



Developing M-Learning Applications to Support Digital Literacy of Vocational High School Students

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ABSTRAK

Literasi digital sangat penting untuk diterapkan saat ini karena pembelajaran telah mengarah pada pembelajaran yang mendukung teknologi. Literasi digital di Indonesia masih tergolong sangat rendah sehingga perlu upaya dalam meningkatkan hal tersebut. Penelitian ini bertujuan untuk mengembangkan aplikasi m-learning berbasis Android yang tepat untuk mendukung literasi digital siswa SMK. Jenis metode yang digunakan yakni penelitian dan pengembangan (R&D) dengan model ADDIE. Hasil penelitian ini menunjukkan bahwa pengembangan media sudah memenuhi kriteria baik, karena materi maupun media yang diuji menunjukkan hasil 3,67 yang termasuk kategori “baik”, sementara hasil pada uji media sebesar 4,05 yang merupakan kategori “sangat baik”, dan uji coba kelas menghasilkan 3,92 yang kategorinya “baik”. Aplikasi ini juga terbukti efektif untuk digunakan dalam mendukung literasi digital siswa yang ditandai dengan meningkatnya hasil belajar siswa dari rata-rata *pretest* 66 menjadi 78 pada *post-testnya*, sehingga dapat disimpulkan bahwa hasil penelitian ini memberikan kontribusi dalam mendukung literasi digital peserta didik vokasi.

ABSTRACT

Digital literacy is vital to apply at this time because learning has led to learning that supports technology. Digital literacy in Indonesia is still very low, so efforts are needed to increase it. This study aims to develop appropriate Android-based m-learning applications to support digital literacy in vocational high school students. The type of method used is research and development (R&D) with the ADDIE model. The results of this study indicate that media development is in accordance with the criteria for both material and media which shows a result of 3.67 which is in the “good” category, while the results in the media test are 4.05 which is in the “very good” category, and class trials resulted in 3.92, in the “good” category. This application has also proven to be effective for use in supporting students’ digital literacy which is marked by increased student learning outcomes from an average *pretest* of 66 to 78 in the *posttest*. So, it can be concluded from the results of this study that it contributes to supporting the digital literacy of vocational students.

INTRODUCTION

Changing trends in getting information get a variety of problems. Nikou & Aavakare, (2021) explain the presence of opportunities and threats in the use of digital technologies poses a particular challenge to the world of education to teach the younger generation how to use and utilize digital spaces. For example, in the middle of hoax news spread on the internet, especially social media, people must be good at choosing accurate information. For this reason, the application of digital literacy is needed so that people can be wiser in using and accessing technology. Based on data from Kementrian Komunikasi dan Informasi (2020), digital literacy in Indonesia is at 3.49 on a scale of 1-5, naturally still relatively moderate and needs improvement in a better direction. Data of internet users in Indonesia is very large, of course it has great potential in supporting the digital literacy of the community. According to a survey by APJII (2019), internet usage in Indonesia reached 54.7% in 2017 (143.3 million users) and increased to 56% in 2018 (160.6 million user).

Digital literacy will have a good impact on the human development index (HDI). The results of research from Nipo et al., (2020) explain that high levels of digital literacy and Internet usage are key tools for advancing human development. From 2015 to 2018, 38 nations throughout the world participated in this study. Undoubtedly, with this result, digital literacy is one of the keys in increasing knowledge and greater economic prosperity. Big steps to improve digital literacy must start from the realm of education. This is in line with what Zua (2021) explained that the importance of literacy for an individual's personal development and the survival of any nation cannot be overstated. Literacy is fundamental to the meaningful development of any nation. It is not a single entity but the interconnection of many sectors - education, health, agriculture, etc.

