

Achievement of Competencies and Performance on the Utilization of the Mobile Application in Teaching Electrical installation and Maintenance

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ABSTRACT

The main objective of this study was to develop a mobile application that can be utilized to aid the teaching-learning process in the subject Electrical Installation and maintenance. The descriptive-correlation design was used together with the validated questionnaire for data gathering. After the utilization of the developed mobile application on to the students, questionnaires are then given to them to evaluate the application. The data gathered was tabulated, and analyzed using Microsoft Excel and Minitab 14 for data processing. Results showed that the level of acceptability of the components of the developed mobile application in terms of content (M=4.71), activities (M=4.59), and assessment (M=4.70) were all regarded *very high*, except for reflection (M=3.67) which was only regarded with an interpretation of *high*. For the level of acceptability of the features of the developed mobile application in terms of design (M=4.61), connection to curriculum (M=4.69), and multimedia quality (4.66) are all interpreted as *very high*.

As for the respondents' level of achievement of competencies in terms of both technical skills (M=92.50) and work attitude (M=96.88), both interpreted have developed an *outstanding* performance, except for cognitive (M=86.75), which has a *very satisfactory* level.

This research also proved that the components of the mobile application have an implication on attainment of the desired competencies for the learners which was manifested in their written and performance task and their attitude towards work. Also, the features of the developed mobile application showed a significant effect towards the achievement of the mobile application users, except for the factor about design. This implies further that the design of the mobile application may be enhanced to influence students' attainment of the desired competencies.

Therefore, it can be concluded that the high level of acceptability of the components of the developed mobile application contributes to the very satisfactory and outstanding level of achievement of the learners. Also, it can be concluded that the features of the mobile application, in terms of connection to the curriculum and multimedia quality impacts the achievement of the students.

Keywords:

Activities; assessment; competencies; connection to curriculum; content; design; electrical installation and maintenance; mobile application; multimedia quality; reflection; technical skills; work attitude

INTRODUCTION

Nowadays, the market for smart devices has seen a rapid growth due to massive consumer interest around the globe that resulted in a shift from using desktop computers to mobile devices for mobility (Miguel et al., 2015). In the Philippines, there is a growing smartphone ownership; in 2013, there were 14.5 million smartphone users, and by the end of 2016, the number of users is projected to reach 29.9 million (eMarketer, 2015). Statista (2022) mentioned that there were roughly 79 million smartphone users in the Philippines, showing an upward trend since 2017. They even anticipated that by 2025, there would be around 91.5 million smartphone users in the country. Thus, this shows opportunities to use mobile devices in facilitating learning, including open and distance e-learning, in new and innovative ways.

With the rapid development of digitalization, multimedia and network-based communication technology, all walks of life are undergoing change and development driven by the application of the internet to conventional industries. Especially because of the outbreak of coronavirus disease of 2019 (COVID-19), teaching and learning modes are undergoing revolutionary changes worldwide (Wong et al., 2020). In response to this, the Department of Education have identified three different distance learning modalities namely: Modular Distance Learning Modality (Digital or Printed); Online Distance Learning; and Blended Learning. Although smart phones are a basic device in a Filipino household, there remains the problem of internet connection. As a matter of fact, the Social Weather Station survey states that only 39% of the Filipino families have strong internet connection, 29% have experience fair connection and the remaining percentage experience somewhat weak up to very weak connection. Thus, in 2021, during the height of the pandemic it is no longer a surprise that, 75.1% of the K to 12 learners are under the printed modular distance learning modality. This equates to a lot of printed materials, as well as time consuming preparation of the teachers.

At present, the Department of Education implements the limited face-to-face instruction and will soon go full capacity for the benefit of the learners. Having experienced the struggles of distance learning as well as its advantages, the researcher sees this as an opportunity to develop a mobile application that can be utilized as a teaching aid or a standalone self-paced learning tool for the benefit of the learners.

