



# Development of Macca Biology Learning Media Based on Android Software Andromo

Muhammad Arafah<sup>1\*</sup>, Arman Arifuddin<sup>2</sup>, Andi Badli Rompegading<sup>2</sup>, Rizal Irfandi<sup>3</sup>, Muhammad Nur<sup>2</sup>, Muhammad Kemal Nasser P<sup>2</sup>, Ahmad Yani<sup>4</sup>, Syamsu Rijal<sup>2</sup>, Ambo Upe<sup>5</sup>

<sup>1</sup>Department of Education Administration, Postgraduate Program, Universitas Puangrimaggalatung, Sengkang 90915, Indonesia.

<sup>2</sup>Department of Biology Education, Faculty of Teacher Training and Education, Universitas Puangrimaggalatung, Sengkang 90915, Indonesia.

<sup>3</sup>Department of Chemistry, Faculty of Mathematics and Natural Science, Universitas Negeri Makassar, Makassar, Jalan Daeng Tata Raya Makassar, 90244, Indonesia.

<sup>4</sup>Department of Biology Education, Faculty of Teacher Training and Education, Universitas Terbuka, Banten, 15437, Indonesia.

<sup>5</sup>Department of Education Administration, Faculty of Teacher Training and Education, Universitas Puangrimaggalatung, Sengkang 90915, Indonesia.

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Corresponding Author:

Muhammad Arafah

[muharafahusman@yahoo.co.id](mailto:muharafahusman@yahoo.co.id)

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**Abstract:** The purpose of this study is to evaluate the applicability, efficacy, and validity of Macca Biology Learning Media, which is based on Andromo Android Software, for environmental pollution content in Class VII SMP Negeri 3 Sengkang. The research methodology employed is research and development, also known as define, design, and development (3D model research and development). This study involved 32 students in class VII and was conducted during the even semester of the 2022–2023 academic year, which began in February–March 2023. The teacher and student practicality questionnaire, student learning outcomes, and validator results provided the research data. A % quantitative descriptive method was used to process the study's results. Macca Biology Learning Media received 90.5% from the media and material validators, 91.6% from the teacher's practical responses and 90.5% from the students' practical responses, and 96.8% of the students received a perfect score from the learning outcomes, according to the study's findings. The study's findings indicate that the Macca Biology Learning Media, which utilizes the Andromo Android platform, is a reliable, useful, and efficient resource for biology education.

**Keywords:** Andromo software; Biology education; Learning media; Macca biology application

## Introduction

Education is a human need (Abidin, 2021). Education always experiences changes, developments and improvements in accordance with developments in all field of life. Changes and improvements in the field of education include the various components involved in it both education implementers, quality education, curriculum tools, educational infrastructure, quality management education as well as more innovative learning methods and strategies (Harliansyah, 2022). System National education must always be developed according to the needs and development Which happen Good in level local, national, nor global (Mulyasa, 2016).

The need to prepare the next generation of leaders for the difficulties of the global economy is growing, and with it, so is the significance of technology in education. Technological developments have altered students' learning styles and viewpoints (Azairok et al., 2023; Syed et al., 2021; Theobald et al., 2020). The millennium era is the era when the internet and technology are the main things and in this era the development of technology, information and communication (ICT) is very influential in the daily life of all people, both students and students (Annisa, 2022; Julius et al., 2020). Development technology And communication the capable push birth innovations new in everything the s field is wrong only one Which No escape from that development is in the

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field of education (Kuswanto, 2019). Example of results from development technology information and communication the is mobile smartphones or which more known with the term smart phone. Smartphones use an operating system or OS (operating System): Androids, iOS (iphones operating systems), windows Phone, Blackberry (Sembiring et al., 2019).

It's a shame if we are not able to develop products the because Indonesia is wrong one country use smartphones largest (Ahyar, 2019). In field education actually a smartphone can be useful as an additional tool for creating new innovations in the learning process (Aditia, 2020). So far, society most use smartphones only limited to calling, texting, playing songs/videos, accessing social media and even games. Whereas smartphones can utilized as Wrong One media in learning, for example use Internet on smartphones for look for learning materials and even make applications that contain it material-subject matter (Syahrul, 2019).

