

## Development of Android Application-Based Learning Media Using Smart Apps Creator (SAC) on Cell Division Materials

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### Abstract

Mobile phones are not only used as a communication tool in the millennial era, but they can also be used in the learning process. Mobile phones are rarely used as a learning tool by students. This study aims to determine the validity level of learning media based on Android applications using Smart Apps Creator (SAC) on mitotic and meiotic cell division material. This type of research is research development, or research and development (R&D), using the ADDIE model, which is modified only up to the development stage with limited trials in class XII IPA 1, SMA Negeri 1, Tapa. The results showed that the results of validating learning media based on android applications using Smart Apps Creator (SAC) on mitotic and meiotic cell division material were included in the "very valid" category with a percentage of 3.93%.

**Keywords:** Android-Based Learning Media, Cell Division, Smart Apps Creator



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### INTRODUCTION

Modern lifestyle really needs education. Fundamentally, education is a process that assists individuals in developing their capacity to learn and prepare themselves for the rapidly changing pace of the world. Education will always be relevant in a world that is constantly changing due to demographic changes, technological advances and the availability of information. If the educational landscape does not change to reflect these developments, education will become out of date and out of step with the technological advances that are occurring more rapidly in today's millennial generation. (Yuberti, 2021).

The use of learning media is very important in the learning process. Learning media is a source that teachers can use to broaden the horizons of their students. Teachers can use various learning media to provide information to students. If the learning material is presented by the teacher in an easy-to-understand way, the use of instructional media can encourage students' interest in learning new things. Learners can be stimulated in their learning process by involving learning materials. In formal educational institutions, the management of teaching materials is very necessary. Learning activities can utilize learning media as a tool. (Hopefully 2019).

[Kustandi \(2011\)](#) emphasizes that the media functions as a channel for delivering messages from the sender to the intended audience. More specifically, graphic, photographic or electronic tools for recording, processing and reconstructing visual or verbal information tend to be interpreted as media in the teaching and learning process. [Susilana \(2009\)](#) emphasizes that media is categorized according to its level, starting from the most concrete to the most abstract, in an effort to use it as a tool. Lesle J. Briggs defines learning media as physical means for transmitting learning content, including books, films, videotapes, etc. in [Russman \(2008\)](#). Briggs added that the media can be used as a tool to motivate students and expedite the learning process.

Teaching tools and methods are promoted as a way to develop basic skills and competency standards. Therefore, competency standards (SK), basic competencies (KD), and graduate competency standards must serve as guidelines in making teaching materials (SKL). Without the guidance of SK, KD, and SKL, teaching materials will not be of much use to students ([Magdalena et al. 2020](#)). Learning basically occurs when students are able to learn. Therefore, it is the teacher's responsibility to have a thorough understanding of the needs of students, especially in relation to how they receive and process information. The tendency of the participants' learning styles must be taken into account when choosing the right learning media. For example, a teacher can use media that students can see (visual media) if they have students who prefer to learn visually (by seeing) ([Mustafida 2016](#)).

One of the crucial factors that must be considered in the learning process is how to improve the quality of learning. Every school has this responsibility, but the role of teachers as teaching staff is very important. Teachers must always be creative and innovative in conducting learning so that students more easily understand the material presented and enthusiastic in participating in the teaching and learning process, so that the learning carried out is of high quality and the achievements achieved by students are satisfactory ([Zaki, 2020](#)).

The learning process so far seems to consist only of lecturing on concepts and using blackboards as a tool. Because the teacher continues to lecture about the material, some students are less motivated to learn. Especially if learning media is not used, which will make it easier for students, especially those in remote locations, to understand the information provided. Especially schools with poor educational infrastructure and resources, such as (poor internet network connection to access learning materials, lack of electricity, and so on).

During research observations at school, the researcher had a chance to talk with a number of students who reported that biology lessons on mitotic cell division and meiosis were quite difficult to understand. During the learning process, students experience difficulties in understanding the meaning of mitosis and meiosis, both in terms of the sequence of stages and the processes that occur at each stage of division and the differences between the two processes.

The material of mitotic and meiotic cell division that is often taught by teachers in schools sometimes makes it difficult for students to distinguish between the stages of mitotic and meiotic division. This is because when explaining or the assistive media that is displayed is still abstract in nature making it difficult for students to understand it, although there are also learning videos circulating on the internet but they have not given

the best results, which might happen to some people. from students. Considering that Android-based learning media can be used by teachers as teaching tools and by students as independent learning tools, Biology learning media are needed that are practical and able to support the learning process in the material of mitotic and meiotic cell division.