This study intends to explore how the developed mobile application for Electrical Installation and Maintenance (EIM) affect the respondents' level of achievement of competencies and performance. Specifically, it seeks to

1. What is the level of the acceptability of the components of the developed Mobile Application for Electrical Installation and Maintenance (EIM) in terms of:
 - a. Content
 - b. Activities
 - c. Assessment
 - d. Reflection
2. What is the level of acceptability of the features of the developed Mobile Application for Electrical Installation and Maintenance (EIM) in terms of:
 - a. Design
 - b. Connection to Curriculum
 - c. Multimedia Quality
3. What is the respondents' level of achievement of competencies relative to:
 - a. Cognitive (Written Tasks)
 - b. Technical Skills (Performance Tasks)
 - c. Work Attitude
4. Does the components and features of the developed mobile application have a significant relationship on the respondents' level of achievement of the competencies?

REVIEW OF RELATED LITERATURE

The impact of these technologies will undoubtedly continue to expand in the years ahead. Rapid advances in the speed and processing power of mobile devices provide a platform for the development and use of instructional Apps in education settings. As more and more Apps emerge on the market with the potential use by teachers and students, decisions regarding their quality and parameters of use in education need to be made quickly, effectively, and judiciously. Aside from this, the content matching the subject areas also must be considered. McQuiggan, et.al., (2015) defines mobile learning as instant and optionally accessible, anywhere, and anytime learning, which helps most people to create knowledge, satisfy curiosity, collaborate with others, and enrich experiences.

The advantage of mobile learning is the ability to provide access to learning contents out of the course time. Mobile learning management systems might be used to provide this. Additionally, mobile learning contents are produced based on design principles for qualified interactions. Researchers suggest that the duration of access time should be increased (Çelik, 2012). Ozan (2013) came with a conclusion that mobile learning is more permanent for learning. In addition, using social networks and mobile technologies positively affect students' performance toward courses. Mobile learning offers benefits such as quick access to information for students, diverse ways of learning, contextual learning, control over own learning, supporting, and encouraging learning, increased participation in the course, will use in the course and positive meaningful differences of academic achievement, considering the results of the research.

In 2017, Denoël et al conducted a study aiming to examine the effect of introducing children to information and communication technologies (ICT) both at home and during school time. The survey involved a population of 39, 15-year-old students: 27 participants from European countries and 12 participants from non-European countries. Data collated from the survey revealed that students of a high-socioeconomic-status generally start using classroom technologies such as laptops, tablets, and e-books at an earlier age than students coming from low-income households, which has its repercussion on the equity between students. The study also showed that much exposure to technology has a negative impact on students' school performance.

Another study was conducted by Carter, Greenberg, and Walker (2017) in a West Point College, in New York, U.S.A. The study aimed to find out whether technology, precisely Internet connected computers, should be integrated in the normal course of instruction. Participants were divided in three groups: the first group followed courses with no connection to any technological devices; the second group was allowed the free use of tablets and laptops; the third group used technology under restrictions. Analysis of data collated from the three groups revealed that students in classrooms where no Internet-connected devices were used scored much higher in their tests (72.9 %) than those in classes where laptops and tablets were allowed.

Even though previous studies have confirmed the positive impact of interaction on distance learning satisfaction, the mechanism behind this relationship has not been well addressed in the literature. The ability and the confidence to learn from online courses and connect and engage with others were the main reasons in explaining online learners' satisfaction (She, et.al., 2021). Alhumaid (2019) also has a similarly negative take on the use of education application through gadgets and smart phones. He describes the experience with technology as bitter-sweet. He pointed out that relevant research has proven that technology could change education negatively through four paths: deteriorating students' competences of reading and writing, dehumanizing educational environments, distorting social interactions between teachers and students and isolating individuals when using technology.

Abovementioned literature has shown conflicting ideas about the suage of mobile smart phones for student-learning. However, the fast-growing industry requires this generation to keep up with its needs. It is but an undeniable fact that the advantages weigh out the disadvantages.

METHODOLOGY

This chapter examines the research methodology used in this study. It includes the research design, respondents of the study, research procedure, research instrument, and statistical treatment of data.

Research Design

To assist an organized and careful analysis of the data gathered, the descriptive-correlational design of research was used to determine the level of acceptability of the component and features of the developed mobile phone application. IvyPanda (2022) defines this type of research as one that aims to provide static pictures of situations as well as establish the relationship between different variables. In this type of research, data are often analyzed quantitatively, using frequencies, percentages, averages, or other statistical analyses to determine relationships. On the other hand, correlational research is designed to locate relationships among variables and to let the prediction of future events from present knowledge.