Based on the results of observations and interviews with science subject teachers at SMP Negeri 3 Sengkang, information was obtained that there were still many problems experienced by students in subjects such as science, especially in environmental pollution. The problems that occur include not creating interest in learning and the attractiveness of students to environmental pollution material which is considered difficult, difficult to understand, and there are certain terms in the material. For that, the teacher must be able to create a conducive atmosphere and create learning be effective and fun, need a change of ways teach from model traditional learning going to model innovative learning. Teachers have a major part to play in encouraging student participation in learning activities because they are educators. Put another way, the effectiveness of a learning process is determined by the nature of the relationship between teachers and pupils (Aulia et al., 2023).

The use of innovative learning models will make students actively involved and not only used as learning objects, no longer centered on the teacher, but on students. Teachers facilitate students to learn so that they are more flexible to Study. In innovative learning, the method used is no longer monotonous such as the expository method or the lecture method, but rather a flexible method and dynamic so that it can meet the needs of students as a whole (Arafah et al., 2022).

On basically in process learning of course need something new and interesting. In this case the development of technology for making application Study become Wrong One Which interesting, Because This technology is able to create new innovations to be utilized as support in education (Susanty, 2020).

Media as all object which can manipulated, seen, heard, be read or talked about along instrument Which used for activity them. So that the media means an intermediary or liaison in the form of writing, images, voice, animation as well as videos for make it easy convey message from sender to recipient (Marlina et al., 2016). The use of media in learning can help with the limitations of educators in conveying information and limitations in class hours (Pustikayasa, 2019). This is in accordance with the results of Indrastyawati's research (2016) which shows the quality of learning media based on the assessment of media experts, material experts, and biology teachers is categorized as good and the responses of students show that they agree that learning media is suitable for use (Indrastyawati, 2016).

Development application Which can used in learning should can give influence Which Good in carry out activity learning, because this is wrong one media study which interesting and it will be easy accessed anywhere (Amaly et al., 2021).

According to Sanjaya (2018) *Android* is a Linux-based operating system designed for touch-screen mobile devices such as smartphones and tablet computers. According to Mudinillah (2021) software is a special term for data that is formatted and stored digitally, including computer programs, the file, And various information Which can be read And written by computer. *Andromo* is a mobile app builder that makes it easy for anyone to build and customize their own app without learning how to code (Andromo, 2020).

Educators must be careful in taking this opportunity to be able to make the learning process more creative, interesting and effective. Learning applications are a medium that teachers can use in the learning process in class. However, the drawback of using learning applications is that users have to pay a fee to be able to access them because the material content contained in these applications must be connected to the internet (Sahlani, 2020). Overcoming this problem is developing a learning application that can be accessed in 2 ways, namely *offline* and *online*. The *macca biology application* developed will be *offline and online*. The *offline macca biology application* will display texts and images related to environmental pollution which can be accessed without an internet network while the *online macca biology application* will display texts, images and videos related to environmental pollution, especially for visual videos requiring an internet network to see the video because so that the capacity size of the *macca biology application* is not large which burdens students' *smartphones*.

Several reasons why research on the development of Android-based *Macca biology learning media* *Andromo* is very important. First of all, technological

advances, especially in terms of mobile devices and Android applications, have opened up new opportunities in the field of education. This research answers the need to include technology in the biology learning process by using software such as Android. Android-based learning media can make education more interesting and interactive. The validity of learning media is also very important to produce good results. Validation results from media experts and material experts provide confidence that Macca's learning media meets high standards. This is very important to ensure that the material delivered through this media is well understood by students and in accordance with curriculum needs. After that, practical aspects become the main consideration. This research shows that this learning media not only meets academic requirements, but is also easy to use in everyday classes with a positive response from teachers of 91.6% and educators of 90.5%. This shows its relevance in classroom teaching. Finally, the exam results show that Android-based Macca learning media can improve students' understanding and achievement in biology with a pass rate of 96.8%. This shows that this learning media is effective. Overall, this research is important because it not only offers innovation in the development of Android-based learning media, but also provides empirical evidence about the validity, practicality and effectiveness of this learning media in improving biology learning at higher education levels (Kuswanto, 2019; Muyorah et al., 2019).