The teaching and learning process that supports the success of curriculum achievement is influenced by many factors, one of which is learning media. Learning media is likened to a teacher's weapon in generating enthusiasm for learning and student interest. It even brings psychological/mood influence on students in understanding the media used. The use of media can also accelerate the concepts and understanding of students in class because it can be used as an intermediary in delivering messages. This is as conveyed by Sadiman et al. (2012) that media is defined as an intermediary or introductory message from the sender to the recipient of the message. Currently, teachers are required to be able to develop and use media according to their needs and make it easier for students to access the material. This is in line with the opinion of Kustandi & Bambang, (2016) that the development of learning media demands that teachers are able to use the tools provided by the school and does not rule out the possibility that these tools are in accordance with the developments and demands of the times. However, in reality, not all teachers can develop and use learning media, so the current learning process is still far from being touched by innovation

Suwartha et al., (2017) emphasized the importance and relevance of innovation. Berawi (2017) then explained that innovation and creativity are considered to be determinants of competitive advantage. Innovation aims to facilitate teachers and students in the teaching and learning process. One of the innovations in learning is using technology-based learning resources to support students' digital literacy in understanding the subject matter. This digital literacy can be delivered through various platforms or applications which are certainly easy for students to access. Digital literacy is very important to be applied today because learning has led to technological support in learning. Sujana & Rachmatin (2019) argued that digital literacy is very important to be mastered by students, including information literacy, information literacy is not just receiving information but how individuals filter the information obtained so that it does not harm others, and also used to improve the quality of learning, media literacy, the use of learning media can help students to learn about an event that is impossible to experience directly, because it takes a long time or is too fast, too dangerous and so on so that by utilizing media students can explore their abilities in observing and analyze existing problems, and ICT literacy.

There are various definitions of digital literacy. According to Liansari & Nuroh (2018), digital literacy is not only reading and writing skills, and also not just adding technology in the learning process but using it to improve the quality of learning and improve other skills. Digital literacy

can mean knowing various kinds of technology, being able to apply the technology, and knowing the impact on oneself and others, the benefit of applying digital literacy is that it can empower individuals so that they can communicate with others, be effective at work and especially an increase in productivity. There are nine critical factors within the global of virtual literacy inclusive of social networking, trans literacy, keeping privacy, handling identity, growing content, organizing and sharing content, reusing/repurposing content, filtering and deciding on material, and self-broadcasting (Wheeler, 2012), (Patmanthara & Hidayat, 2018).

Digital literacy can be studied with various devices, such as computers, laptops, and smartphones. However, currently, the dominant use of smartphones causes access to learning materials to be carried out by cellphones. Most cellphones today have an Android operating system. Android is an operating system (OS) that is embedded in a smartphone to run applications that can run on it. Android is an operating system on touchscreen smartphones and tablets. According Haq et al., (2022), android is a working gadget for cellular phones. In the cellular world like this, android is one of the working gadget platforms that makes it smooth for producers to layout high-end phones.

The ease of accessing information digitally needs to be addressed by teachers so that they can play an active and selective role in selecting and developing good learning resources for their students. In line with this, based on the results of observations at SMK NWDI Pancor in the Fashion Design study program, the researchers found some problems. For example, the teaching and learning process presented has not explored students' basic literacy according to learning styles, the lack of innovation in the form of learning media caused by the lack of training carried out by teachers and the school, the use of independent learning facilities using smartphones by students has not been utilized optimally; and lack of learning resources that support digital literacy that can be utilized by students.

For this reason, it was necessary to have a breakthrough in parsing or solving the aforementioned problems, namely by developing and utilizing learning media in the form of applications to support students' digital literacy. For example, the teacher can take advantage of learning applications with mobile learning. To support teachers in accelerating student's understanding, it was necessary to develop an Android-based m-learning application that contains all interactive learning content. M-learning is mobile-assisted learning that can be included in learning applications. Due to the fact that m-learning is accessible using smartphones, which are now widespread and nearly all students own, it will be simpler for students to obtain the content.

METHOD

The method used in this research is research and development (R&D). R&D research in education is a process that is often used to develop and validate a product. The development research carried out by the researchers is to develop a product in the form of an Android-based mobile learning application as a learning resource for fashion subjects and then validate the product. Product validation was carried out by material experts, media experts, and vocational teachers and then were tested on class X SMK students so that it could be seen from the product to be used as a learning resource for class X SMK fashion. Meanwhile, apart from being seen from the product, the effectiveness of the product used was tested so that it can be seen to what extent this product was effectively used in the learning process of class X fashion subjects.

