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Development and Acceptability of E-Tech Mobile Application

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ABSTRACT

Educational leaders made the decision to adopt the new normal in education in response to the widespread of COVID-19 pandemic. The goal of the study was to create an E-Tech mobile application and assess its acceptability using standards specified in ISO 25010: 2011. This study utilized the developmental method of research. The data needed were gathered with the use of an evaluation sheet to evaluate the level of acceptability of the mobile application in terms of functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability. The E-Tech mobile application is a learner-centered app intended to deliver the services of DepEd to its clients anytime and anywhere. The users of the product served as the respondents of the study. Based on the results, the registration, log-in and log-out, viewing module, download/storage, assignment, notes, and learners list features are all present and functioning features of the mobile application. Furthermore, when all the 22 expert-respondents and 20 ICT teachers were taken as a whole group, they evaluated the level of acceptability of the mobile application as very acceptable. Likewise, they evaluated the level of acceptability of the E-Tech mobile application as very acceptable in terms of functional suitability, performance efficiency, reliability, usability, compatibility, security, maintainability, and portability.

Keywords: Acceptability, E-Tech, Self-learning module, COVID-19 epidemic, and Mobile application.

INTRODUCTION:

The novel coronavirus SARS-CoV-2, which caused the most recent COVID-19 epidemic, first appeared in China and spread fast throughout the world. Due to its widespread infections and efforts to control and lower the number of cases, it has drawn attention on a global scale. There are presently no specific vaccines or therapies available to eradicate the disease, despite continuous efforts. As a result of the viral strains continuing to mutate, people must adapt to a new normal and be ready to live with viruses, according to Guo *et al.* (2020).

The decision to accept the new normal in education was made by educational authorities in reaction to those circumstances. The Learning Continuity Plan (LCP), implemented by the Department of Education (DepEd), was in operation during the School Year 2020 - 2021. Instead of June 2020, school started on August 24th, 2020 (DepEd, 2020). The way that students and teachers interact in person when they are in class has also changed. The achievement of the new standard in education also depended on ongoing innovation by teachers and active participation from

other stakeholders. The DepEd carry out Modular Distance Learning to maintain continuity in education and to guarantee that every school achieves its objective and vision of offering high-quality instruction to each Filipino student. (Gautam and Tiwari, 2016; Martinez-Caro *et al.*, 2015) pointed out that e-learning enables the observation of far more adaptable learning methods to attend classes with less need for travel. Through classroom activities that utilize interactive video technology, learners are able to comprehend the material more fully. This enables students to react quickly to the exercises.

Due to technology limitations, many learner circumstances benefit from the usage of Self-Learning Modules (SLM). Similar to this, a study by Duyan (n.d.) indicated that modular teaching is a more successful style of learning for chemistry than traditional teaching, and it further proposes that this can be applied to various topics and educational levels. Ambayon, (2020) opined that in comparison to traditional teaching methodologies, modular instruction is more effective since it allows students to study at their own pace. The students are stimulated and their curiosity is piqued by the unconstrained self-learning approach in which immediate support, the comment is supplied to practice exercise. Talebian *et al.* (2014) claimed that although using technology in daily life makes it easy to take it for granted, it is not extensively used because there lack any financial incentives to have access to it. By giving students additional access to computers along with additional electronic gadgets, the amount of knowledge accessible through the internet is being expanded (Baguyo, 2022).

The goal of the present study was to develop a mobile application that would provide features for learners that can be conveniently accessible using Android Smartphones. The app includes a registration option that requires users to provide their personal information, a security feature that requires learners to log in and out before and after reading the materials, a viewing module function that comprises Portable Document Format (PDF) designed, specifically for Empowerment Technology students in Grade 11 Senior High School, an assignment function with a document file with a set of assignments on a specific subject, a notes function for saving handouts, power

point presentations, videos and other learning resources, and a list of registered learners. The learner can download learning materials from the program if the smartphone receives an internet signal. Functional appropriateness, performance efficiency, dependability, usability, security, compatibility, maintainability, and portability are all provided to the user in this study. In view of this, the researcher developed an E-Tech mobile application to help learners access and read learning materials, anywhere and anytime, specifically with features such as registration (admin & learner), log in and log out, viewing module, storage/download, assignment, notes and learners list. This study also determined the level of acceptability of the developed mobile application as evaluated by the Information and Communication Technology (ICT) teachers and experts' respondents as a whole and in terms of functional suitability, performance efficiency, reliability, usability, compatibility, security, maintainability, and portability. This research would answer the problem of learners in distribution and sub-mission of module answer sheets. The availability, accuracy, and performance of application were studied to enhance and provide quality education to learners.

