They have assessed consistently the MELMA with a high acceptability rating for each criterion. It can be seen in the range of the mean scores received by the three (3) identified criteria. Likewise, this proves that the developed mobile learning application is of high regard and quality based on the judgement of the validators statistically.

Second Phase: Implementation and experiment

4.5. Difference between the pretest and posttest scores of the experimental group

Table 5 shows the difference between the pretest and posttest scores of those undertaking MELMA or the experimental group.

Table 5: Difference Between the Pretest and Posttest Scores of the Experimental Group (MELMA).

G	Test	$\bar{x}$	SD	df	Comp T	Crit T	Int
Experimental	Pre	2.20	1.47	14	35.71	2.145	Significant difference
	Post	17.73	0.96				

The computed t value is 35.71 which is higher than the critical t value of 2.145. This signifies that there is a significant difference between the pretest and posttest results after introducing MELMA in the delivery of the lesson. This also means that MELMA can be an essential learning tool and delivery mode in preparing learners for the A&E Test.

4.6. Difference between the pretest and posttest scores of the controlled group

Table 6 shows the difference between the pretest and posttest scores of those undertaking the conventional flexible learning delivery, the modular instruction, as the controlled group.

Table 6: Difference Between the Pretest and Posttest Scores of the Controlled Group (Modular Instruction).

G	Test	$\bar{x}$	SD	df	Comp T	Crit T	Int
Con-trolled	Pre	2.60	1.35	14	23.13	2.145	Significant difference
	Post	14.80	1.21				

Under the modular instruction, the computed t value is 23.13 which is higher than the critical t value of 2.145. It depicts that there is a significant difference between the pretest and posttest results. This means that the conventional flexible learning delivery, the modular instruction, is effective as it helps out learners in their own pace and mode.

4.7. Difference between the posttest scores of the experimental and controlled group

To further analyze the gathered data, the posttest scores of the two groups shall be compared. This will determine it there is a significant difference on the results of those who have taken MELMA and the conventional modular instruction as flexible learning delivery in ALS.

Table 7: Difference Between the Posttest Scores of the Experimental Group (MELMA) and Controlled Group (Modular Instruction).

G	Test	$\bar{x}$	SD	df	Comp T	Crit T	Int
Expe-riment	Post	17.73	0.96	28	7.36	2.048	Significant difference
Con-trolled	Post	14.80	1.21				

The computed t value is 7.36 which is higher than the critical t value of 2.048. This signifies that there is a significant difference between the posttest scores of the groups under MELMA and modular instruction. This shows that the developed learning application is effective in comparable with the conventional flexible delivery mode which is the modular instruction. Though both yielded significant difference on their pretest and posttest results, MELMA has taken an edge on the modular instruction. This also

corresponds to the notions that mobile learning is an effective learning intervention for adult learners [48], [49], [50], improving attitudes towards learning [51], enhancing learning strategies [52], and, continuous learning [53].

Third Phase: Learning experience assessment

4.8. Significance assessment on the developed MELMA

Meanwhile, the researchers have presented the summarized data for the overall significance assessment results for the developed MELMA in Table 8.

Table 8: Significance Assessment on the Developed MELMA based on the Respondents' Experience.

Criteria	WM	VI	R
Functionality	4.36	PS	3
Safety	4.23	PS	5
Economy	4.32	PS	4
Aesthetics	4.05	SS	6
Workability	4.58	PS	1
Efficiency	4.45	PS	2
Total	**4.33**	**PS**	–
Legend:			
WM: Weighted Mean			
VI: Verbal Interpretation			
R: Rank			
4.21 – 5.00: Perfectly Significant (PS)			
3.41 – 4.20: Slightly Significant			
2.61 – 3.40: Average (A)			
1.81 – 2.60: Slightly Insignificant (SI)			
1.00 – 1.80: Totally Insignificant (TI)			