This research was conducted in order to develop an Android-based learning media using *Andromo* software. The development of learning media is carried out on environmental pollution material so that it can be conveyed using interesting videos, so that learning is not monotonous and boring and is able to foster enthusiasm for learning and the desired learning outcomes. Based on the description above, the research objective to be achieved is the development of macca biology learning media that are valid and practical in order to achieve effective learning.

**Method**

This research will be conducted at SMP Negeri 3 Sengkang, Tempe District, Regency Wajo. Time carried out study this that is semester even year teaching 2022/2023.

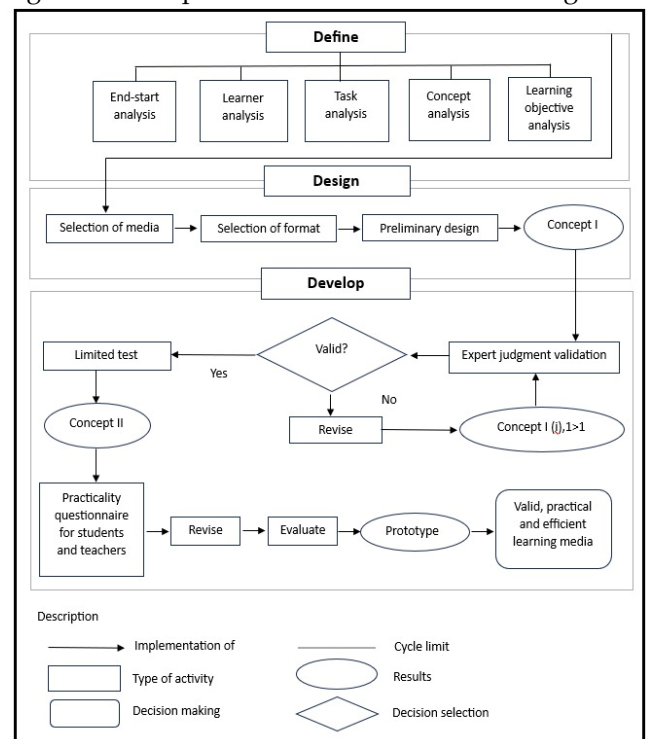
The type of research used in this research is development research or 3D model Research and development, namely the development of learning media through the Android-based *macca biology application andromo software* on environmental pollution class VII at SMP Negeri 3 Sengkang.

The research subjects were 32 students of SMP

Negeri 3 Sengkang class VII with the reason for choosing to already own and use a *smartphone* with the Android operating system.

*Research Procedure*

*Define, Design, Development* and *Disseminate* research and development model which is modified into a 3D model. In producing a product that is suitable for use, appropriate research procedures are needed. This development research uses a 4D development model that is modified to 3D. The 3D model only includes three stages, namely *define, design* and *development*. With this research model the product produced is *Andromo software* on environmental pollution material with the aim of facilitating learning activities between educators and students that implements the achievement of educational goals. If described schematically, the four stages of development research can be seen in Figure 1.



**Figure 1.** 3D Research procedure

*Defining Stage (Define)*

Definition of stages is helpful. In order to ascertain and specify the requirements for the learning process and to gather diverse data pertaining to the product that needs to be created. Ardila et al. (2023) states that this stage is broken down into multiple parts that include Early-late analysis, student analysis, task analysis, concept analysis, and learning objective analysis are all included.

*Design Stage (Design)*

Definition of stages is helpful. In order to ascertain and specify the requirements for the learning process

and to gather diverse data pertaining to the product that needs to be created. Ardila et al. (2023) states that this stage is broken down into multiple parts that include Early-late analysis, student analysis, task analysis, concept analysis, and learning objective analysis are all included.

*Development Stage (Development)*

The results of the define and design stages resulted in the initial design of a learning media called prototype I. After the learning media was designed in the form of prototype I, validity tests were carried out on experts/experts and field trials. Validation is the first step in the development stage. Expert validation is focused on format, content, illustration, and language in the developed learning media. The results of expert validation are in the form of validation values, corrections, criticisms, and suggestions which are used as a basis for revising and improving learning media. The results of this revision are learning media that have met the valid criteria and are hereinafter referred to as prototype II.