Respondents of the Study

For this study, the researcher will make use of the universal sampling which includes the total population of forty (40) Grade 11 TVL-Electrical Installation and Maintenance students of Sta. Catalina Integrated National High School. These students were exposed to the use of the developed mobile application in after the researcher have integrated the use of the developed mobile application in teaching the students.

Research Procedure

The survey questionnaire is major data gathering tool for this research study. Each of the respondents was given a validated set of questionnaires. For data gathering, the researcher carried out the following procedure:

1. The researcher got the consent to conduct the study from the Division authorities of the Province of Laguna as well as the school where the study will be conducted.
2. After gaining the approval, the researcher then created the survey-questionnaire. This questionnaire underwent the validation of experts to ensure the validity of the items.
3. The respondents as well as their parents were informed of their participation in this research study. After doing so, the copy of the Mobile Application was distributed to the respondents and was utilized by the researcher in the teaching learning process in the subject EIM.
4. Then, survey questionnaires were distributed among the user-respondents. Each respondent was oriented and carefully guided by the researcher. Then, the questionnaires were retrieved.
5. Answers from the questionnaires were then tabulated, analyzed, and interpreted.

Research Instrument

This study made use of the validated questionnaire which includes the adapted some of the items from existing scales as the main data gathering instrument. The questionnaire aimed to gather information on the level of acceptability of the components and features of the developed mobile application. The questionnaire have underwent validations from experts to ensure the validity of the instrument.

Statistical Treatment of Data

The data gathered was presented and statistically treated using Microsoft Excel and Minitab 14. The results were then presented using the necessary tables and figures. For an organized analysis and interpretation of the data gathered, the following statistical measures will be utilized:

- In terms of the acceptability of the components and features of the developed mobile phone application the scale below was utilized. The instrument is a five-point Likert Scale in which the respondents' responses for the given indicators may range from "strongly disagree" (1); "disagree" (2); "neither agree nor disagree" (3); "agree" (4); and "strongly agree" (5) and may also consider some items to be "not applicable". The rating scale is as follows:

Rating Scale	Range	Descriptive Evaluation
5	4.50-5.00	Strongly Agree
4	3.50-4.49	Agree
3	2.50-3.49	Neither Agree nor Disagree
2	1.50-2.49	Disagree
1	1.00-1.49	Strongly Disagree

- The performance of the respondents in terms of their cognitive (Written Tasks), technical skills (Performance Tasks) and work attitude were evaluated using the scale below:

Rating Scale	Range	Descriptive Evaluation
5	90 -100	Outstanding
4	85-89	Very Satisfactory
3	80-84	Satisfactory
2	75-79	Fairly Satisfactory
1	Below 75	Did not meet expectations

Regression analysis was utilized to determine if there is a significant relationship between the level of acceptability of the developed mobile application in terms of its component and features and the respondents' level of achievement of the competencies.

RESULT AND DISCUSSION

Table 1. Level of Acceptability of the Components of the Developed Mobile Application for Electrical Installation and Maintenance (EIM) in terms of Content

STATEMENT	Mean	SD	Remarks
The app provides up to date content.	4.70	0.46	Strongly Agree
The app permits users to review past lessons.	4.93	0.27	Strongly Agree
The app offers and caters various instructional practices.	4.65	0.53	Strongly Agree
All the app's content leads to the user's achievement of competencies.	4.85	0.36	Strongly Agree
The text, design, videos, speech, and sound of the app are organized in a way that develops the app's content.	4.70	0.56	Strongly Agree
The learning content is presented in a sequential manner and considers the pre-requisite topics.	4.60	0.50	Strongly Agree
The app's content is aligned with the learning competencies mandated by the subject.	4.55	0.50	Strongly Agree
Grand Mean	4.71		Strongly Agree
Interpretation			Very High

As shown in table 1, the level of acceptability of the components of the developed mobile application for electrical installation and Maintenance (EIM) in terms of Content attained a grand mean of 4.71 and was interpreted *Very High* as assessed by the respondents. This indicates further that the content of the developed mobile application highly contributes to the overall acceptability of its components.

