# DEVELOPMENT OF ANDROID-BASE LEARNING MEDIA TO DETERMINE DIGITAL LITERATURE AT SMK NEGERI 2 CILAKU

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## *ABSTRACT*

*The development of information and communication technology (ICT) in the era of globalization has had a major influence in all aspects of life, including in the world of education. In the development of information and communication technology, Android-based learning media was developed as a means of learning for students. The limited number of books that can be used by students and in conditions likenow where the learning process is carried out online requires learning media that can be used and accessed easily by students. The objectives of this study are: (1) developing android- based learning media, (2) knowing the feasibility of android-based learning media, and (3) knowing the digital literacy ofstudents by using android-based learning media as a learning resource. The development of this android- based learning media uses a research and development model with stages including identification of potential and problems, data collection, product design, design validation, design revision, small-scale trials, product revisions, large-scale trials, and product revision. The results of this study indicate that the learning media developed was declared "Decent" by material experts, media experts and linguists and students stated "Very Decent" to be used as learning media in the subject of Plantation and Herbal Commodity Processing Production. Furthermore, the learning media is applied in learning by using One Shot Case Study. Based on the results obtained, the digital literacy that students have is already in the "Very High" category for the aspect of using. As for the understanding aspect, the indicators of analyzing and creating are in the "High" category and the indicators for reflecting and acting are in the "Very High" category.*

***Keywords:*** *Android Based, Digital Litarature, Learning Media, Research and Development.*

## 1.  INTRODUCTION

The development of information and communication technology in the era of globalization has had a major influence in all aspects of life, including in the world of education. In the development of information and communication technology, Android-based learning media was developed as a means of learning for students. This learning media is based on Android because most students already use smartphones. According to Wirawan (2011), the use of smartphone technology so far is not only focused as a means of communication or entertainment, but as a learning medium. In its use, it allows students to access material and information related to learning anywhere and anytime.

Digital literacy is one of the abilities that must be possessed by students. In UNESCO (2011), digital literacy is an important pillar for the future of education because digital literacy can be a knowledge base supported by integrated information technology and is very strategic forthe development of education in the cyber era. According to research conducted by Marty (2013), digital literacy possessed by students can be known through the use of innovative technology. According to Paul Gilster (1997) in the Ministry of Education and Culture (2017) digital literacy is defined as the ability to understand and use information in various forms from a very wide variety of sources accessed through computer devices. While computer literacy is a skill needed to retrieve information efficiently and communicate effectively using computer hardware and software, based on a conceptual understanding of computer technology and how it can be used to complete certain tasks, including an awareness of its limitations and advantages (Reitz, 2004).

Based on the results of observations made, students at SMK Negeri 2 Cilaku already use smartphones as a communication tool, but if it is used for learning media it is still very limited. Learning resources used in schools are textbooks. There are only a few textbooks available in the library, so it is not possible for students to borrow them at the same time. So that the use of this package book has not been able to make it easier for students to use it anywhere and anytime. By developing this android-based learning media, students can use it anywhere and anytime. In the subject of plantation and herbal processing production, there is one basic competency that must be understood by students, namely applying the basic principles of processing plantation products. The basic competencies consist of material characteristics, processing, to the tools used for processing plantation commodities. This competency was chosen because students get an idea of what kind of machine is used or the different characteristics of each plantation commodity being studied because it cannot be seen directly. In addition, this subject is one that is expected to be mastered by students of SMK Agribusiness Agricultural Product Processing both cognitive, affective, and psychomotor.

## 2. METHODOLOGY

This study uses a Research and Development research design. This design is used because research activities are used not only at the stage of user needs but also in the product development process that is made, which requires data collection and data analysis activities, namely the validation process by material experts, media experts, and linguists, while development refers to products produced in a study. Research and Development research design includes 9 stages including Potential and Problem Identification, Data Collection, Product Design, Design Validation, Design Revision, Small-Scale Trial, Product Revision, Large-Scale Trial, and Product Revision.

Learning media that have gone through the development process and are suitable for use are then implemented for students of SMK Negeri 2 Cilaku majoring in APHP who are studying Plantation and Herbal Commodity Processing Production lessons to determine their digital literacy. The research design used is One Shot Case Study. According to Arikunto (2009), One Shot Case Study is an experiment carried out without a comparison group and without a pre-test.

The population used in this study were students of SMK Negeri 2 Cilaku in the APHP department who were studying Plantation and Herbal Commodity Processing Production lessons.Data collection was carried out using a questionnaire in the validation process by experts and a student assessment questionnaire. The sample selection technique used is purposive sampling which is a method of withdrawing from a population by determining the sample with certain considerations (Sugiyono, 2008). There were 16 students identified who had Android operating system Android version 5.1 (Lollipop) or had the latest Android system.