*Data Collection Technique*

Media validation techniques are carried out by distributing learning media and validation sheets to experts (Dewi et al., 2020). Questionnaires or questionnaires are a data collection method that is carried out by giving a set of questions to respondents, namely students and teachers to respond according to user requests (Hadiyanti, 2021). This activity is one of the methods used to find authentic data that is documentation in nature, whether the data is in the form of diaries, memories of an activity or other important notes. What is meant by documents here is documentation in the form of pictures during research.

*Research Instruments*

According to Wana (2021) the research instrument is a tool used to measure variables in the observed natural and social sciences. The instruments used in this research are (1) validation sheets; and (2) student and teacher response questionnaires. Instruments are used to collect data during the learning media development process in the form of validation sheets and questionnaires. The instrument was arranged to include 4 types according to the respondents from the study. The instruments are validation sheets for media experts, questionnaires for students and teachers and test questions on learning outcomes.

*Data analysis technique*

*Expert Validation Data Analysis*

Validity analysis is based on expert validation data using the Aiken scale, namely:

$$\%NA = \frac{NV}{NV \text{ Maximum}} \times 100\% \tag{1}$$

Information:

% NA = Percentage mark end

Σ NV = Total score validation

Count average total score validation with formula:

$$\%RT = \frac{\Sigma \%NV}{\text{number of validator}} \tag{2}$$

Information:

% RT = Percentage average total

Σ % NA = Total percentage mark end

*Analysis of Learning Media Practicality Data*

Practicality media based on aspect practice can see from the results of the questionnaire den response after using the media which has developed. Data which obtained processed by using formula as following:

$$\%Rs = \frac{\text{total score}}{\text{maximum score}} \times 100\% \tag{3}$$

Information:

% R<sub>s</sub> = Percentage respondent

Σ % R<sub>s</sub> = Total percentage response den

% R<sub>st</sub> = Average percentage of respondents

**Table 1.** Media Practicality Scale (Purnomo, 2015)

Percentage (%)	Criteria
0-20	Impractical
21-40	Less practical
41-60	Pretty practical
61-80	Practical
81-100	Very practical

Learning media is categorized as practical in a manner practice if average results percentage student response more from or the same with 61% (Mukholifah et al., 2020).

*Data Analysis of Learning Media Effectiveness*

The effectiveness of using learning media is seen from the completeness of learning outcomes student after follow learning with use media Which has developed. Students are categorized as complete if the value is more than or the same with mark Criteria Completeness At a minimum (KKM) which set by school ie 70. Use of media can categorized as effective if the percentage of students complete is moreis equal to 80% of the number of students Which There is in class.

Percentage amount student complete obtained with formula:

$$\% \text{ Completeness} = \frac{\text{number of student completed}}{\text{total number of student}} \times 100\% \quad (4)$$

### Results and Discussion

Research on the development of *macca biology learning media* based on *android software andromo* uses a 4D development research model that is modified into a model study 3D *Software* which used in study this development is *andromo*. *Macca biology* based on *android software andromo* that has been developed will be valid, practical and effective based on the assessment of expert validators and assessors of students and teachers. Each stage of media development carried out along with its analysis is described as following:

#### Validation

Validation is filling out the instrument sheet related to the expert, first the material expert validator with the aspects that are assessed are aspects of content quality and linguistic aspects, secondly the media expert validator with the aspects that are assessed, namely media design size, programming and ease of use of media (Cook et al., 2016). Through structured interviews with international assessment experts, brainstorming, and member checking, expert consensus can be gathered to develop appropriate validation instruments and guidelines (Dijkstra et al., 2012). The process of content validation, which involves evaluating school teachers' knowledge levels through the assessment of experts, can also be used to determine the validity of learning materials (Luque-Vara et al., 2020).

