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The development of android-based computer and basic network learning media

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Abstract: This research aims to produce valid and practical Android-based learning media. Sub-optimal learning methods and the lack of Android-based learning media can be used as a medium to support the learning process. This research uses the Research and Development (R&D) method with the ADDIE development model. The subjects of this study were 20 students as a sample. The data collection technique used was a questionnaire with a Likert scale. The results showed that the average value of the media expert validity test was 0.68 with one valid category and the material expert was 0.67 with one valid category. For the practicality test, the teacher's response reached 83.33% with a very practical category and the student's response reached 90.92% with a very practical category. Based on the evaluation and input from the media and materials experts, as well as the results of the field tests, this Android-based learning medium is suitable for use.

Keywords: Learning media; Android based; Valid and practical; Research and development; ADDIE model

1. Introduction

Education is a need for every human being, education is a process of forming human character which is very important to increase intelligence, skills and competencies in accordance with identity and environmental conditions (Berková et al., 2023; Samala et al., 2023; Tetteh et al., 2023). With education, the knowledge that we have will increase, the insight that we have will be wider, so that we can think in a more futuristic and rational way. In Law No. 20 of 2003 it is stated that national education functions to develop capabilities in producing national character and civilization that are useful in the context of educating the nation's life, aiming to develop the potential of students to become human beings who believe and fear the Almighty God, as democratic and responsible citizens.

Currently mobile devices, especially Android smartphones, have spread in various circles of society, ranging from adults, small children, among business people, students, and students, because Android smartphones can help do some important work or needs and make it easier to find and get information (Papadakis et al., 2021). Learning media is an important component of learning material, the existence of learning media determines the success of learning, technological developments facilitate the use of learning media, and media design also becomes easier (Isnaeni et al., 2021).

Android is an operating system for developing Linux-based mobile phones that includes operating systems, middleware, and applications, Android is an operating system for Linux-based mobile phones that provides an open platform that gives developers the freedom to create their own applications

(Eveline et al., 2019; Lisana & Suciadi, 2021). Android-based learning media which is a teaching delivery system that presents text material, images, videos, audio recordings with computer control to students who not only hear and see video and audio, but also provide active feedback so as to determine the speed and sequence of presentation.

App Inventor is an open-source web application originally developed by Google and currently maintained by the Massachusetts Institute of Technology (MIT) (Jain et al., 2023). App Inventor allows novice computer programmers to create applications for the Android operating system (Mir & Llueca, 2020). App Inventor uses a graphical interface, which allows users to drag-and-drop visual objects to create applications running on Android devices, MIT App Inventor is visual-based programming, even this programming is done simply by dragging and dropping on the tools provided , App Inventor is a web-based software that is shown for all Android developers, this software is easy to use because we don't need to write any programming or coding languages, we only need to arrange the available coding components such as putting together a puzzle (Adiono et al., 2019).

The advantages of MIT App Inventor are that it is more practical, simple and does not require coding, only logic and a drag system (Sangeetha et al., 2022), even so, there are some disadvantages of MIT App Inventor, namely, there are several components that are incomplete, much different from Eclipse which is more flexible, and there are credits from MIT. MIT App Inventor or an extension of the Massachusetts Institute of Technology is a platform that is used to create android applications without using a programming language (Top & Gökbulut, 2022), or web-based applications where in making learning media there is no cost but free and only by connecting to the internet to create an Android application (Adiono et al., 2019; Sarkar et al., 2019).

Computer and basic network subject teachers and several students of class X TKJ SMK Negeri 1 Lubuk Basung, information was obtained that in general the learning methods used by teachers when learning were conventional methods such as delivery of material in the form of lectures , so that students do not understand the material conveyed by the teacher during the learning process, this can be seen from the practice scores and student test scores which are still low. It can be concluded that learning media is an access to offline and online learning processes that can help teacher performance and student learning processes in teaching and learning activities. From some of the research problems, the research objectives can be explained as follows:

a. This research produces valid android-based learning media.
b. This research produces practical android-based learning media.

The benefits of this research are:

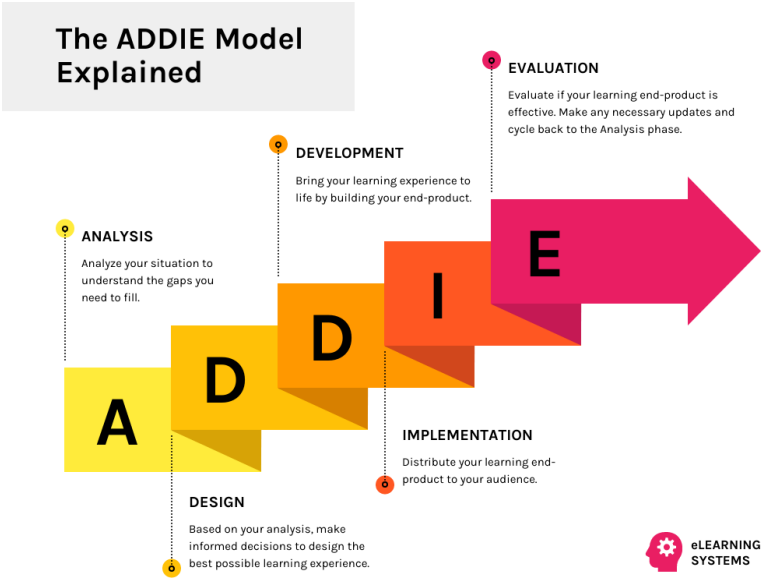
a. Can improve the quality of learning in achieving the developed curriculum
b. Can facilitate teachers in the learning process
c. As a media or tool in maximizing the delivery of learning material
d. As an independent means and clarify students' understanding of learning material

2. Methods

This study uses the research and development (R&D) method with the ADDIE development model (Al-Malah et al., 2020; Nadeem et al., 2022). Research and Development is a research method used to produce certain products, and test the effectiveness of these products (Prasetya, Fajri, et al., 2023; Prasetya, Syahri, et al., 2023; Wils et al., 2021). Research and development (Research and Development) as a type of research aims to produce new products through a development process that

is integrated with research activities . This study will use the ADDIE research model (Analysis-Design-Develop-Implementation-Evaluate) which is a generic learning or lesson design model which has 5 stages of development including Analysis , Design , Development, Implementation and Evaluation (Nita et al., 2022).

Figure 1. ADDIE development model



a. Stage Analysis a needs analysis is carried out for the learning media that will be developed.
b. Design Stage for planning android-based learning media to be developed, determining competency standards and basic competencies to be developed.
c. Development Stage will provide materials for students and teachers in accordance with the specific products to be developed.
d. Implementation Stage is carried out by deploying Android-based learning media , which at this stage will prepare learning equipment and a well-conditioned environment, after everything is available the designer can implement the products that have been designed and then developed into the learning process activities in class.
e. Evaluation Stage is carried out on the use of learning media after being tested on the subjects studied. This evaluation is intended to determine the quality and feasibility of the product being developed. The evaluation phase begins with the validation of each product by media experts and material experts then input is obtained for media improvement.

Data collection techniques are the most strategic steps in research, because the main purpose of research is to obtain data (Roberts, 2020). In this study used data collection techniques in the form of a questionnaire. Questionnaire is a data collection technique used to ask questions to get answers from respondents. The data analysis technique used in this study is one of the main procedures used in data analysis by collecting all the necessary data (Al-Malah et al., 2020), namely the results of the validity of media experts and material experts as well as data from the practicality of media whether or not a media is appropriate is determined by judgments made by experts Practicality test analysis is used to test whether the media is practical or feasible. Practicality testing is done by using a questionnaire. The questionnaire used uses a Likert scale. The material expert instrument contains aspects related to learning media material which includes material, language and evaluation (Khaeroningtyas et al., 2016). The following is a grid for the learning material expert instrument. The media expert instrument contains points about aspects related to learning media. The following is a grid for the learning material expert instrument. To get the results of the validity of the material and media, the Aiken'V formula is used Eq. 1.

$$v = \sum s/[n(c-1)] \quad (1)$$

Description:

S = r-lo
Lo = The lowest validity rating score (in this case = 1)
C = The highest validity rating score (in this case = 5)
R = Number given by an appraiser
N = Number of Validators (Experts)

Table 1. Categories the validity of learning media

No	Achievement level	Category
1	0- 0.666	Invalid
2	≥ 0.667	Valid

Practical tools the Practicality Questionnaire Grid of Android-based learning media for teachers and students (Novra, Ricky & Asmara, 2021). The formula used to calculate the teacher and student practicality tests was Equation 2.

$$\text{Practicality Value } p = \frac{f}{n} \text{x } 100\% \quad (2)$$

Description:

P = Practicality Value
f = Score Acquisition
n = Maximum Score

Table 2. Categories the practicality by teachers and students

No	Percentage value	Category
1	81-100%	Very Practical
2	61-80%	Practical
3	41 – 60%	less practical
4	21-40%	Impractical