The development steps that the researcher referred to were the ten steps of implementing selected research and development according to Borg and Gall in Sukmadinata & Nana (2009). The first is information collecting and study. Then, planning followed by beginning the product's development and the first field test. After that are the primary product's revision and primary field testing with 30 to 100 test subjects in 5 to 15 schools. The quantitative data on the effectiveness of the teachers are collected both before and after the model under test. The outcomes of the data collection are compared, where possible, to the control group. The next steps are modification of operational goods and field testing in operation, comprising 40 to 200 disciplines and taking place in 10 to 30 schools. Tests are conducted using questionnaires,

interviews, observation, and result analysis. After that are the editing of the final product with enhancements based on the feedback from the field trials and implementation ([Figure 1](#)).

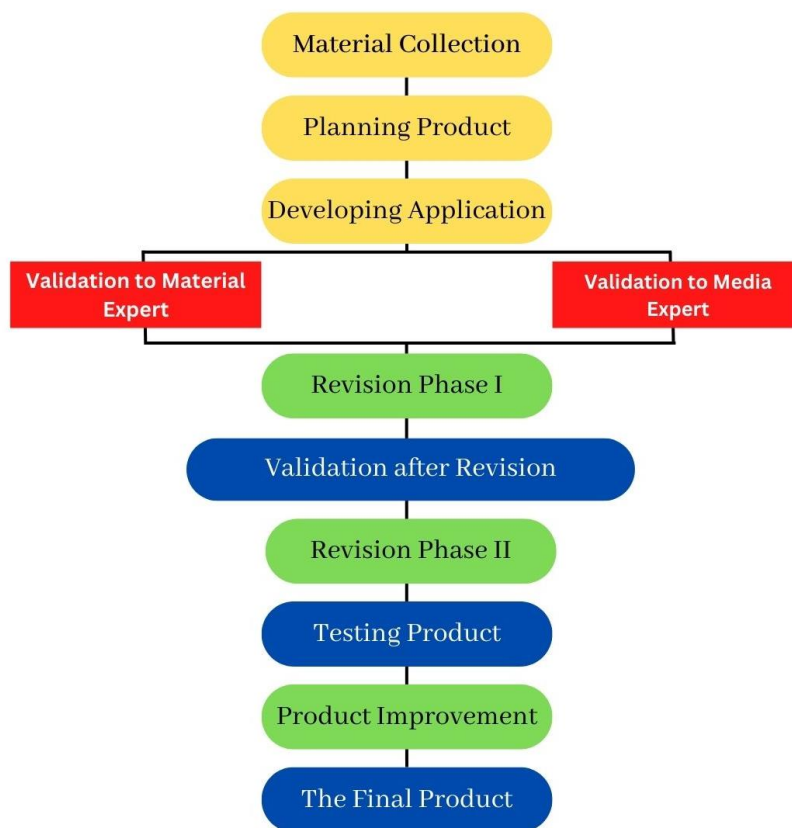


Figure 1. Android-based Application Development Procedure Chart

However, from the ten stages, the researcher made a simplification of the stages. The simplification was started by the opinion of Borg and Gall who suggested limiting research on a small scale, including limiting research steps. The simplification of the stages of the research was carried out by the researcher due to the limited time and cost. The simplification of this stage is depicted in [Figure 1](#).

The research was carried out at SMK NWDI Pancor. The school is located in Jalan TGKH. M. Zainuddin Abdul Madjid 70 Pancor Selong District, East Lombok Regency, West Nusa Tenggara. This research was limited to class X Fashion as many as 32 students. The variables observed in this study were the feasibility of an android-based application product through a series of feasibility tests, as well as the effectiveness of learning which was measured through the learning outcomes of class X students (pretest and posttest). In development research, a trial design is very necessary to determine the quality of the product that has been developed. The product is tested for its feasibility to be used as a learning resource. The product assessment was carried out by material experts and media experts, then stage I revision was carried out. Furthermore, the product was re-assessed by the Vocational School Clothing teacher, then stage II revision was carried out. After that, the product was tested on class Vocational students before the product become a feasible and qualified final product as a learning resource.