METHODOLOGY:

This study utilized a developmental method of the research. Necessary data were gathered using an evaluation form. This was used to evaluate the level of acceptability of the mobile application in terms of functional suitability, performance efficiency, compatibility, usability, reliability, security maintainability, and portability. The E-Tech mobile application is a learner-centered app that was intended to deliver the services of the Department of Education (DepEd) to its clients anytime and anywhere. The study was conducted at Roxas City, Capiz, Philippines. There were two groups of participants who were surveyed, 20 of them were Information and Communication Technology (ICT) teachers from four different schools in the areas of Roxas City School for Philippine Craftsmen, Congressman Ramon A. Arnaldo High School, Tanque National High School, Capiz National High School, and 22 were technical experts who were proficient in the field of ICT.

The data needed were gathered with the use of an evaluation sheet. This was utilized to assess the mobile

application acceptability level as to functional suitability, performance efficiency, compatibility, security, usability, reliability, maintain-ability, and portability as based on the software quality criteria specified by ISO 25010: 2011 standard. To ensure the validity of the research instrument, the evaluation sheet was subjected to the face validation zeroing on its content. The evaluation sheet was checked, validated, and approved by the thesis adviser, members, and ICT experts. In scoring the variables, a 5-point rating scale in a score card was used in evaluating the mobile application acceptability. To interpret the result of the evaluation, mean was used with corresponding verbal interpretation. In the different categories, each quality was assigned with adjectival description.

After the face validation of the evaluation sheet was established, the researcher distributed and administered the evaluation sheet to the respondents to ensure a hundred percent retrieval of the said evaluation. The evaluators were given installation file that need to be installed in their smartphone and to be evaluated by them in terms of functional suitability, performance efficiency, compatibility, security, usability, reliability, maintainability, and portability as based on the software quality criteria specified by ISO 25010:2011 standard. The evaluation sheet was given to ICT teachers and technical expert respondents and to fill-in according to their observation and evaluation of the mobile application. During the assessment of the developed E-Tech mobile application, the 20 ICT teachers and 22 expert respondents were given the chance to utilize the said mobile application and to fill-in according to their observation and evaluation given the evaluation sheet, which they rated using 5-point scale. This mobile app evaluation was validated face-to-face by the respondents.

In the evaluation of the development and acceptability of E-Tech mobile application, criteria on ISO/IEC 25010: 2011 and evaluation sheet were formed, utilized, and evaluated by 20 ICT teachers and 22 expert respondents. The process flow in data gathering is the basic step or procedure that the researcher followed to achieve the derived output that answered the current problem that the most of the teachers experienced due to the sudden change in the world of education due to pandemic. **Fig. 1** displays the flow of UniversePG | www.universepg.com

the process in gathering the needed data, which the researcher employed.

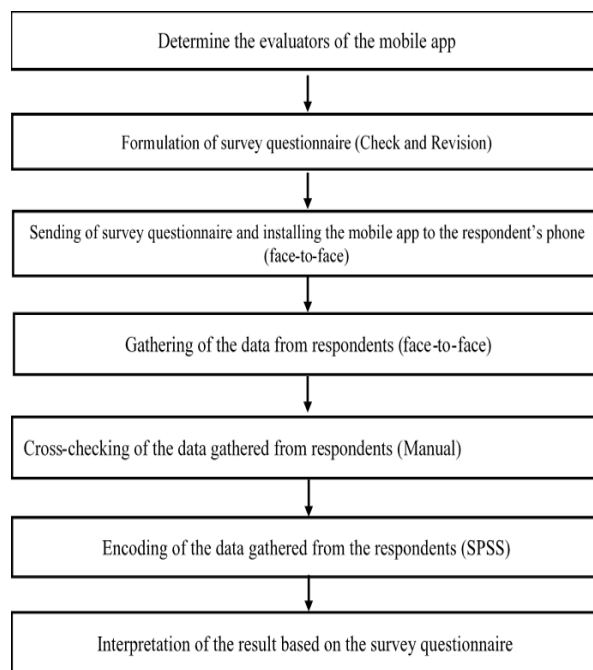


Fig. 1: The flow of data gathering.