Table 2. Level of Acceptability of the Components of the Developed Mobile Application for Electrical Installation and Maintenance (EIM) in terms of Activities

STATEMENT	Mean	SD	Remarks
The app provides enough learning activities that the users can use to practice their skills.	4.68	0.57	Strongly Agree
The app's text, graphics, videos, sounds, and speech are integrated flawlessly to enhance the learning process.	4.40	0.74	Strongly Agree
The app provides various activities that caters multiple learning styles (auditory, visual, kinesthetic, etc.)	4.63	0.54	Strongly Agree
The app recommends external resources and activities to enhance learning.	4.65	0.53	Strongly Agree
Grand Mean	4.59		Strongly Agree
Interpretation		Very High	

Table 2 reveals the level of acceptability of the components of the developed mobile application for electrical installation and maintenance (EIM) in terms of activities. As shown from the above data, the respondents *strongly agree* that the application provides enough learning activities that the users can use to practice their skills, gaining the highest mean ($M=4.68$, $SD=0.57$). Also, respondents also *strongly agree* that the application's text, graphics, videos, sounds, and speech are integrated flawlessly which enhanced the learning process attaining the least mean ($M=4.40$, $SD=0.74$).

Overall, the level of acceptability of the components of the developed mobile application for electrical installation and Maintenance (EIM) in terms of activities attained a grand mean of 4.59 and was interpreted *Very High* as assessed by the respondents. This indicates further that the activities on the developed mobile application highly contributes to the overall acceptability of its components.

Table 3. Level of Acceptability of the Components of the Developed Mobile Application for Electrical Installation and Maintenance (EIM) in terms of Assessment

STATEMENT	Mean	SD	Remarks
The app provides feedback on whether the user has answered correctly or incorrectly.	4.65	0.53	Strongly Agree
The assessment on the app is interactive.	4.85	0.36	Strongly Agree
The assessment on the app is directly related to the competencies of the subject.	4.70	0.56	Strongly Agree
The app offers adequate assessment opportunities to measure the achievement of competencies.	4.60	0.50	Strongly Agree
Grand Mean	4.70		Strongly Agree
Interpretation		Very High	

Table 3 shows the level of acceptability of the components of the developed mobile application for electrical installation and maintenance (EIM) in terms of assessment. As shown from the above data, the

respondents *strongly agree* that the application is indeed interactive, gaining the highest mean ($M=4.85$, $SD=0.36$). Likewise, respondents also *strongly agree* that the application offers adequate assessment opportunities to measure the achievement of competencies, attaining the least mean ($M=4.60$, $SD=0.50$).

Overall, the level of acceptability of the components of the developed mobile application for electrical installation and Maintenance (EIM) in terms of assessment attained a grand mean of 4.70 and was interpreted *Very High* as assessed by the respondents. This indicates further that the assessment of the developed mobile application highly contributes to the overall acceptability of its components.

Table 4. Level of Acceptability of the Components of the Developed Mobile Application for Electrical Installation and Maintenance (EIM) in terms of Reflection

STATEMENT	Mean	SD	Remarks
The app gives enough praises and rewards for assessment questions answered correctly.	3.65	0.53	Agree
The app offers the users an explanation for their incorrect answer.	3.85	0.36	Agree
The app allows the users to review material related to the question and gives them the opportunity to answer the question again.	3.70	0.56	Agree
The app allows the users to connect their learning with their real-life experiences.	3.60	0.50	Agree
The app recommends topics that reflects my learning progress.	3.55	0.50	Agree
Grand Mean	3.67		Agree
Interpretation		High	

Table 4 indicates the level of acceptability of the components of the developed mobile application for electrical installation and maintenance (EIM) in terms of reflection. As shown from the above data, the respondents *agree* that the application offers the users an explanation for their incorrect answer, gaining the highest mean ($M=3.85$, $SD=0.36$). Likewise, respondents also *agree* that the application recommends topics that reflects my learning progress, attaining the least mean ($M=3.55$, $SD=0.50$).

Overall, the level of acceptability of the components of the developed mobile application for electrical installation and Maintenance (EIM) in terms of reflection attained a grand mean of 4.70 and was interpreted *High* as assessed by the respondents. This indicates further that the reflection of the developed mobile application contributes to the overall acceptability of its components.