The data analysis used is the validation of the feasibility of learning media, student assessment questionnaires, digital literacy questionnaires, validation of digital literacy questions and data analysis of digital literacy questions.

### Media EligibilityValidation

The instrument used to determine the feasibility of this android-based learning media is in the form of a questionnaire. The questionnaire addressed to the experts was made using a Rating Scale with four different answer choices. The suitability of aspects can be seen in table 1. The results of the data obtained were then analyzed using descriptive statistical methods.

Score (%) = ∑ acquisition score
∑ Maximum score

**Table 1.**
*The media eligibility percentage scale*

| Score | Percentage | Criteria | Conversion |
|:---:|:---:|:---:|:---:|
| 4 | 75% -100% | Very good | Very eligible |
| 3 | 50% - 74.99% | Good | Eligible |
| 2 | 25% -49.99% | Bad | Not eligible |
| 1 | 0% - 24.99% | Worst | Very not eligible |

### Student Assessment Questionnaire

Questionnaires addressed to students were made using a Rating Scale with four different answer choices. The results of the questionnaire obtained are interpreted based on the total percentage obtained by referring to table 2. The value of the student response questionnaire from small and large scale tests is done using the following equation:

**Total score Percentage (100% )= Maximum score x 100**
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The percentage of the student response questionnaire from small and large scale tests are then determinedusing the conversion table in Table 2.

**Table 2.**
Interpretation of the student response questionnaire

| Score | Percentage | Criteria | Conversion |
|---|---|---|---|
| 4 | 75% < x ≤ 100% | Very agree | Very eligible |
| 3 | 50% < x ≤ 74.99% | Agree | Eligible |
| 2 | 25% < x ≤ 49.99% | Disagree | Not eligible |
| 1 | 0% < x ≤ 24.99% | Very disagree | Very not eligible |

### Digital Literacy Questionnaire

Questionnaires addressed to students were made with several questions to measure the digital literacy possessed by students. The results of the questionnaire obtained are interpreted based on the total percentage obtained by referring to table 3. The formula used is as follows:

$$\text{Total score Percentage (100\% )} = \frac{\text{Total score Percentage}}{\text{Maximum score}} \times 100$$

**Table 3.**
*Digital Literacy Questionnaire Interpretation Scale Aspects of Using*

| Score | Percentage | Criteria | Conversion |
|---|---|---|---|
| 4 | 75% < x ≤ 100% | Very agree | Very eligible |
| 3 | 50% < x ≤ 74.99% | Agree | Eligible |
| 2 | 25% < x ≤ 49.99% | Disagree | Not eligible |
| 1 | 0% < x ≤ 24.99% | Very disagree | Very not eligible |

Validation of Digital Literacy Questions

The validation of this question uses the CVR (Content Validity Ratio) technique. This validity is carried out to obtain information about the compatibility between test items and indicators that have been constructed, content validity will be carried out by experts or Subject Metter Experts (SME) (Ratnasusanti, 2018). The stages in processing instrument validation are done by giving validator response criteria. The scoring of the validator responses can be seen in table 4 as follows:

**Table 4.**
*. Validator Assessment Criteria*

| Score | Percentage | Criteria | Conversion |
|---|---|---|---|
| 4 | Very good | 1 | Agree |
| 3 | Good | | |
| 2 | Worst | 0 | Disagree |
| 1 | Very worst | | |

This explains that if the validator answers "valid", it means that the validator agrees with the question design, so it has a weight of one. If the validator states "invalid" then it means that the validator does not agree with the question design, so it has a value of zero. According to Azwar (2017) the formula is used as follows.

1. Calculating CVR (Content Validity Ratio)

$$CVR = \frac{Ne - 0.5\ N}{0.5N}$$

Information:

Ne = Number of validators who agree
N = Total Number of Validators

Calculations using CVR (Content Validity Ratio) have several provisions, namely:

- When the number of validators who agree is less than half of the total validators, then the CVR is negative.
- When the number of validators who agree is half of the total number of validators, the CVR is zero.
- When all validators agree, the CVR is worth 1.
- When the number of validators who agree is more than half of the total validators, the CVR is worth between 0 – 0.99.
- After each item is identified using the CVR, the next step is to assess the CVI based on the instrument validation index.

2.    Calculating CVI (Content Validity Index)

The formula used for calculating the CVI value is:

CVI =        Total CVR

Total items of the questionnaire

**Calculating CVR and CVI**

The results of the calculation of CVR and CVI are in the range between -1 < x < 1. Thus, thesecategories can be seen in table 5.