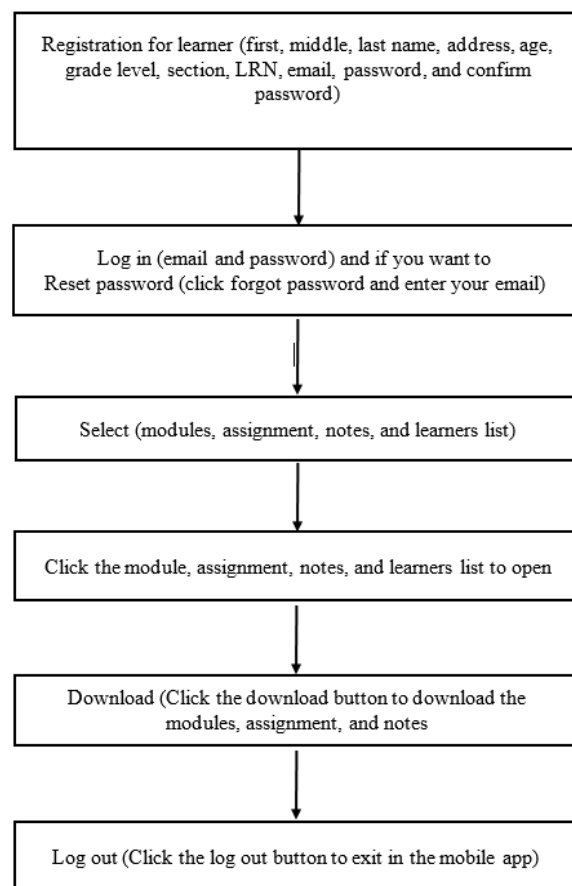


Fig. 2: Process flow of making mobile app for utilization of learner.

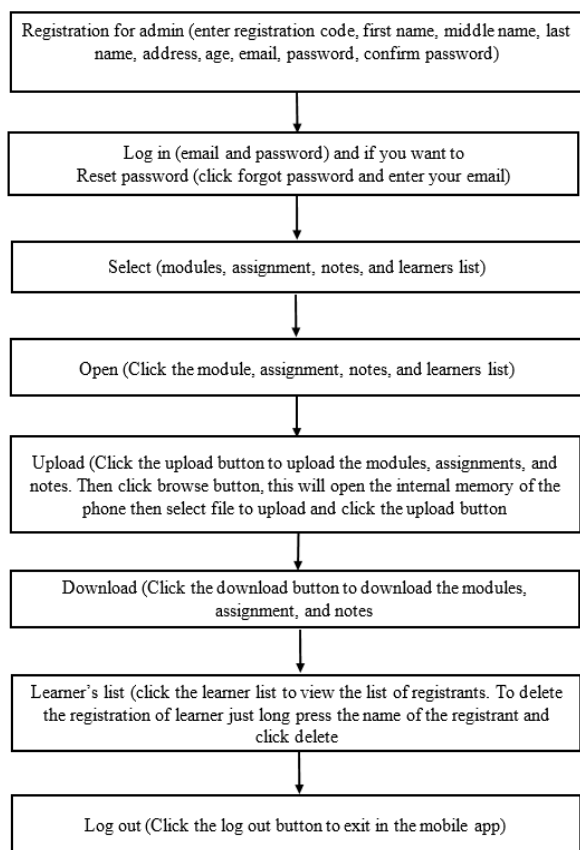


Fig. 3: Process flow of making mobile app for utilization of admin.

Development of E-Tech Mobile Application

This study used the Rapid Application development as its software development process model. The Rapid Application Development (RAD) model was used to describe the development of the mobile app. The RAD is a software development process model that emphasizes an extremely short development cycle using a component-based construction approach. If the requirements are well understood and defined, and the project scope is constraint, the RAD process enables the creation of a fully functional system within a very short period. The RAD has four (4) phases, namely: requirements planning phase, user design phase, construction phase, and cutover phase, respectively as shown in **Fig. 4**.

Requirements planning

Requirements planning is where specific information is needed to develop an easy to use and usable mobile app is specified. In this stage, the registration, log in and log out, viewing module, download/storage, assignment, notes, and learners list are the features that

are identified to be included in the mobile application. There is a security feature that requires admin and learners to register their personal information and log in before reading and enjoying all the mobile app's learning materials.

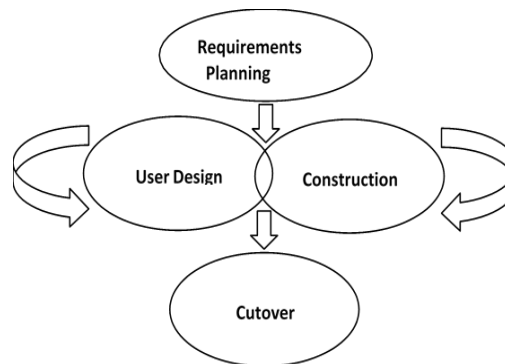


Fig. 4: Rapid Application Development Model.