These high level of acceptability of the components of the developed mobile application support the work of Valconi (2018). He pointed out that, for a mobile application to be effective, it must put knowledge, the learner, assessment, and the learning community at the center of its foundation. McQuiggan, et.al., (2015) add that mobile learning should be instant and optionally accessible, anywhere, and anytime learning, which helps most people to create knowledge, satisfy curiosity, collaborate with others, and enrich experiences.

Table 5. Level of Acceptability of the Features of the Developed Mobile Application for Electrical Installation and Maintenance (EIM) in terms of Design

STATEMENT	Mean	SD	Remarks
The app shows application's most notable features.	4.65	0.58	Strongly Agree
The app explained how it can give benefit to its users.	4.83	0.45	Strongly Agree
The application has a clear introduction of its content.	4.63	0.54	Strongly Agree
The app loads up easily without any errors and bugs.	4.80	0.52	Strongly Agree

Users can move through the app's content and options fluidly.	4.58	0.50	Strongly Agree
The app's graphics and interface are motivating and engaging.	4.48	0.55	Strongly Agree
The offline smartphone application has a clear and readable title.	4.35	0.53	Strongly Agree
Grand Mean	4.61		Strongly Agree
Interpretation		Very High	

The level of acceptability of the features of the developed mobile application was also evaluated by the respondents. Table 5 reveals the level of acceptability of the features of the developed mobile application for electrical installation and maintenance (EIM) in terms of design. As shown from the data below, the respondents *strongly agree* that the application explained how it can give benefit to its users, gaining the highest mean ($M=4.83$, $SD=0.45$). Also, respondents *strongly agree* that the application has a clear and readable title, attaining the least mean ($M=4.35$, $SD=0.53$).

Overall, the level of acceptability of the features of the developed mobile application for electrical installation and Maintenance (EIM) in terms of design attained a grand mean of 4.61 and was interpreted *Very High* as assessed by the respondents. This indicates further that the design of the developed mobile application highly contributes to the overall acceptability of its components.

Table 6. Level of Acceptability of the Features of the Developed Mobile Application for Electrical Installation and Maintenance (EIM) in terms of Connection to Curriculum

STATEMENT	Mean	SD	Remarks
The app's content is directly related to the content standard of the subject.	4.58	0.59	Strongly Agree
The content of the app matches my skills.	4.90	0.30	Strongly Agree
The app provides real-world situations wherein topics are related.	4.70	0.56	Strongly Agree
The app generally improves my skills.	4.58	0.50	Strongly Agree
Grand Mean	4.69		Strongly Agree
Interpretation		Very High	

Table 6 shows the level of acceptability of the features of the developed mobile application for electrical installation and maintenance (EIM) in terms of connection to the curriculum. As shown from the data below, the respondents *strongly agree* that the application matches their skills, gaining the highest mean ($M=4.90$, $SD=0.30$). Also, respondents *strongly agree* that the application's content is directly related to the content standard of the subject and that it generally improves their skill, both attaining the least mean ($M=4.58$, $SD=0.50$).

Table 7. Level of Acceptability of the Features of the Developed Mobile Application for Electrical Installation and Maintenance (EIM) in terms of Multimedia Quality

STATEMENT	Mean	SD	Remarks
The videos use a casual, eager style to improve engagement.	4.70	0.46	Strongly Agree
The app contains videos that matches the required competencies of the subject.	4.93	0.27	Strongly Agree
The videos contain on-screen text or symbols to highlight important information.	4.58	0.55	Strongly Agree

The videos have a high quality making the content clear.	4.90	0.30	Strongly Agree
The app allows the users to turn on/off the music and sound effects to modify the learning experience.	4.68	0.57	Strongly Agree
The app caters varied learning styles by having both written and spoken content.	4.50	0.51	Strongly Agree
The audio content and narration of the app is aligned with the media content.	4.45	0.50	Strongly Agree
The app provides audio and sound effects that is appropriate for the content.	4.58	0.50	Strongly Agree
Grand Mean	4.66		Strongly Agree
Interpretation		Very High	

Table 7 indicates the level of acceptability of the features of the developed mobile application for electrical installation and maintenance (EIM) in terms of multimedia quality. As shown on the table above, the respondents *strongly agree* that the application contains videos that matches the required competencies of the subject, gaining the highest mean ($M=4.93$, $SD=0.27$). Also, the respondents *strongly agree* that the application's audio content and narration is aligned with the media content, attaining the least mean ($M=4.45$, $SD=0.50$).