The significance assessment results showed that the developed mobile learning application is perfectly significant after receiving a mean rating of 4.33. Only the aesthetic criterion received a slightly acceptable mark among the six (6) significance dimensions. The criterion workability received the highest mean score of 4.58. It is followed by efficiency with a 4.45 mean score and functionality with 4.36 mean rating for the second and third spots respectively. For the fourth rank, economy garnered an average score of 4.32. Second to the last is the criterion safety with 4.23 mean rating. Lastly, aesthetic landed on the said spot with 4.05 mean rating. The gathered data for this finding is congruent to the results of some studies on assessing the significant

quality of a developed learning material [34], [35]. The relevance of the findings of the current undertaking to these literatures have signified that it both received excellent marks on the significance of the product being developed. This also proves that the developed mobile learning enhancement material followed the set standards.

4.9. Significant difference among the significance assessment results of the developed MELMA

To test statistically the difference among the responses of the respondents in relation to the identified six (6) dimensions, the researcher utilized one-way analysis of variance. Moreover, these dimensions are divided into functionality, safety, economy, aesthetics, workability and efficiency. Presented in Table 9 is the result of the statistical testing using cited statistical analysis.

Table 9: Difference Among the Assessment Results on the Significance Assessment of the Developed MELMA.

Variable	SS	df	MS	F-Value	F Crit	Decision
Between	0.45	5	0.090	2.62	2.96	No significant difference
Within	0.48	14	0.034		$\alpha = 0.05$	
Total	0.93	19				

The data presented in Table 9 depicts that the calculated value of *F* at 5 and 14 df does not exceeds the critical value of 2.96 at the $\alpha = 0.05$. Therefore, the null hypothesis is accepted and concludes that there is no variation of the responses on the significance assessment among its six (6) criteria. Statistically, it yielded no significant difference. This implies that the research findings received similar observations on how the developed learning material is perceived by its users. However, it still shows that the developed MELMA is of high quality level based from the yielded findings.

4.10. Learning experiences of teachers and learners in using MELMA

To magnify the results of the experiment and significance assessment conducted, the researchers conducted an in-depth interview on the teachers and learners involved in the implementation. Presented in Table 10 is the congregated interview response from the respondents.

Table 10: Interview Response from the Respondents on their Learning Experiences in Using MELMA.

Congregated Response	F	R
Study with peers collaboratively	4	4.5
Evaluate themselves and their peers	3	6
Learn with own pace	7	1
Responsible for own learning	6	2
Access information when needed	5	3
Discover and use own learning styles	4	4.5

There are six (6) general themes gathered by the researchers based on their in-depth interviews and document analysis during the implementation phase. Among these, learning in their own pace top the spot with seven (7) responses from the learners. This entails that learners are aided for their own independent and individual learning [54], [55]. It is followed by making them responsible for their own learning. This posits that motivation and interest is triggered upon the utilization of mobile learning materials [55]. For the third spot, accessing information anytime and anywhere takes place. It resembles that the ease of mobile devices made it easily available for every learner [54]. Other significant information concluded are the studying with peers collaboratively, discovering their own learning styles, and evaluating their own learning and progress.

These findings are also relevant with several research undertakings [54], [55]. Mobile learning has bearing in increasing students' achievement [31]. It also becomes an attractive learning device for education as it provides inputs on its value towards students' use [56]. It has also explored seamless learning by going outside the confinement on time and place [57]. Moreover, their students' positive attitudes towards mobile learning has greatly affect their motivation and interest towards greater learning [58]. With mobile learning technology, mobility is a prime platform towards highlighting technology utilization in learning [59]. Significantly, the gathered data corresponds on the general claim and notion that mobile learning has impact in both teaching and learning practices as it transforms learning according to the needs of both teachers and students [60].

5. Conclusion and Recommendation

The developed Mobile-based Enhancement Learning Material for the Accreditation and Equivalency Program (MELMA) achieved an overall evaluation rating of excellent as

assessed by the validators. Its content quality is perfectly acceptable while its technical and aesthetic qualities both received a slightly acceptable rating. There is no significant difference among the mean scores of the identified criteria for its acceptability level. Suggestions and comments were made by the validators to further improve the developed mobile application.