3. Results and discussion

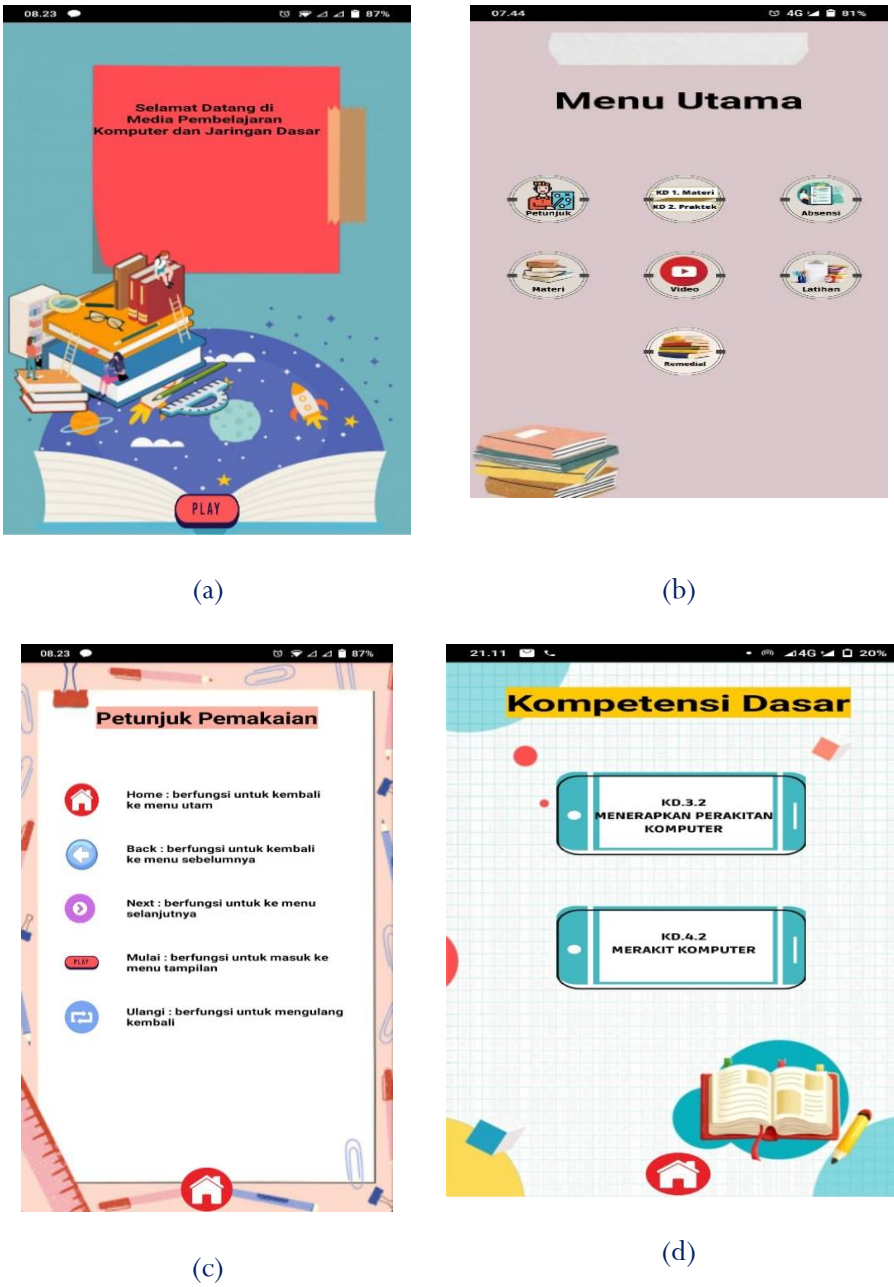
The results in this study were Android-based learning media created and designed by researchers, with the aim of being used as a teacher 's tool in the learning process and as a source of independent learning used by students at home or at school. Development of Android-based learning media on computer and basic network materials in subjects applying computer assembly using research and development (R&D) products to be developed in the form of Android-based learning media. The development model used in this research is ADDIE (analysis, design, development, implementation, evaluate) (Chatwattana et al., 2023). Android-based learning media will be created using the MIT App Inventor platform. The development of Android-based learning media is the use of Android learning media that is run so that it runs as expected. How to install learning media software first so that it can run on Android.

3.1 Android-based learning media

This initial screen has a welcome message about basic computer and networking topics and a button to move to the next page. The main menu is the menu page of the Android-based learning media. This menu has 7 buttons that link to the next menu, namely Instructions, Basic Skills, Attendance, Materials,

Videos, Exercises and Remedies. The main menu screen is shown in Figure 2.b. This screen contains instructions on how to use Android-based learning media. Here students can learn how to use the media and understand the learning material (Figure 2.c). The basic skills screen contains basic skills 3.2 and 4.2 relating to computer assembly (Figure 2.d). The attendance display shows the student's full name and the class the student has attended (Figure 2.e). The material screen contains lessons that students will learn, including theory and practice about assembling a computer (Figure 2.f). The Video screen contains an instructional video on how to assemble a computer (Figure 2.g). The Exercise screen contains 10 multiple-choice questions for students to answer (Figure 2.h). The Tutorial screen contains 3 essay questions for students to complete (Figure 2.i).