The module feature contains the Portable Document Format (PDF) lessons for Empowerment Technology subject in Grade 11. Learners can easily download the modules with the help of internet connectivity. Another noteworthy element of this program is the assignment function, which includes a document file with a set of assignments on a certain subject that learners may download. Additionally, the mobile app has notes function for saving handouts, power point presentations, and other supplementary learning resources that will assist users in improving their learning and abilities. Furthermore, if the learner who enrolled with the use of mobile app was not on the teacher's list, the learner registration can be deleted from the database. Finally, anytime the smartphone receives a signal from the internet, the application will instantly give changes in the module content. Visual Studio Code was chosen as the best development tool for building the mobile app, while the Dart programming language was chosen as the best language for writing the app's code.

User design

User design is a phase that involves the complete mobile app design. This phase designs the database, which specifies the content of files that were included. In designing, the researcher considered the user interface and user friendliness of mobile app that affects the overall usability and easiness of use of the app.

Construction phase

Construction phase focuses on program and application development tasks. It includes programming and application development, coding, unit-integration, and system testing. Visual Studio Code was utilized as the development and compilation tool for E-Tech mobile application. The Dart programming language is used to code the app's user interface actions and events.

The cutover phase

The cutover phase is the implementation phase of RAD that includes data conversion, testing, change-over to the new system, and user training. The system was delivered to the target respondents in APK format, and the researcher provided a presentation file that includes basic information about the use and function of the system. **Fig. 5** displays the new project window of Visual Studio Code.

Fig. 6 shows the project structure of the mobile app. The built project is contained in the APK file, which may be delivered by copying it to a mobile device.

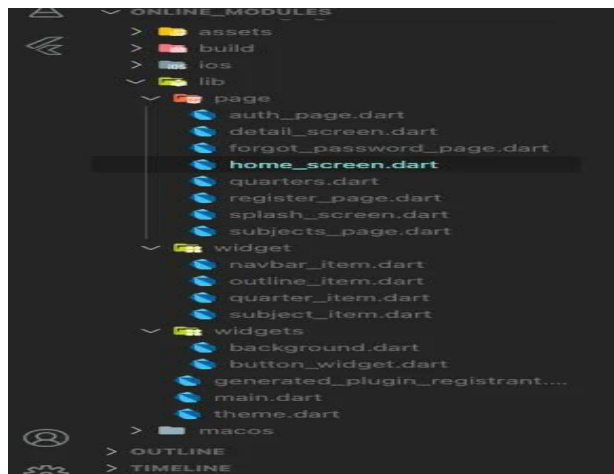


Fig. 5: New project window of Visual Studio Code.

After the evaluation sheet had been retrieved, results were collated, scored, entered in the master data, and processed using a licensed IBM SPSS Statistics 26 program. The researcher made sure that the responses were properly scored and assigned the respective qualitative description for each indicator. The frequency, percentage, and mean were the descriptive statistical tools used to analyze and interpret the gathered data.

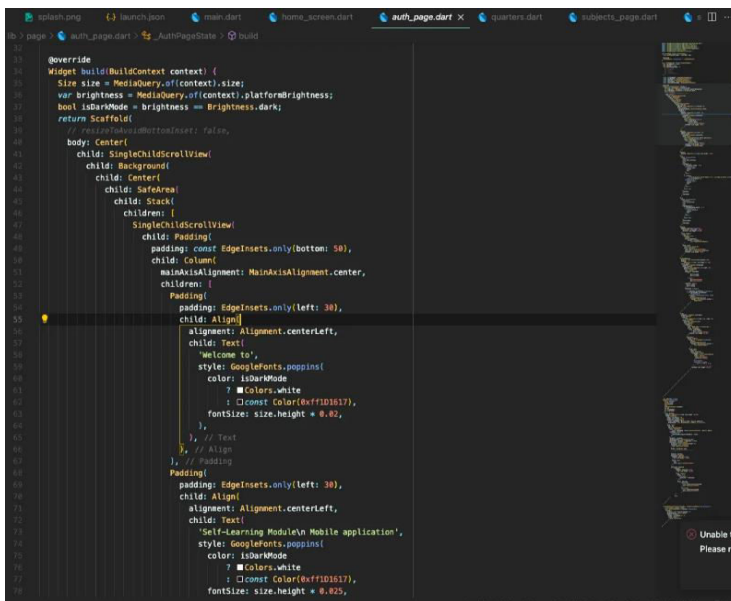


Fig. 6: Project structure of the mobile app.