Moreover, the utilization of the developed mobile application yielded positive results as used by the learners. It showed that the learners who underwent learning intervention from MELMA have scored high and performed significantly compared to those under modular instruction.

The respondents also revealed that the developed material is relevant to their needs as it received a perfectly significant rating in terms of its functionality, safety, aesthetics, economy, workability and efficiency. Further, the respondents for the significance assessment phase revealed that there is no variation on their given responses.

It is highly recommended by the researchers for the full implementation of MELMA in its community learning centers (CLCs) capable of holding mobile learning, capacitating its teachers and learners towards its full implementation, and creating implementation guidelines for its effective delivery.

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Appendix

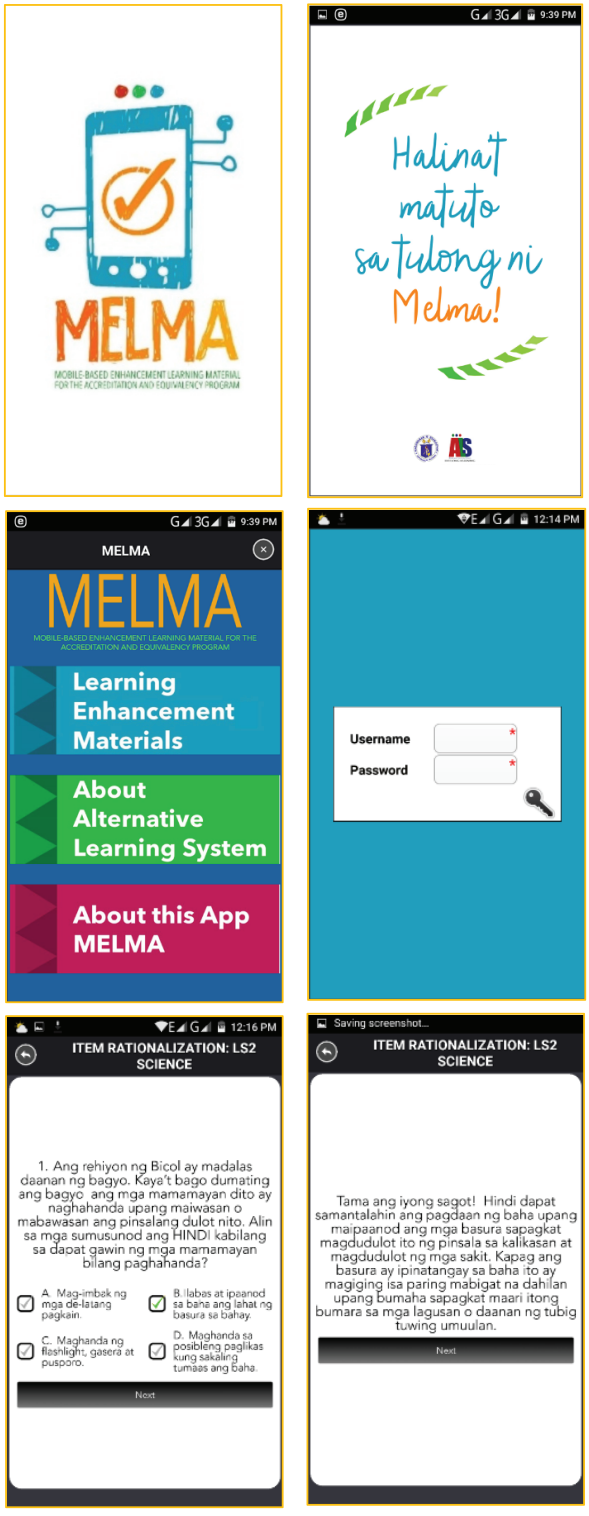

Figure 1: Screenshots of the Developed MELMA *Left to Right: (1) App ID and Logo; (2) Welcome Page; (3) Log-In Page; (4) Major Pages/Tabs; (5) Content Page for Question; and, (6) Content Page for Sample Rationalization.*

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