The validators in this study were fashion material experts, learning media experts, and vocational fashion teachers. The test subjects in this study were 25 students of class X SMKN 2 Selong. SMKN 2 Selong was used as the research trial place because there was not much development of learning resources in the form of mobile learning applications. The data collection techniques of this research included interview, questionnaire, document study, and observation. Aspects that at the time of the interview were in accordance with competence so that someone could be said to be digitally literate (Glitsner, [1997](#)) include evaluation aspects on the internet,

hypertext directions, information content evaluation aspects, and preparation aspects. Furthermore, the media and material expert questionnaires were compiled based on product assessments adopted from Borg and Gall. Meanwhile, at the time of observation, the observations covered the readiness of teachers and students, supporting facilities, and the learning process. The data used were classified into two parts, namely qualitative and quantitative data. Qualitative data in the form of corrections made by media experts, material experts and students were collected to improve the product. Meanwhile, the data were obtained during observation, interviews, questionnaires, and documentation. The quantitative data analysis technique in this study was descriptive statistics, namely very bad, not good, enough, good, and very good statements which are converted into quantitative data with a scale of 5 with a score of 1 to 5. The steps in data analysis were gathering raw data, scoring; and converting the score to a value. The criteria used to see the feasibility of the product used were the Likert scale. Based on the results of the conversion of scores to values, the value of the product being developed were obtained. The determination of the effectiveness of the product in improving students' cognitive abilities was by looking at changes in students' initial abilities by comparing the pretest and posttest scores of students before and after using the developed product.

RESULT

In accordance with the development procedure shown in [Figure 1](#), several research results that can be explained are related to product trial results and product effectiveness in supporting digital literacy. However, before explaining the results of research related to data, [Figure 2](#) is a picture showing a mobile application that has been developed. The dashboard development stage for the application is taken by design which leads to pattern design drawings accompanied by material identity, level, and class. There is a button to start the application. In the main menu display several options are given to the user to select materials, quizzes, and instructions for using the application. The material was made sequentially to make it easier for students to learn independently. To test the understanding, there is a quiz to answer some questions.

Instructions for use need to be included so that students can understand the proper use of both the content and the buttons. The existence of this certainly makes it easier for teachers as they do not need to explain in too much detail regarding this application. Students will also be accustomed to reading instructions independently. This application has been adapted to the applicable curriculum. Included in it are the final goals that must be achieved by students. Therefore, the media created must be in line with the existing syllabus or lesson plans.



Figure 2. Screenshot of the developed m-learning application

Product Trial

Material Expert Test

For testing the material, the product was examined by a fashion teacher from SMKN 2 Selong. This material test was conducted at the school. The results of the assessment of the material that were presented in applications that are accessed using smartphones. The results show that the material test was feasible with the "good" category (see [Figure 3](#)). However, there were some corrective comments filled in by the validator, namely 1) Adjusting the material to the latest curriculum and 2) Adding several pictures to each sub-discussion of the material.