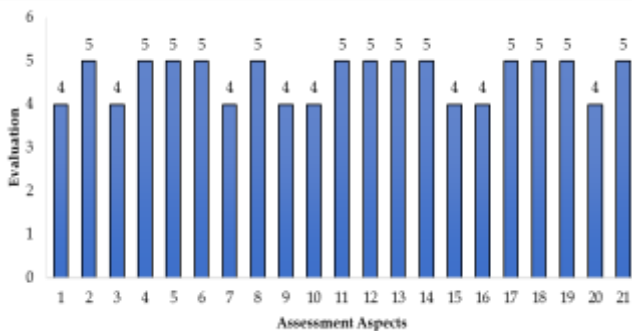


Figure 2. Aspects of media eligibility

$$\%NA = \frac{\sum NV}{NV \text{ Maksimum}} \times 100\%$$

$$\%NA = \frac{97}{105} \times 100\%$$

$$\%NA = 92.3\%$$

Based on the data above, the results of the validation analysis of *macca biology learning media* based

on *Android software andromo* for software components and the average use of *Andromo software media* obtained from the validation analysis start from statement grain First that is obtain %NA= 923% that enter in very category valid.

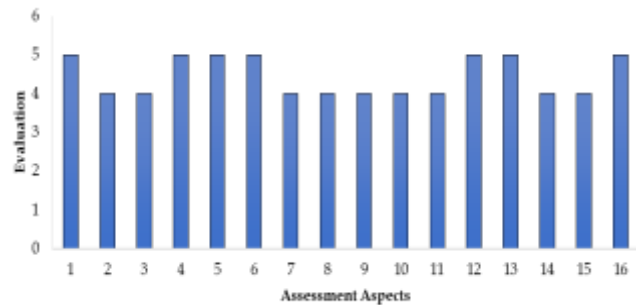


Figure 3. Aspects of material feasibility

$$\%NA = \frac{\sum NV}{NV \text{ Maximum}} \times 100\%$$

$$\%NA = \frac{71}{80} \times 100\%$$

$$\%NA = 88.7\%$$

Based on the data above, the results of the validation analysis of *macca biology learning media* based on *Andromo Android software* were obtained for the language component and content feasibility. The results of the validation analysis for content and language feasibility starting from the statement in the first point to the end, namely obtaining %NA = 88.7% are in the very valid category.

Based on the data validation results obtained from the two components in above, where it shows the validator value is the score set from the material validator added up with the media validator score is then divided by two in category Which worn namely 100%, the average value of the two validators obtained the value of %RT = 90.5% with very valid criteria which means that *Macca biology learning media* based on *Andromo Android software* is feasible and can proceed to the next stage, namely the practicality test after making revisions based on suggestions from the experts. expert. The validity of a learning device is said to be valid if the learning device is declared fit for use with revision or without revision by the validator. Adams et al. (2011) said, that the validation of learning devices is carried out by means of a person or several learning experts providing an assessment of learning devices through expert validation instruments to assess the suitability of learning devices with their theory and provide input for improving learning devices.

*Macca biology* has advantages including this learning media can be used offline in other words students can learn even without an internet network the

material contained in. This is evidenced by several relevant studies, namely research by Syarisma (2019) with the title "Development of *Android -Based Learning Media Assisted by Codular Fluid Learning at SMAN 3 Bontang*" which is a physics subject and research by Riyan (2021) with the title "Use of *Codular to Develop Android Application Media in Learning Green Plants in Class V Elementary School*" with the same subject but with different material.

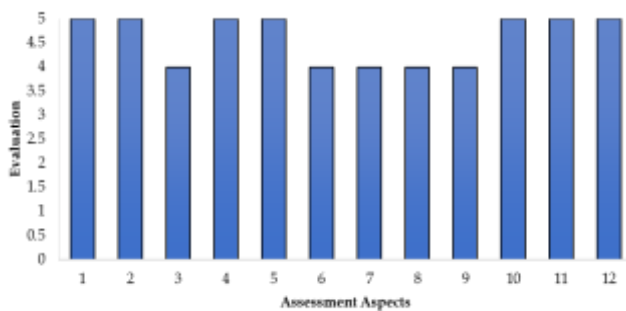
*Practicality*

The practicality level of the product being developed is carried out by a practicality analysis which consists of the practicality of media responses by teachers and students. Data on the level of practicality of *macca biology learning media based on Andromo Android software* were obtained through a practicality questionnaire. This stage involves one teacher and 32 students. Based on the results of the analysis obtained the following results:

$$\%Rs = \frac{\text{total score}}{\text{maximum score}} \times 100\%$$

$$\%Rs = \frac{55}{60} \times 100\%$$

$$\%Rs = 91.6\%$$



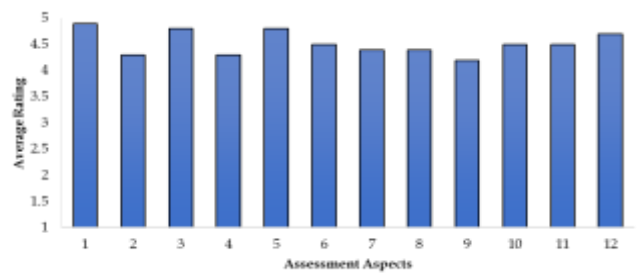
**Figure 4.** Aspects of the practicality of the media by the teacher

In the practicality analysis stage of *macca biology learning media based on Andromo Android software*, 12 statement points were used from the teacher's response regarding the practicality of the media. Figure 4 shows that the teacher as a respondent gave a practical response to the *macca biology media based on Andromo Android software* in the range of values  $4 > X \leq 5$  with an average rating of 4.58 or in the form of a percentage of 91.6% in the very practical category.

$$\%Rs = \frac{\text{total score}}{\text{maximum score}} \times 100\%$$

$$\%Rs = \frac{1738}{1920} \times 100\%$$

$$\%Rs = 90.5\%$$



**Figure 5.** Average practicality aspect by students

Based on the graph above shows that students as respondent practicality to media learning with a range of  $48 > X \leq 59$  with an average of 54.3 or in a percentage of 90.5% obtained from 32 students on very practical category.

According to Santi et al. (2016) each learning device is said to be practical if the teacher's assessment is at least in good criteria.

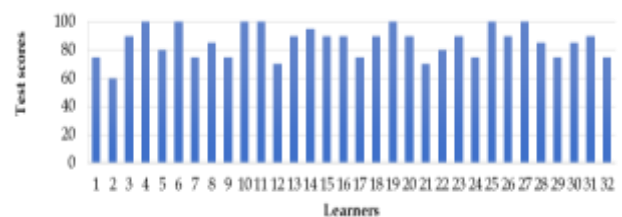
*Effectiveness*

Effectiveness media learning obtained from completeness results Study student form of repetition after use media learning *macca's biology*. Results Study obtained from 32 students. From results test which given to student obtained that completeness learners is 96.8%. Matter the means that completeness learners exceed 80%. So can concluded that media learning *macca biology* this is media learning which effective used on eye science lessons with environmental pollution material. This means media learning *macca biology* can reach success for achievement something objective which set like which put forward by Putra et al. (2019). Objective which set the is 80% students can reach Criteria Completeness Minimum (KKM).

$$\%Completeness = \frac{\text{number of student completed}}{\text{total number of student}} \times 100\%$$

$$\%Completeness = \frac{31}{32} \times 100\%$$

$$\%Completeness = 96.8\%$$



**Figure 6.** Aspects of the effectiveness of learning media

**Conclusion**

Media experts' (%NA = 92.3%) and material experts' (%NA = 88.7%) validation results show that

Macca's biology learning media, built on Andromo Android software, fits very valid standards. This media is classified as very valid with the average of these two validation criteria (%RT = 90.5%). Aside from that, instructors have responded favorably to Macca's biology learning materials, which are built on the Andromo Android platform, scoring 91.6%, and educators have participated, scoring 90.5%. As a result, one may categorize this educational material as extremely practical. As demonstrated by the student's 96.8% classical pass rate after utilizing this learning medium, Macca's Andromo Android-based biology learning media is effective in the context of effectiveness. The study's findings demonstrate how well this learning tool is employed as a learning tool.

#### Author Contributions

Conceptualization, M.A. and A.A.; methodology, A.B.R.; software, R.I.; validation, M.N. and M.K.N.; formal analysis, A.Y.; investigation, S.R.

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#### Conflicts of Interest

There is no conflict of interest disclosed by the writers.

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