Students will develop this concept and then relate it to real life when they learn about biology. Students are able to apply the theoretical knowledge they learn in real-world situations. Learning involves more than just memorizing facts and information, and engaging in learning activities will encourage students to identify learning challenges that hinder their ability to understand what they are learning. This is also stated in Permendiknas Number 22 of 2006 which can be summarized as follows: "Each educational unit can organize learning in accordance with regional potential, cultural environment, economic conditions, and regional needs, as well as basic competencies and competencies. self-developed standards for more meaningful learning ([Permendiknas 2006](#)).

The use of interesting teaching media is one of the strategies used to create a fun learning environment. Learners will be engaged if innovative teaching methods and creative teaching materials are used, which will make the teaching and learning process interesting rather than boring. Teaching materials are very special and distinctive and unique, in the sense that they can only be applied to certain audiences in the learning process ([Nuryasana and Desiningrum, 2020](#)). Specific refers to the design of teaching material content only to achieve certain goals from certain audiences. Systematic teaching methods are also modified to suit the needs of the students who use them, as well as the characteristics of the subjects. Any type of material used to assist teachers or instructors in carrying out the learning process qualifies as teaching materials, according to the National Center for Competency-Based Training. The material in question can be in the form of written or unwritten material ([Nuryasana and Desiningrum, 2020](#)).

## **METHOD**

### **Location and Time of Research**

The research location was carried out at Tapa 1 Public High School in Tapa District, Bone Bolango Regency, Gorontalo Province which was carried out from November to December 2022.

### **Development style**

The development model used in this research is the ADDIE model, which is a research and development model of the Robert Maribe Branch which consists of five stages, including: analysis, design, development, implementation, and evaluation. However, this research only reached the implementation stage with limited trials.

### **Test Subjects**

The test subjects in developing learning media based on android applications using smart apps creator (sac) on cell division material were students of class XII IPA 1 SMA Negeri 1 Tapa.

### Research methods

The research method used in this study is an experimental research method, namely pre-experimental design with the research design used, namely one grub pree test-post test.

### Data collection technique

Research data collection techniques using *Non-Probability Sampling* with this type of purposive sampling technique. Research data was obtained using data collection instruments in the form of: 1) Media expert validation sheets; 2) Material expert validation sheets and questions; 3) Teacher and student response questionnaires; 4) Learning implementation sheet; 5) Student observation sheets; 6) Learning implementation sheet; 7) The test sheets are in the form of pre-test and post-test questions for students.

### Data analysis technique

The research data was analyzed using descriptive and quantitative analysis.

### Validity Analysis

Analysis of the validity of learning media data in this study uses the formula according to the average value (Arikunto, 2010) as follows :

$$x = \frac{\sum x}{n}$$

Where :

$x$  = Average value

$\sum x$  = The total number of answers from the validator

$N$  = Number of validators

The validation criteria for the analysis of the average value can be seen in Table 1.

**Table 1.** Average Value Analysis Validation Criteria

Average	Validation Criteria
3.75 – 4.00	Very valid
3.00 – 3.75	Valid
2.25 – 3.00	Valid Enough
1.50 – 2.25	Invalid

(Arikunto, 2010)

### Practicality Analysis

Calculating the percentage of student responses in learning is used by using the following formula.

$$\text{Percentage (\%)} = x 100\% \frac{\text{jumlah respon peserta didik yang muncul}}{\text{jumlah peserta didik}}$$

Assessment of student responses is carried out by matching the results of the average total score given with the criteria in Table 2.

**Table 2.** Student Response Criteria

Value Range	Interpretation
86 % - 100%	Very good
76 % - 85 %	Good
66 % - 75 %	Enough
56 % - 65 %	Not enough
0 % - 55 %	Very less

(Sukardi, 2013)

Calculating the implementation of the learning process used the following formula.

$$\% \text{ Execution} = \frac{\text{Banyak Langkah yang terlaksana}}{\text{Banyak Langkah yang direncanakan}} \times 100\%$$

Assessment of the implementation of learning is done by trying the results of the average total score given with the criteria in Table 3.