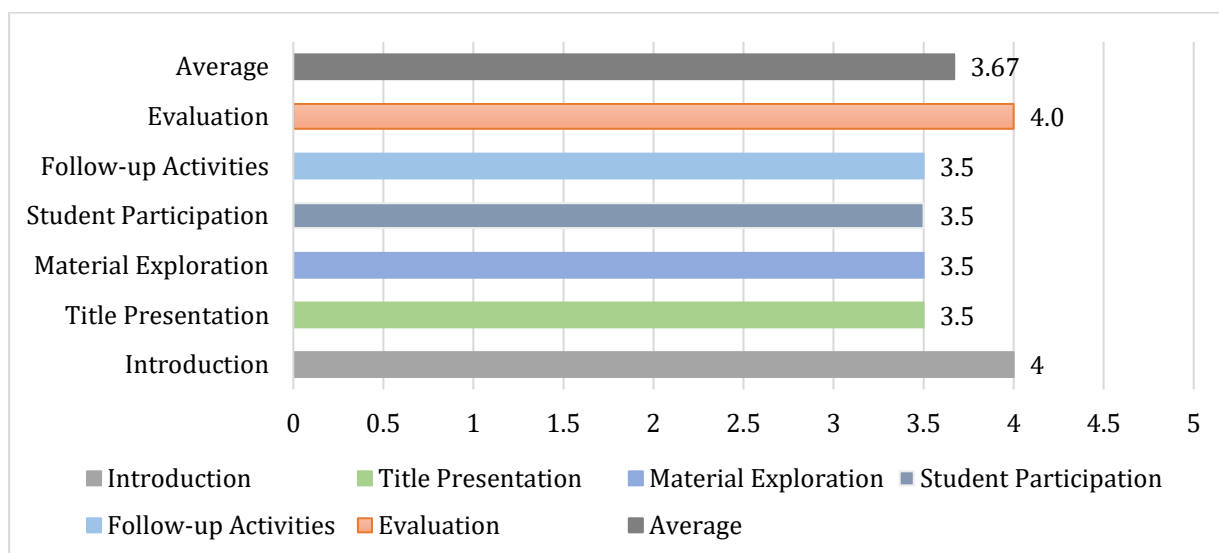


Figure 3. Result of Material Test

Media Expert Test

For testing, the media was examined by learning media practitioners, namely Dr. Zul Anwar, M.Pd who is a lecturer in education technology department. This material test was conducted at the Mandalika University of Education. The results of the assessment of the media to be presented in the application are shown in [Figure 4](#).

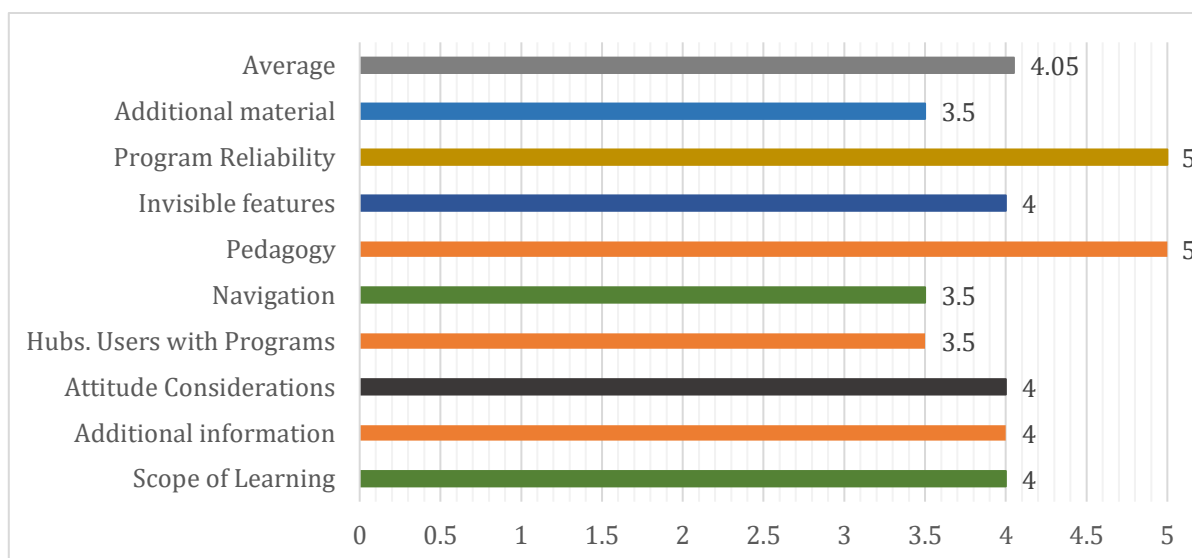


Figure 4. Result of Media Test

The results show that the material was feasible with the “very good” category. However, there were some corrective comments filled out by the validator, namely 1) some links needed to be repaired because they were not connected properly and 2) regarding the choice of colors and images to attract the attention of students.