Overall, the level of acceptability of the features of the developed mobile application for electrical installation and Maintenance (EIM) in terms of multimedia quality attained a grand mean of 4.66 and was interpreted *Very High* as assessed by the respondents. This indicates further that the developed mobile application is highly connected to the curriculum.

These high level of acceptability of the features of the developed mobile application is comparable to claims of the work of Jan, (2015) and Jiang et al., (2021) wherein they reiterated that factors such as online support service quality, perceived ease of use and usefulness of online platform, computer self-efficacy, academic self-efficacy, prior experience, and online learning acceptance, were found to significantly impact students' online learning satisfaction.

Table 8. Respondents' Level of Achievement of Competencies relative to Cognitive (Written Tasks)

Grading Scale	Frequency	Percentage	Descriptors
90 – 100	11	28%	Outstanding
85 – 89	16	40%	Very Satisfactory
80 – 84	13	33%	Satisfactory
75 – 79	0	0	Fairly Satisfactory
Below 75	0	0	Did Not Meet Expectations
Mean	86.75	Interpretation	Very Satisfactory

Table 8 reveals the level of achievement of competencies relative to cognitive (written tasks). It can be gleaned that 13 or 33% of the respondents attained grades ranging from “80 to 84” which had a verbal interpretation of “Satisfactory”. Besides, 16 or 40% of the respondents attained grades ranging from “85 to 89” which had a verbal interpretation of “Very Satisfactory” and 11 or 28% of the respondents attained grades ranging from “90 to 100” which had a verbal interpretation of “Outstanding”.

The mean grade, 86.75 with verbal interpretation of “Very Satisfactory” indicates that the respondents achieved the desired cognitive competency as evidenced by their performance in their written task.

Table 9. Respondents’ Level of Achievement of Competencies relative to Technical Skills (Performance Tasks)

Grading Scale	Frequency	Percentage	Descriptors
90 – 100	29	73%	Outstanding
85 – 89	0	0	Very Satisfactory
80 – 84	11	28%	Satisfactory
75 – 79	0	0	Fairly Satisfactory
Below 75	0	0	Did Not Meet Expectations
Mean	92.50	Interpretation	Outstanding

Table 9 reveals the level of achievement of competencies relative to Technical Skills (Performance Tasks). It showed that 11 or 28% of the respondents attained grades ranging from “80 to 84” which had a verbal interpretation of “Satisfactory”. On the other hand, 29 or 73% of the respondents attained grades ranging from “90 to 100” which had a verbal interpretation of “Outstanding”.

The mean grade, 92.50 with verbal interpretation of “Outstanding” indicates that the respondents achieved the desired technical skill competency as evidenced by their performance in their performance task.

Table 10. Respondents’ Level of Achievement of Competencies relative to Work Attitude

Grading Scale	Frequency	Percentage	Descriptors
90 – 100	13	33%	Outstanding
85 – 89	25	63%	Very Satisfactory
80 – 84	2	5%	Satisfactory
75 – 79	0	0	Fairly Satisfactory
Below 75	0	0	Did Not Meet Expectations
Mean	96.88	Interpretation	Outstanding

Table 10 reveals the level of achievement of competencies relative to work attitude. It showed that 2 or 5% of the respondents attained grades ranging from “80 to 84” which had a verbal interpretation of “Satisfactory”. On the other hand, 25 or 63% of the respondents attained grades ranging from “85 to 89” which transpires to a verbal interpretation of “Very Satisfactory” and 13 or 33% of the respondents attained grades ranging from “90 to 100” which had a verbal interpretation of “Outstanding”.

The mean grade, 96.88 with verbal interpretation of “Outstanding” indicates that the respondents have the right attitude towards their work. The same increased level of achievement was also evident on the work of Lopuch (2013) wherein it was found out that students who supplement traditional classroom education with an app-based curriculum achieve 165% of their expected learning gains. Kadir and Ercan (2018) also suggested that mobile learning may promote students' academic achievement.