**Table 3.** Learning Implementation Criteria

Value Range	Interpretation
86 % - 100%	Very good
76 % - 85 %	Good
66 % - 75 %	Enough
56 % - 65 %	Not enough
0 % - 55 %	Very less

(Sukardi, 2013)

### Effectiveness Analysis

Student learning outcomes data in the cognitive domain (knowledge) can be analyzed using formulas.

$$\text{Individual completeness} = \frac{\text{peserta didik yang tuntas}}{\text{skor maksimum}} \times 100$$

The results of calculations using the formula above will obtain minimum mastery achievement data, which can then be used to calculate the percentage of students' learning completeness classically. The formula used is as follows.

$$\text{Classical completeness} = \frac{\text{peserta didik yang tuntas}}{\text{jumlah peserta didik}} \times 100$$

Learning outcomes data obtained by students are interpreted according to the criteria in Table 4.

**Table 4.** Classical completeness criteria

Value Range	Interpretation
86 % - 100%	Very good
71% - 85%	Good
66% - 70%	Enough
0% - 65%	Not enough

(Sukardi, 2013)

To get the n-gain value from the concept understanding score using the following equation.

$$g = \frac{\% \text{ skor post} - \% \text{ skor pre}}{100 - \% \text{ skor pre}}$$

Information :

g = gain increased ability to understand the concept  
pre-test score = average pre-test (%)  
posttest score = average post test score (%)

Category n gain namely: 1) learning with "high-gain", if  $\langle g \rangle \geq 0.7$ ; 2) learning with "medium-gain" if average is  $0.7 < \langle g \rangle < 0.3$ ; 3) "low-gain" learning if  $\langle g \rangle < 0.3$  (Hakes, 1999).

In following the learning process for two meetings the results of observations of students' activities were analyzed using the formula.

$$\% \text{ Student activity (pa)} = \frac{\text{jumlah skor yang diperoleh (A)}}{\text{skor maksimum (N)}} \times 100$$

Observations were made at each meeting, so the average percentage of student activity can be calculated using the formula.

$$\% \text{ average (pa)} = \frac{\% \text{ Pertemuan 1} + \% \text{ Pertemuan 2}}{N}$$

Assessment of student activity is carried out by trying the results of the average total score obtained with the criteria in Table 5.

**Table 5.** Student Activity Criteria

<b>Value Range</b>	<b>Interpretation</b>
86 % - 100%	Very good
76 % - 85 %	Good
66 % - 75 %	Enough
56 % - 65 %	Not enough
0 % - 55 %	Very less

(Sukardi, 2013)

## RESULTS AND DISCUSSION

### Results

The data were obtained from the validation results of two qualified validators. The assessments carried out by the two validators, media experts and material experts, produced validity results which were then analyzed and converted into very valid, valid, moderately valid, or invalid percentages as shown in Table 6.

**Table 6.** Validity Test Results

No	Expert Validator	Mark	Percentage	Criteria
1	Media Expert	3.93	98.25%	Very Valid
2	Material Expert	3.92	98%	Very Valid

Based on the results of the validity test by 2 (two) expert validators, data was obtained that the eligibility of the media from the assessment of media experts obtained a percentage of 98.25% in the "very valid" category, then continued with an assessment from material experts obtained a percentage of 98% in the "very valid" category. valid". Then a practicality test was carried out by distributing response questionnaires to biology teachers and students which are presented in Table 7.

**Table 7.** Practicality Test Results

No	Aspect	Percentage	Criteria
1	Execution	97.62%	Very good
2	Teacher	92.98%	Very good
3	Learners	82.05%	Good

Based on the distribution of the questionnaire to the respondents, namely the biology teacher and 29 students in class XII IPA 1 SMA Negeri 1 Tapa, it was found that the results of the assessment from educators (biology teachers) on the implementation aspect of learning obtained a percentage of 97.62% with the criteria "very good", and the response from the biology teacher to the media obtained a percentage of 92.98% with the criteria of "very good" and the results of the students' assessment of the media obtained a percentage of 82.05% with the criteria of "good". Furthermore, the effectiveness test was carried out through the pre-test and post-test to measure how much the value changed before and after the treatment which is presented in Table 8.