RESULTS AND DISCUSSION:

Features of E-Tech Mobile Application

The E-Tech mobile app is a learner-centered app that is designed to provide services such as uploading and downloading Self-Learning Modules for simple access

to materials at any time and from any location, if there is internet availability. It would improve and modify the school's present learning modality, which is modular print, resulting in a lot more efficient, paper-

less, and less fuss modality for better service. As UNESCO, (2013) stated that m-Learning is portable, personalized, collaborative, and interactive, and it presents different characteristics than traditional learning because instruction can be done anywhere, at any time and with an emphasis on the importance of access to knowledge at the right time. The mobile app might be an excellent tool for schools to fulfill their objective of providing the finest education possible to all students. The mobile app, which was conceptualized by the researcher in June 2022 and started learning Dart programming language. The mobile app development began after learning the language and gathering necessary data to start coding. The registration, log in and log out, viewing module, upload/download, assignment, notes, and learners list screens were all featured.

Registration Feature

The registration part of the mobile app included the learner's first name, middle name, last name, address, age, grade level, section, lrn, email, password, and confirming password, and the administrator's registration code, first name, last name, address, age, email, password, and confirming password. **Fig. 7** shows the appearance of the registration feature that can be seen from the mobile app. The user may access the functionality by hitting the register button on the mobile app's main screen. The feature's screen was created as a scrollable display, allowing the user to move the screen to view the whole registration information in the app. This was designed in this manner to ensure that even small screen devices may see the information despite the screen size constraint.

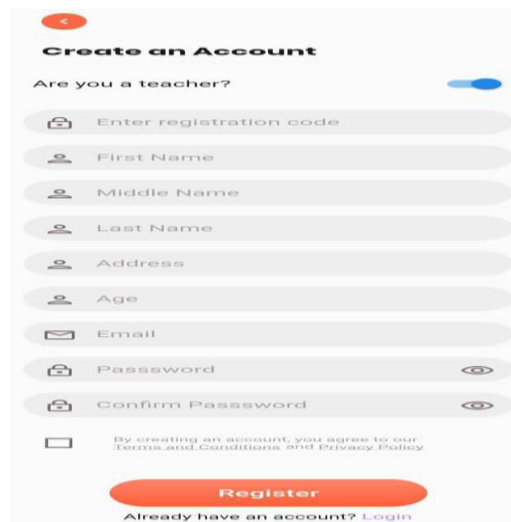


Fig. 7: Registration feature.

Log in and Log out Feature

The mobile app offers a security log in and log out function that protects the information of learners who use it. This security feature allows users to log in and out, and each user must be registered on the system's database to fully use the mobile app. Unregistered users would be refused to access, if they attempt to open the mobile app while not registered. To log in, enter the user's email address and password, then click the log in button to activate the mobile app. When a user forgets his/her password, the user can click the Forgot your password button, provide the required information, and then click the send instruction button. The instructions would be delivered to the user's registered email address, and the user would finally be able to change the password. Furthermore, the system would ask the user for the email address and the new password again. This is the point at which the user may fully utilize the mobile app and its capabilities.

Fig. 8 shows the log in and log out feature.

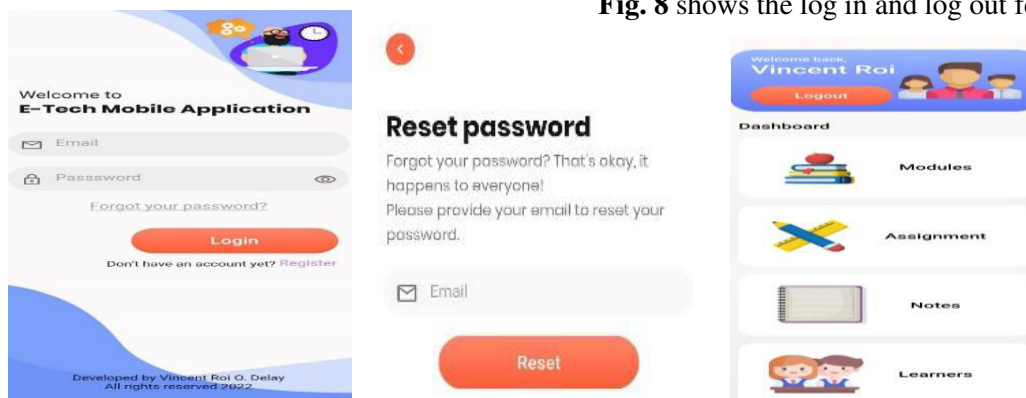


Fig. 8: Log in and log out feature.

Viewing Module Feature

The module screen of the mobile app allows the user to access the module on screen. This feature provides the user with a portable document version of an Empowering Technology subject, allowing them to view

the module from any location at any time via a mobile app. This app may upload a document file from the user admin's device by pressing the upward arrow. **Fig. 9** displays the viewing module feature.