Limited Class Test

Furthermore, a trial was carried out to 1 class as a form of limited testing before the product was said to be perfect. [Figure 5](#) shows the results of the trial to 25 students at SMKN 2 Selong.

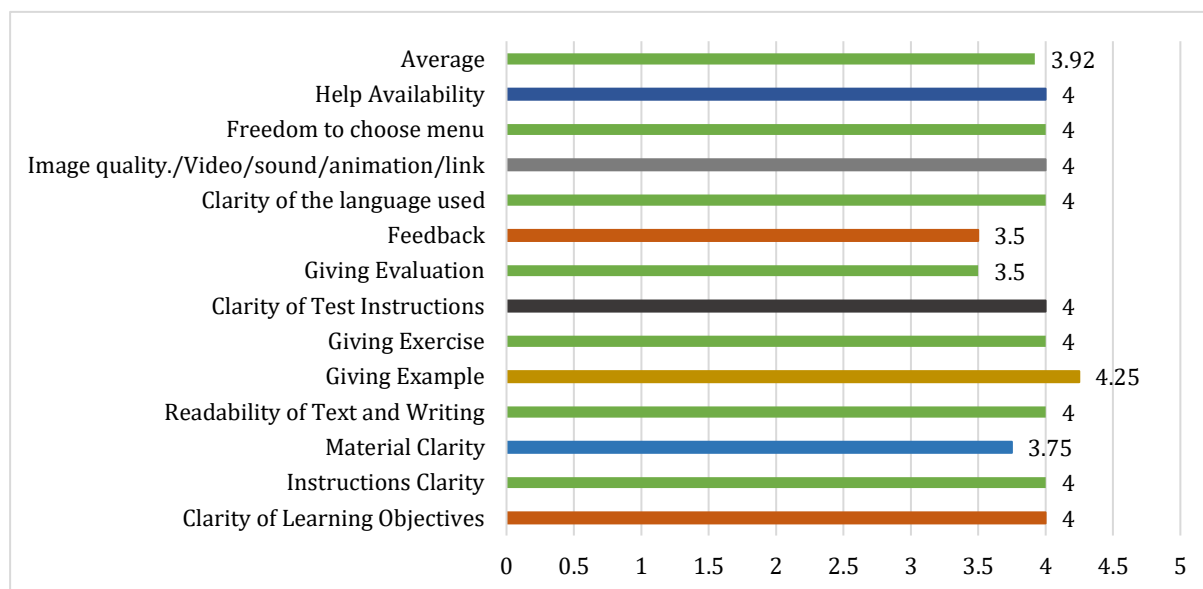


Figure 5. Result of Limited Class Test

Based on the questionnaire data distributed to 25 students on several aspects contained in the questionnaire, it can be seen that in terms of media and material, the average student assessment is 3.92 ("good" category). In other words, in terms of the quality of the media and materials, the learning portal developed is "appropriate" to use in the actual class and there are several inputs given, such as 1) the quality of images and videos is further improved, 2) the teaching materials provided are increasingly diverse, and 3) the number of materials must be improved and simplified so that it is easy to understand.

Product Effectiveness

For the results of testing the "effectiveness" of the product, pretest and posttest were carried out. The pretest was conducted to determine the initial ability of students before using the product, while the posttest was carried out at the end of learning to use the product. The results of the pretest and posttest are described in the [Table 1](#).

Table 1. Pretest & Posttest Results

No	Test	Subject	Results	X
1	Pretest	32	2112	66
2	Posttest	32	2496	78

To get the effect size or gain, the data can be entered into the formula 1:

$$\begin{aligned}
 ES &= d = X_2 - X_1 & (1) \\
 d &= 78 - 66 \\
 d &= 12
 \end{aligned}$$

Information based on the formula 1, ES means effect size, d means gain, X1 means the mean value of the pretest and X2 is the average value of the posttest. From the results above, it can be explained that the change or increase in learning outcomes from the cognitive aspect after the pretest and posttest are 12. This means that it can be said that the m-learning products were effective. Thus, based on the results obtained, it can be said that in general, the products developed are feasible and effective because they have gone through a series of trials and have been proven to be able to support digital literacy in the basic material for the design of the fashion study program at SMK NWDI Pancor.