**Table 5.**
*CVR and CVI Nilai Value Categories*

| Score | Interpretation |
|---|---|
| -1 < x < 0 | Worst |
| 0 | Good |
| 0 < x < 1 | Very good |

This can explain that if the results of the calculation of CVR and CVI are in the range -1 < x < 0, then the item is declared invalid, whereas if the result is in the range 0, then the item is declared valid and if the result is in the range 0 < x < 1, then the item declared very valid.

## 3.    FINDINGS AND DISCUSSION

At the stage of identifying the potential and problems of the learning media chosen to be developed, namely the android-based learning media. This is because along with the times, communication tools such as smartphones are widely offered to support and meet the educationalneeds of students (Nurohimah, 2014). The use of smartphones as learning media can also help students in getting information to be more interesting (Oktavia, 2017).

The information collection stage is carried out to obtain data as an initial step in development. Information gathering consists of literature study, field survey, needs analysis and curriculum analysis. Based on the results of the field survey, it is formulated that the learning process can be supported by android-based learning media. This type of media is expected to make it easier for students to learn, increase learning motivation, and help improve student understanding. The learning media can contain an explanation of the material and be accompanied by an evaluation.

Product design or product planning is done by making product designs in the form of flowcharts and storyboards. Flowcharts describe the navigation flow in operating learning media on android devices. Storyboard is a visual script that is used as an outline in making learning media. Storyboards describe in detail the arrangement of images, text, effects, and other components on the learning media screen display. Learning media product development iscarried out using App Inventor. The product output is in the form of an apk file extension that can be opened on the appropriate

android device and then it will automatically install learning media on the android device.

Before the android-based learning media was used, the researcher validated it first to determine the feasibility of the developed learning media. Validation carried out by material experts, media experts and linguists. Based on the results of validation by experts, the learning media material developed was feasible with 57.14%. The material expert stated that the android- based learning media that was developed was feasible to be tested on students with improvements on the advice of material experts. The suggestion is that the correct way of writingforeign terms needs to be considered, such as the use of the word "sortation" for what should be "grading". Improvements are carried out so that students are not confused and know the right words. Musfiqon (2012) states that one of the main principles in the selection of learning mediais the principle of relevance, which means that learning media must consider the suitability and synchronization between objectives, content and evaluation of learning materials.

The results of expert validation of the learning media developed are feasible with 67.30%. Media experts stated that the android-based learning media that was developed was feasible to betested on students with improvements on the advice of media experts. The suggestion is that taking the color and background image is not right on the interface design so that the reader will feel uncomfortable. Improvements were carried out so that students were more comfortable when reading the material available on this android-based learning media. Tri (2011) stated that the aspects of the user interface and color selection in learning media can help understanding concepts by users. Thus the selection of colors in the Android-based learning media application is expected to provide convenience for students to better understand the side of the application.

The results of the validation of the developed learning media linguists are feasible with 67.50%. Linguists stated that the android-based learning media that was developed was feasible to be tested on students with improvements on the advice of linguists. The suggestion is not to include the source of the images listed in the media. Improvements were made to find out the source of the image. In accordance with the results of the assessment given by linguists, in addition to punctuation marks, terms or symbols, the language and words used in android-based learning media use words that are easy to understand so that students can clearly understand the material presented. Yuniarti, et al. (2012) explained that the use of the right words can reduce theoccurrence of concept changes and information gaps.

The design revision stage was carried out based on the advice given by the experts. Revisions were made so that the learning media developed were appropriate and the development of this android-based learning media became even better. Furthermore, the small- scale trial phase was carried out to determine the response of students to the developed android- based learning media, this trial was carried out by 4 students. This trial was also carried out to find out the advantages and disadvantages of the developed learning media and to obtain feedback and suggestions that were used as the basis for considering product revisions. The revision stage after the small-scale trial was carried out on the advice of students who gave their opinions about the developed android-based learning media.

Large-scale trials were carried out to obtain quality criteria for learning media based on student assessments on a large scale. The assessment was given by 16 students with various academic abilities. The assessment was carried out on learning media that had been revised based on the suggestions and responses of students at the small-scale trial stage. Large-scale trials use the same assessment instruments as in small-scale trials. Aspects of the assessment in the form of aspects of appearance, aspects of material presentation and aspects of benefits. Based on all aspects, it was declared "Very Eligible" with a percentage of 85.93% in the aspect of display assessment, 87.18% for the material presentation aspect and 83.20% for the benefit aspect. According to Hadiyanti (2013), a good display aspect will make it easier for users to use learning media and continue to use learning media. Meanwhile, according to Rusman (2013), the use of this learning media can be used as a tool in the learning process that can clarify, facilitate conveying messages so that the core subject matter as a whole can be conveyed to students. The product revision stage after a large-scale trial was carried out on the advice of students who gave their opinions about the developed android-based learning media. This revision stage is the last stage before this android-based learning media is applied or used in the learning process. suggestions that are used as revisions for product improvement are some images that are not clear because the image resolution is not good, besides that there are suggestions that the explanations contained in each image are clarified so that students understand better.