Table 11. Significant Effect of Components and Features of the Developed Mobile Application on the Respondents' Level of Achievement of the Competencies

	Variables	t-value	p-value	Analysis
Components				
Content	Cognitive (Written Tasks)	8.43	0.000	Significant
	Technical Skills (Performance Tasks)	5.30	0.000	Significant
	Work Attitude	9.85	0.000	Significant
Activities	Cognitive (Written Tasks)	7.25	0.000	Significant
	Technical Skills (Performance Tasks)	7.21	0.000	Significant
	Work Attitude	6.81	0.000	Significant
Assessment	Cognitive (Written Tasks)	8.01	0.000	Significant
	Technical Skills (Performance Tasks)	7.06	0.000	Significant
	Work Attitude	12.76	0.000	Significant
Reflection	Cognitive (Written Tasks)	9.04	0.000	Significant
	Technical Skills (Performance Tasks)	7.06	0.000	Significant
	Work Attitude	12.51	0.000	Significant
Features				
Design	Cognitive (Written Tasks)	1.35	0.185	Not Significant
	Technical Skills (Performance Tasks)	0.45	0.653	Not Significant
	Work Attitude	0.05	0.963	Not Significant
Connection to Curriculum	Cognitive (Written Tasks)	3.38	0.002	Significant
	Technical Skills (Performance Tasks)	2.67	0.011	Significant
	Work Attitude	5.31	0.000	Significant
Multimedia Quality	Cognitive (Written Tasks)	5.32	0.000	Significant
	Technical Skills (Performance Tasks)	4.06	0.000	Significant
	Work Attitude	7.56	0.000	Significant

*significant at .05 level of significance

Table 11 disclosed the significant effect of the components in terms of content, activities, assessment, and reflection and features as to design, connection to curriculum and media quality of the developed mobile application on the respondents' level of achievement of the competencies relative to cognitive, technical skills and work attitude.

A *significant* analysis revealed on the effect of mobile application components on the students' achievement of competencies. The obtained p-values were all lower than (0.05) level of significance which supports the analysis. This explains more that the evaluation on the components of the mobile application have implication on their attainment of the desired competencies which was manifested in their written and performance task and their attitude towards work.

In addition, a *significant* analysis also revealed on the effect of mobile application features on the students' achievement of competencies except for the application design. This implies further that the design of the mobile application may be enhanced to influence students' attainment of the desired competencies.

However, these results contradict the work of Carter, Greenberg, and Walker (2017) wherein they found out that revealed that students in classrooms where no Internet-connected devices were used scored much higher in their tests (72.9 %) than those in classes where laptops and tablets were allowed.

CONCLUSION

The null hypothesis stating that there is no significant relationship between level of acceptability of the components of the developed mobile application and the respondents' level of achievement of the competencies (cognitive, technical, and work attitude) was rejected. Therefore, it can be concluded that the high level of acceptability of the components of the developed mobile application contributes to the very satisfactory and outstanding level of achievement of the learners.

Also, the null hypothesis saying that there is no significant relationship between level of acceptability of the features of the developed mobile application and the respondents' level of achievement of the competencies (cognitive, technical, and work attitude) was rejected. Consequently, it can be concluded that the features of the mobile application, in terms of connection to the curriculum and multimedia quality impacts the achievement of the students.

RECOMMENDATIONS

1. Generally, all the identified factors for the acceptability of the components of developed mobile application are very high except for the reflection part, it is recommended to improve this part of the mobile application.
2. As for the identified factors for the acceptability of the features of developed mobile application, all are deemed to be very high, it is recommended to explore more features that can still be added to the developed mobile application to further enhance the tools' usability.
3. For the level of achievement of the learners who utilized the developed mobile application, all aspects had outstanding performance except for the cognitive part, hence it is recommended to improve the reflection part of the developed application to further provide timely feedback to the learners therefore correcting misconceptions right away. Consequently, improving the written performance of the learners.
4. Results of the study indicated a significant relationship between the level of acceptability of the components and features except for the aspect of design. It is but recommended to enhance its part of the mobile application.