Figure2. Android-based learning media

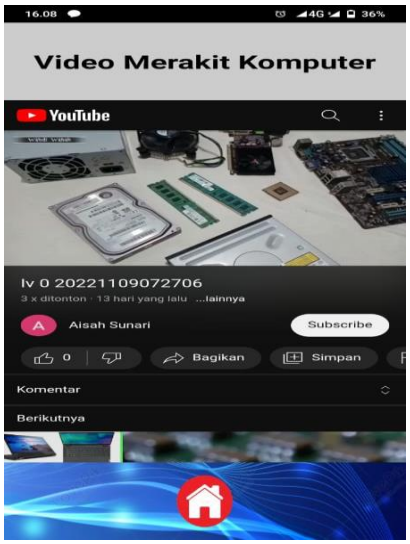


(a) (b)

(c) (d)

(e)

(f)



(g)

(h)

(i)

3.2 Validation

In the development of Android-based learning media, the authors have carried out data collection techniques by distributing questionnaires, which were distributed to media experts and material experts. The results of this study will produce a level of validity and practicality of Android-based learning media that has been made.

Table 3. Media validation results

Assessment aspects	Validators			Amount	Validity results	Category
	V1	V2	V3			
Visual Aspect	3	2.5	2.75	8.25	0.69	Valid
Appearance Aspect	3	2.5	2.67	8.17	0.68	Valid
Average					**0.68**	**Valid**

Based on the results of data analysis of Android-based learning media, the instructional and display aspects assessed by the media expert validator are declared "valid" because the validity category in learning media ≥ 0.68 is declared "valid".

Table 4. Material validation results

Assessment aspects	Validators			Amount	Validity results	Category
	V1	V2	V3			
Content eligibility	3	2.4	2.4	7.8	0.65	Valid
Presentation eligibility	3	2.6	2.8	8.4	0.7	Valid
Language eligibility	3	2.33	2.67	8	0.67	Valid
Average					**0.67**	**Valid**

Based on the results of the analysis of Android-based learning media on the content (material) and instructional aspects assessed by the material expert validator are declared "valid" because the validity category in learning media ≥ 0.667 is declared "valid" while 0 - 0.666 is declared "invalid" from the table above which stated that the results of the validation of the material value of 0.67 were declared "valid" and suitable for use as learning media.

3.3 Practicaltiy

Based on the results of the analysis and the percentage level of practicality of computer and basic network learning media assessed by the computer teacher and basic network "very practical" because the practicality category of 81-100% is declared "very practical" because in the Table 5 of results the practicality of the teacher's response above states that it has a percentage of 88.33% in the "very practical" category Good as a learning medium. The results of the practicality of students' responses based on the development of learning media in computer subjects and basic Android-based networks at SMKN 1 Lubuk Basung are as follows Table 6.

Table 5. Teacher response practicality test results

Practicality aspect	(%)	Category
Visual aspect	87.5	Very practical
Content aspect	90	Very practical
Aspects of language and writing	87.5	Very practical
Average	**88.33**	**Very practical**

Based on the practicality table of teacher and student responses, it can be concluded that the android-based learning media produced have an average teacher practicality score of 88.33% in the very practical category and an average student response practicality score of 90.92% in the very practical category.

Table 6. Student response practicality test results

Practicality aspect	(%)	Category
Media display aspect	91.43	Very practical
Aspects of use	90.42	Very practical
Average	**90.92**	**Very practical**

4. Conclusion

Based on the results of research and discussion on the development of Android-based learning media in Computer and Basic Networking subjects at SMKN 1 Lubuk Basung. This study uses the Research and Development (R&D) method, which is research that is used to produce certain products and test the effectiveness of these products. It can be concluded that Learning media were produced in basic computer and network based Android subjects using MIT App Inventor software in learning media production. The validity test of Android-based learning media was conducted by 3 validators, namely the media validator and the material validator, for the media validator it was conducted by 3 lecturers, while for the material validator it was conducted by 2 lecturers and 1 teacher who taught computer subjects and basic networking at SMKN 1 Lubuk Basung. The validity for media experts is 0.68 with one valid category, and the validity for material is 0.67 with one valid category. Thus, it can be concluded that from the results of the validation of media experts and material experts on Android-based learning media, they are declared valid. very practical category. Thus, it can be concluded that the response of teachers and students is that Android-based learning media are very practical to use in the learning process at school.

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Declarations

Author contribution

Desi Handrayani as research implementer, media design and data collection. Kurniati Rahmadani as research and article concept designer. Fuad Abdul Baqi as researcher and article concept designer. Gulzhaina Kuralbayevna Kassymova as proofreader.

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Conflict of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Ethical Clearance

The involvement of human subjects in this research complies with the Declaration of Helsinki.

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