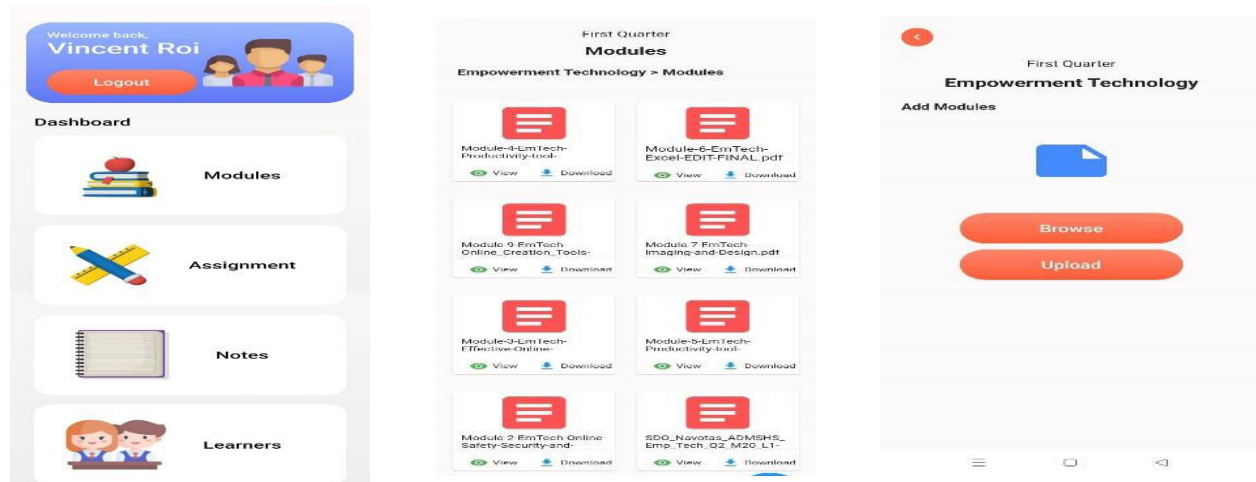


Fig. 9: Viewing module feature.

Download/Storage Feature

The mobile app has also a download feature, allowing users to connect to the internet and download the PDF Self-Learning Module (SLM), power point presentation, excel and word document. To transfer the SLM to smartphone's internal storage, just hit the modules icon and then the download button. The user may easily see and study the materials in the most portable and flexible time frame as shown in **Fig. 10**.

task's document file. This feature provides learners with an additional learning activity of the lesson to help them grasp and learn more about a certain subject. It allows students to download the document file, allowing them access to the information even when they are not connected to the internet. This allows the user to study while having pleasure reading and exploring the content. By hitting the upward arrow, this app may upload a document file from the user admin's device as displayed in **Fig. 11**.

Assignment Feature

In assignment feature, when the button is clicked in the assignment feature, the assignment function shows the

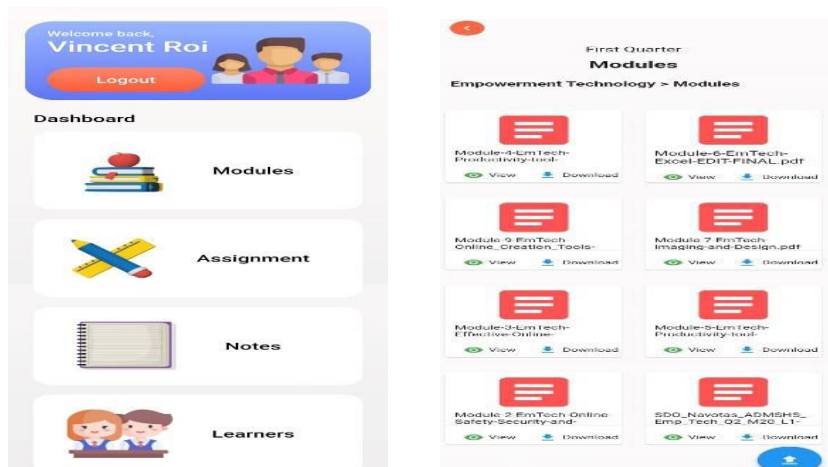


Fig. 10: Download/Storage feature.