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REFERENCES

- Baber, H. (2020). Determinants of students' perceived learning outcome and satisfaction in online learning during the pandemic of COVID-19. *J. Educ. E-Learn. Res.* 7, 285–292. doi: 10.20448/journal.509.2020.73.285.292
- Celik, I., Sahin, I., & Aydin, M. (2014). Reliability and Validity Study of the Mobile Learning Adoption Scale Developed Based on the Diffusion of Innovations Theory. *Online Submission*, 2(4), 300-316.
- DepED (2022). DepEd Data Bits: Learning Modalities. Retrieved from <https://www.deped.gov.ph/wp-content/uploads/2022/08/7-Databits-Learning-Delivery-Modalities-Jul.pdf>
- Foundations of Education Technology. Technology Acceptance Model. Retrieved from <https://open.library.okstate.edu/foundationsofeducationtechnology/chapter/2-technology-acceptance-model/>
- IvyPanda. (2022, June 19). Descriptive Correlational Design in Research. Retrieved from <https://ivypanda.com/essays/descriptive-statistics-and-correlational-design/>
- Jan, S. K. (2015). The relationships Between academic Self-efficacy, computer Self-efficacy, prior experience, and satisfaction With online learning. *Am. J. Dist. Educ.* 29, 30–40. doi: 10.1080/08923647.2015.994366
- Jiang, H., Islam, A. Y. M. A., Gu, X., and Spector, J. M. (2021). Online learning satisfaction in higher education during the COVID-19 pandemic: A regional comparison between eastern and Western Chinese universities. *Educ. Inf. Technol.*, 1–23. doi: 10.1007/s10639-021-10519-x

- Lim, L.; Lim, S.H.; Lim, R.W.Y. Measuring Learner Satisfaction of an Adaptive Learning System. *Behav. Sci.* 2022, 12, 264. <https://doi.org/10.3390/bs12080264>
- Lopuch, M. (2013). The effects of educational apps on student achievement and engagement. Recuperado en <https://www.esparklearning.com/resources/the-effects-of-educational-apps-on-student-achievement-and-engagement>.
- Lubniewski, K. L., Arthur, C. L., & Harriott, W. (2018). Evaluating instructional apps using the app checklist for educators (ACE). *International Electronic Journal of Elementary Education*, 10(3), 323-329.
- Mamolo, L. A. (2022). Online Learning and Students' Mathematics Motivation, Self-Efficacy, and Anxiety in the "New Normal". *Education Research International*, 2022.
- Miguel, Z.R., Salvador, R.C., Guillen, C.D. and Nisperos, S.F. (2015), "HiStorya: a game based mobile learning application", *International Journal on Open and Distance eLearning*, Vol. 1 Nos 1-2, pp. 27-40.
- Ramassubu, (2015, June 20). Does Technology Impact a Child's Emotional Intelligence? Retrieved from https://www.huffpost.com/entry/does-technology-impact-a-childs-emotional-intelligence_b_7090968
- She, L., Ma, L., Jan, A., Sharif Nia, H., & Rahmatpour, P. (2021). Online learning satisfaction during COVID-19 pandemic among Chinese university students: the serial mediation model. *Frontiers in psychology*, 4395.
- Statista (2022, July 27). Number of smartphone users in the Philippines from 2017 to 2020, with forecasts until 2026. Retrieved from <https://www.statista.com/statistics/467186/forecast-of-smartphone-users-in-the-philippines/>
- Technopedia (2020, August 7). Retrieved from <https://www.techopedia.com/definition/2953/mobile-application-mobile-app>
- Valconi, R. (2018). Mobile Technologies and Mobile Learning. Retrieved from <https://pressbooks.pub/techandcurriculum/chapter/principles-and-applications-of-mlearning/>
- Walker, H. C. (2013). Establishing content validity of an evaluation rubric for mobile technology applications utilizing the Delphi method (Doctoral dissertation, Johns Hopkins University).
- Wheeler, S. (2022). The Activity Learning Theory: An Overview. Retrieved from <https://www.teachthought.com/learning/how-the-activity-learning-theory-works/>
- Wu, Y. C., Hsieh, L. F., & Lu, J. J. (2015). What's the relationship between learning satisfaction and continuing learning intention?. *Procedia-Social and Behavioral Sciences*, 191, 2849-2854.