DISCUSSION

Digital literacy has a very large function to improve human intelligence. It is hoped that digital literacy can be disseminated starting from the basic level. The way that can be done is by using cellular technology in digital storytelling. The results of Churchill (2020) shows that digital storytelling with mobile technology contributes to the development of students' digital literacy skills by enabling them to: a) access information anytime and anywhere, b) take a look at their assumptions and replicate on their thinking, constitute and percentage their thoughts and answers to problems, and, get a hold of remarks from friends and teachers. Aside from that, Hatlevik et al. (2015) explained approach digital literacy as: 1) the ability to use innovative technologies to solve cognitive tasks at work; 2) the possession of chops that aren't inescapably technology- acquainted, as they may not apply to the use of any specific software; 3) possession of skills that form Higher Order Thinking Skills (HOTS) and 4) possession of skills related to cognitive processes contributing to the lifelong learning of employees.

To ward off the current hoax, we need to strengthen the literacy foundation with digital literacy-based education. Digital literacy can support the human development index. Ejemeyovwi et al. (2019) who specifically studied the impact of internet use and innovation on human development found that internet use, innovation, and their interactions have a significant and positive relationship to human development. The research shows that technological advances have a positive impact on human development through poverty reduction and economic growth. This relationship between technological advance and human development, albeit indirect, suggests that higher technological advance is associated with higher human development in Indonesia during the period. To support learning activities in terms of media can be done in various ways, one of which is by developing innovative products for educators and students which are easy to use. The product developed in this study is an application that can be installed on the Android system that contains material in accordance with the applicable curriculum. The development of this product has met the requirements of feasibility and effectiveness so that it can be used directly in learning. Online class development using PowerPoint applications and interactive quizzes was developed using the *iSpring* suite pro application and apk web builder. The features presented start from the dashboard, instructions for use, learning objectives, materials, to evaluation. The research was conducted in an effort to overcome the problem of limited space and time for learning in schools.

The results of the research in the discussion illustrate that the development of m-learning-based applications is very supportive of quality learning. Many similar studies have been developed which are also effective for learning. For example, at the elementary school level, Firdaus et al., (2022) found that product effectiveness was obtained by testing the results of the pre-test and post-test and then calculated using the n-gain score and showed that the learning application had a moderate level of effectiveness. This of course can be used as an important part to promote effective and innovative learning. In addition, it can also make it easier for students to master the basic concepts of the material in making patterns for class X SMK before it will be given in practice. Digital-based learning is very much in line with current technological developments. Students will find it easier to access material from a variety of developed applications. Furthermore, mobile-based learning increases learning innovation in schools, especially in terms of developing teaching materials in delivering learning materials. According to

Ardiansyah and Nana (2020), the role of mobile learning in improving learning outcomes is so great and can be a solution to problems encountered in the teaching and learning process in the classroom. Therefore, of course, it is very important to develop learning materials that are packaged as attractively as possible and can be accessed by students. Mobile learning using smartphones is expected to encourage learning so that students can use and utilize technology at the same time (Ljungkvist & Mozelius, (2012); Talan (2020); (Zhang & Zuo (2019)). At this time, mastery of technology is very important to support the competencies and life skills possessed. One of the life skills that the current generation must possess is digital literacy skills (Asrizal et al., 2018).

At the end of this discussion the researcher provides limitations on this research, namely the lack of 1) users who access the material due to time, cost, and effort so that it needs to be updated on a wider scale; and 2) the material included in the application is only 1 chapter so it is very limited to be used for 1 semester. Therefore, it is hoped that in the future, it can become a synergy for teachers and developers to develop materials on a wider scale.

CONCLUSION

After getting the material using this application, students got a different experience. In addition, there was also an increase in the average of learning outcomes. It can be concluded that the m-learning was effective in increasing the digital literacy of vocational students. However, this research still has limitations in terms of the amount of material in the application and its application which has only been carried out in one department. For further research, the researcher recommends developing wider materials and more samples so that they have a more significant impact and effectiveness than this research.

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