Based on the results obtained, the digital literacy that students have in the aspect of using can be said to be high. Although it can be said to be high, the high level differs between each indicator. On the indicator of media use, the ability to use the expected media is to be able to use and maximize the developed android-based learning media. Based on the results obtained, namely 87.89%, digital literacy in the indicators of media use owned by students is classified as very high. According to Subrahmanyam and Smahel (2010) these results can occur because students are accustomed to using digital media in their daily lives.

Guidance indicator is the ability to use the expected direction guide, which is to be able to understand the information obtained in multimedia format. Similar to what Bawden (2001) explains, digital literacy is the ability to read and understand information in multimedia formats. Based on the results obtained, 87.50% of digital literacy in the directional indicators owned by students is classified as very high. According to Krug (2006) a media is said to be good when the media explains who it is and its functions to users and does not make users think.

Indicators of content evaluation of the expected content evaluation ability are the ability to think critically and provide an assessment of what is found online accompanied by the ability to identify the validity and completeness of referenced information (Gilster, 1997). Based on the results obtained, 81.25% of digital literacy in the content evaluation indicators owned by students is classified as very high. This is because students are able to use and control what is displayed on the screen with the information content provided (Gilster, 1997).

And the last indicator on the aspect of using is the preparation of knowledge. The ability to prepare knowledge is expected to be able to build a collection of information obtained to evaluate the facts and opinions properly. Based on the results obtained,

81.64% of digital literacyin the indicators of the preparation of knowledge possessed by students is classified as high. According to Gilster (1997) in addition to the art of critical thinking, the competencies needed bystudents are to build a reliable set of information from several different sources which then the information obtained can be collected to form new knowledge.

For the aspect of understanding that students have for digital literacy, it is already in the highcategory. The first indicator in understanding aspects of digital literacy is analyzing. This indicator is very important for students to have because it is one of the focus goals of 21st century education (Osborne, 2013). Based on the results obtained, digital literacy in analyzing indicators owned by students is classified as high with a percentage of 68.75%. This is because the learning style of the digital native generation has the characteristics of fast learning, processing information quickly, even though in the end they cannot concentrate well, because they are looking for fast-paced information in a short time (Ghaith, 2010).

The second indicator in understanding aspects of digital literacy is creating. In this study, theability to create what is expected is to be able to create innovative products related to the material that has been read in android-based learning media. Based on the results obtained, digital literacy in the indicators of creating that students have is already high with a percentage of75%. This is because students are used to new innovations and creations during the practicum of making processing subjects. This indicator of creating is also included in the ability to think creatively. According to Foti (2014) using mobile learning in everyday use can increase the skillsthat must be possessed in the 21st century such as being creative and innovating.

The third indicator in understanding aspects of digital literacy is reflection. In this study, the expected reflection is the ability to think reflectively by making what has been answered in the aspect of creating. Based on the results obtained, digital literacy in the reflecting indicators possessed by students is classified as very high with a percentage of 89.06%. According to Fuady (2016), reflective thinking is the ability of students to select the knowledge they have and arestored in their memory to solve every problem they face to achieve the goal.

The fourth indicator in understanding aspects of digital literacy is action. The ability to act in digital literacy in this study can be described as an activity to take actions that can share knowledge, such as making a summary of how to produce good green tea based on the information that has been read. Based on the results obtained, digital literacy in the indicators of action owned by students is classified as very high with a percentage of 92.18%. This is because students have a digital native generation learning style that is able to learn and process information quickly, in line with research conducted by Ghaith (2010).

## 4. CONCLUSION

The development of android-based learning media in the subjects of Plantation and Herbal Commodity Processing Production refers to the R&D (Research and Development) research design with stages including Potential and Problem Identification, Data Collection, Product Design, Design Validation, Design Revision,

Small-Scale Trial, Revision Products, Large-Scale Trials, and Product Revisions. From the results of the development produced learning media that has five menus. The five menus are the coffee menu, the chocolate menu, the tea menu, the question menu, the glossary menu, and the about menu. This learning media was developed with an online-based application builder development tool called Appinventor 2 which can be accessed through the website http://ai2.appinventor.mit.edu.