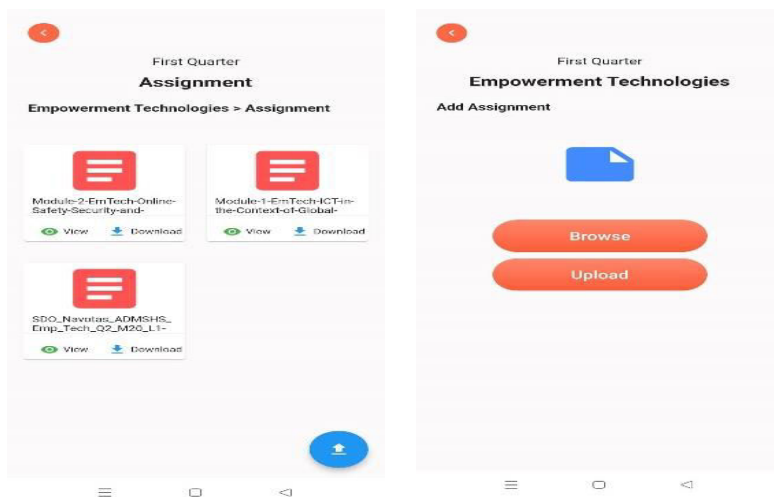


Fig. 11: Assignment feature.

Notes Feature

The mobile app has also notes function for handouts, power point presentations, videos, and other additional learning aids from the teacher that can be downloaded via internet connection to help learners improve their learning, knowledge, and abilities for a given session. This feature is intended to hold additional learning

resources, which the subjects and courses are streamlined and easy for learners to understand. This software may upload a document file from the user admin's smartphone by pressing the upward arrow as shown in **Fig. 12**.

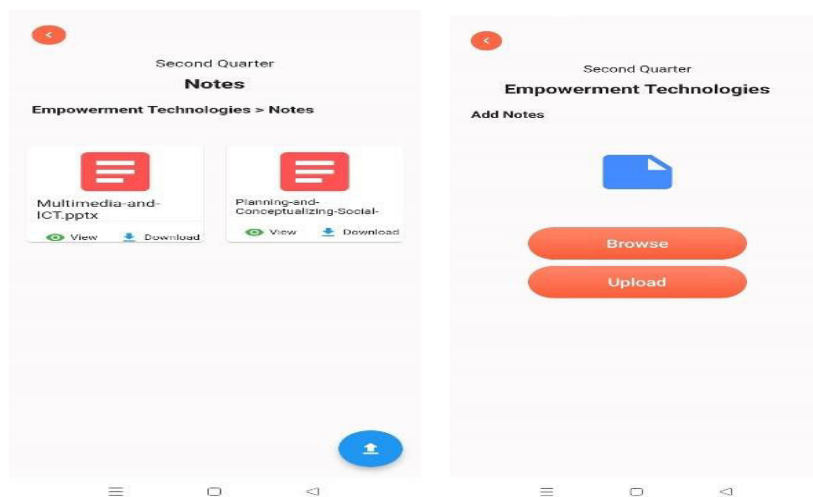


Fig. 12: Notes feature.

Learner's List Feature

This feature, as shown in **Fig. 13**, displays a list of learners, together with associated information such as the user's first name, last name, grade level, and section. This feature informs the user administrator about the registration of learners and who uses the mobile app. The admin can delete a registered learner who does not belong on the list of teachers' learners by clicking the registrant's name. This would prohibit the intruder from accessing the mobile app and modules.

Acceptability of E-Tech Mobile Application

When all the 20 Information and Communication Technology (ICT) teachers and 22 expert-respondents were taken as a whole group, **Table 1** discloses the grand mean score of 4.84 on the mobile app acceptability level as evaluated by the ICT teachers and expert-respondents. The highest variables with 4.86 mean were portability and security, while the

lowest variable with 4.80 mean was reliability. The result implied that the E-Tech mobile app was very acceptable as evaluated by the ICT teachers and expert-respondents. The evaluators' comments were mainly favorable, and they considered that the mobile app may be highly valuable for learners and teachers, especially during the current pandemic and help the

learners for their learning progress. It is simple and straightforward, and it performed as expected and as promised. They also mentioned some minor concerns with the user interface and the suggested additional functions such as raising the font size and position of the text.

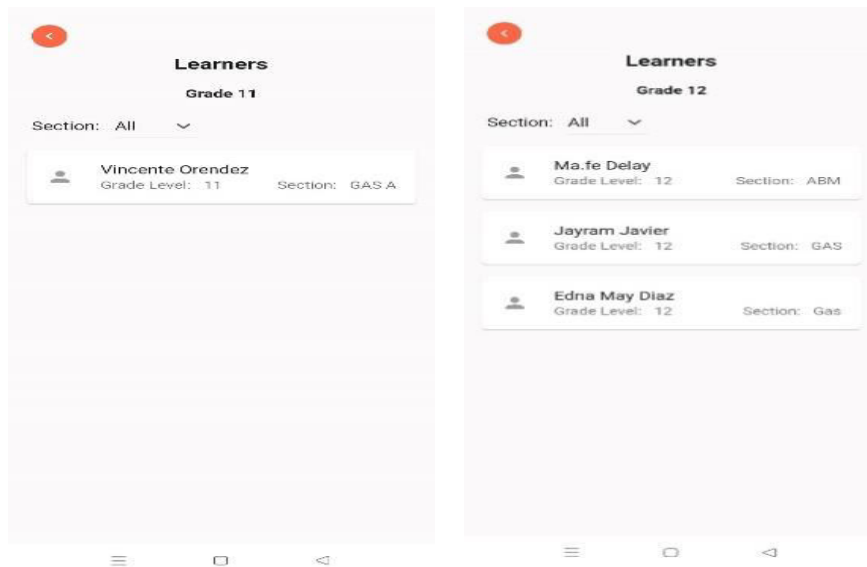


Fig. 13: Learner’s list feature.

Overall, the evaluators believed that the mobile app is quite useful, helpful, and timely. The findings agreed with that of Manglapuz and Lacatan, (2019), who found that software quality standards were crucial factors in modern work process innovation in all institutions, particularly given that current period is dominated by computer software and platforms. This indicates that it is important for the mobile app to be evaluated using the software quality criteria indicated

by ISO/IEC 25010 before it can be released to the users for use. These software quality criteria would ensure the good standard of mobile app and followed the quality assurance recommended by the ISO/IEC 25010. Taking this into account, the analysis indicated that the produced mobile application is suitable for distribution and may be adapted by the school to be utilized as an alternate manner of delivering DepEd services to the learners.

Table 1: Acceptability of E-Tech mobile application.

Variables	Mean	Verbal Interpretation
Security	4.86	Very Acceptable
Portability	4.86	Very Acceptable
Usability	4.85	Very Acceptable
Functional Suitability	4.84	Very Acceptable
Compatibility	4.84	Very Acceptable
Performance Efficiency	4.83	Very Acceptable
Maintainability	4.83	Very Acceptable
Reliability	4.80	Very Acceptable
Grand Mean	4.84	Very Acceptable

Legend: 4.21-5.00 = Very Acceptable; 3.41-4.20 = Acceptable; 2.61-3.40 = Moderate Acceptable; 1.81-2.60 = Less Acceptable; 1.00-1.80 = Not Acceptable.

CONCLUSION AND RECOMMENDATIONS:

The E-Tech mobile application successfully embodies a learner-centered approach, fulfilling the objective of providing the Department of Education (DepEd) services to clients at their convenience, regardless of time or location. The participants, who were users of the product, reported that the app's registration, log in and log out, viewing module, download/storage, assignment, notes, and learners list features were all present and functioning as intended. This demonstrates the effectivity the mobile app caters to the needs of learners by offering a comprehensive set of features that support their self-learning journey. By leveraging the convenience and accessibility of mobile technology, the application empowers users to engage with educational resources and activities whenever and wherever they choose, the enhancing their learning experience. The Information and Communication Technology (ICT) teachers and technical experts evaluated the mobile application as very acceptable in respect to ISO/IEC 25010 in terms of functional suitability, performance efficiency, compatibility, usability, reliability, security, maintainability, and portability. The results indicate the effectivity of the mobile app to meet the requirements and expectations of the users, demonstrating its potential as a valuable tool for self-learning in ICT. The E-Tech mobile application offers a variety of learner-centered features and it as a viable tool for students and teachers seeking a simple and accessible platform to connect with educational resources and services at their convenience. In the features of mobile app, user-interface aesthetics of the mobile app may be enhanced so that it can work to more sizes of screen of mobile devices and adapt to the dark theme or night mode of Android. The storage capacity might be increased to accommodate large files. For more functionality of the mobile app, the app may add such as live chat interaction with the users. In addition, more security options may be added aside from password such as fingerprint, and facial recognition protection. For better experience, while the early reaction has been encouraging, it is nevertheless recommended that further testing and assessment be carried out. This can assist in identifying any possible flaws or opportunities for improvement that were not identified in earlier reviews. Moreover, the developer may establish a schedule for frequent upgrades and

maintenance to resolve any bugs, security vulnerabilities, or compatibility issues that may develop. This may aid in the long-term reliability and security of the application. Furthermore, mobile application may be better utilized by iOS users and other operating systems and improving mobile app storage is much better. Also, the E-Tech mobile application may be developed as a learning management system to improve its functionality, and it can be used in blended learning, which is a popular style of learning right now, and it can assist learners and teachers in the classroom teaching process.

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CONFLICTS OF INTEREST:

The author declared that he had no conflict of interest.

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