Based on the results of the validation to determine the level of feasibility of the developed learning media, it was declared "Appropriate" by material experts, media experts and linguists. The results of the large-scale trial of respondents stated "Very Eligible" for the developed android-based learning media.

Based on the results obtained, the digital literacy that students have in the aspect of using "Very High" for indicators using media, guide indicators, content evaluation indicators, and indicators of knowledge preparation. As for the aspect of understanding the results obtained, there are two "high" indicators, namely the analyzing indicator and the creating indicator. The next two indicators the results obtained are "Very High" for reflecting indicators and acting indicators.

## 5. REFERENCES

Arikunto, S. (2009). *Metode Penelitian Suatu Pendekatan Praktis*. Jakarta : PT. Rineka Cipta. Azwar, S. (2017). *Metode Penulisan*. Yogyakarta: Pustaka Pelajar.

Bawden, D. (2001). Information and Digital Literacies: A Review of Concepts: *Journal ofDocumentation*, Vol. 57, No. 2, 218-259.

Foti, M.K. dan Jomayra, M. (2014). Mobile Learning: How Student use Mobile Devices toSupport Learning: *Journal of Literacy and Technology*, Vol. 15, No.3, 58-78.

Fuady, A. (2016). Berfikir Reflektif dalam Pembelajaran Matematika. *Jurnal Ilmiah PendidikanMatematika*, Vol. 1, No.2, 104-112.

Ghaith, G. (2010). An exploratory study of the achievement of the twenty-first century skills inhigher education. Education & Training, 52 (6/7), 489-498.

Gilster, P. (1997). *Digital Literacy*. New York: Wiley.

Hadiyati, R. (2013). Pengembangan Website Layanan Laboratorium Bimbingan dan Konseling. In *Skripsi*. Fakultas Ilmu Bimbingan dan Konseling, Fakultas Ilmu Pendidikan. UniversitasNegeri Yogyakarta.

Kemendikbud. (2017). *Materi Pendukung Literasi Digital*. Jakarta: Kementrian Pendidikan dan Kebudayaan.

Krug, S. (2006). Don't Make Me Think a Common Sense Approach to Web Usability: US America. Nem Riders.

Marty, P.F., dkk. (2013) Scientific Inquiry, Digital Literacy, and Mobile Computing Informal Learning Environmrnts. *Learning, Media and Technology*, Vol.38, No.4, 407-428.

Musfiqon. (2012). *Pengembangan Media dan Sumber-Sumber Pembelajaran*. Jakarta: Prestasi Pustakaraya.

Oktavia, F. (2017). Pemanfaat Aplikasi Whatsapp Berbasis Android Sebagai Media Pembelajaran untuk Meningkatkan Kognitif dan Motivasi Belajar. *National Proceeding of MIPA III. ISBN 978-602-50939-0-6.*

Osborne, J. (2013). The 21st Century Challenge for Science Education. *Eurasia Journal of Mathematics, Science & Technology Education*, 10, 265-279.

Reitz, J.M. (2004). *Dictionary for Library and Information Science*. Westport: GreenwoodPublishing Group.

Rusman. (2013). Belajar dan Pembelajaran Berbasis Komputer: Mengembangkan Profesionalisme Guru Abad 21. Bandung: Alfabeta.

Sugiyono. (2013). Metode Penelitian Pendidikan, Pendekatan Kuantitatif, Kualitatif, dan R&D. Bandung : Alfabeta

Tri, A. (2011). Pengembangan Media Pembelajaran Berbasis Multimedia Interaktif Menggunakan Adobe Flash CS3 dalam Pembelajaran Matematika SMA/MA Materi Pokok Pertidaksamaan Satu Variabel. Fakultas Sains dan Teknologi. Universitas UIN Sunan Kalijaga.

UNESCO. (2011). Digital Literacy In Education. Available at: http://unesdoc.unesco.org/ark:/48223/pf0000214485.

Wirawan. (2011). Evaluasi Teori Model Standar Aplikasi dan Profesi, Contoh Aplikasi Evaluasi Program: Pengembangan Sumber Daya Manusia, Program Nasional Pemberdayaan Masyarakat (PNPM) Mandiri Pedesaan, Kurikulum, Perpustakaan, dan Buku Tes. Jakarta:Raha Grafindo Persada.

Yuniarti, A., Fitri, L., Yokhebed. (2012). Pengembangan Virtual Laboratory Sebagai Media Pembelajaran Berbasis Komputer Pada Materi Pembuakan Virus. *Journal of Biology Education.* Vol.1, No. 1, 86-94