**Table 8.** Practicality Test Results

No	Aspect	Percentage	Criteria
1	Student Activity	79.53%	Good
2	Pre-test	24,13	Not enough
3	Post-test	81.32%	Good
	N-Gain Score	75.08%	Effective

Based on the results of the pre-test, an average score of 24.13 was obtained which proved that the learning outcomes of students were still below the school's minimum completeness criteria (KKM), which was 70. After being given the treatment, the post-test average score was 81. 32 which shows that there is an increase in learning outcomes. If converted through the normalized gain test, an increase value of 75.08% is obtained with the "effective" criteria.

### *Discussion*

Based on the research findings, it is known that 29 students experienced an increase in learning outcomes. Improved learning outcomes like this were obtained through pre-test and post-test exams, where there was an increase in results after using Android application-based learning resources created by Smart Apps Creator (SAC) on material related to cell division. . This shows how easy it is for students to understand the teaching media that the researcher has created. It can be seen that students have no difficulty learning with the developed teaching media. Students believe that the use of innovative learning media applied by teachers gives the impression to students that teachers are also trying to help students in learning and motivate students during the learning process.(Suprihatin Siti, 2020).

Basically learning media can be interpreted as an independent learning package which includes a series of learning experiences that are planned and systematically designed to help students achieve learning goals (Mulyasa and Script, 2021). This is also in line with Hazel's opinion that learning is shown from changes in behavior as a result of learning experiences. So that with a quality learning process, one day you will get the learning results that are in accordance with your wishes (Lambert, 1960).

The use of learning media in the teaching and learning process can generate new desires and interests, generate motivation and stimulate learning, and even bring psychological influences on students. Media is very useful and useful in the process of education because with learning media the learning process is more directed, organized and has guidelines according to educational goals (Indriyani 2019)). Media or learning aids are dynamic so that they can influence the learning process which is closely related to the implementation of learning in order to achieve graduate competencies with learning outcomes that are in accordance with the wishes (Hamalik 2003).

From the explanations of several previous experts regarding the elements, theories, and principles of learning, we can conclude that the influence is from within (internal) and from outside (external). One of the external factors that influence is the use of appropriate learning media as a form of communication process between educators and students. This is in line with the opinion of Gagne and Briggs that the media is a component of the system for conveying something, conveying information from educators to students in the form of knowledge information in the learning process (Koohang, 2007).

The results of this study were supported by research conducted by Yuberti entitled "Development of Smart Apps Creator-Based Mobile Learning as a Physics Learning Media" showing the results that the assessment of material experts with a score of 87.76%, media experts with a score of 94.58%, material experts technology with an average yield of 84, so the product is very feasible. The educator's response was carried out to assess the feasibility of learning media in the form of mobile learning which was developed with an average score of educator response assessments of 89.04%. As well as the results of the student interest response of 82.40%. The results of the mobile learning interest response test showed that the media developed was able to motivate students in the learning process (Yuberti, 2021).

Based on this, researchers see that learning media based on android applications is one of the tools that can be applied in the world of education, especially in the material



of mitotic and meiotic cell division. Apart from being a learning medium, media based on android applications can be used as a means to open up students' knowledge about information that can be integrated with the learning being studied. This is in accordance with Lefrida's opinion which states that proper teaching is teaching that is in accordance with the material to be taught, while effective teaching is teaching that is able to utilize all the potential that drives the achievement of goals. The effective level can be seen from the learning achievement that will be obtained from the learning outcomes (Lefrida, 2016).

Various innovations have been made in the world of education through theoretical and empirical studies but very few have adapted to the daily lives of students. One educational innovation that is very suitable for use is learning media based on Android applications. Currently, the use of smartphones is not only used as a communication tool, but can be used in the learning process. Most students' smartphones have not been used as learning tools, and if we look back at the habits of the current generation, almost all of their smartphones have game applications, and teachers have not maximized the use of electronic media such as applications that can be installed on students' smartphones for the learning process.

## **CONCLUSION**

1. Android application-based learning media using smart apps creator (sac) on mitotic and meiosis cell division materials developed have met very valid criteria obtained from validation results based on aspects of usability, functionality and visual communication, with an average score of 3, 93 with a percentage of 98.25%.
2. Android application-based learning media using smart apps creator (sac) on mitotic and meiosis cell division materials developed have fulfilled practical criteria because the learning implementation is carried out with a percentage of 97.62% in very good category, teacher response to android application-based learning media using smart apps creator (sac) on mitotic and meiosis cell division materials obtained an average percentage of 92.98% in the very good category, and student responses obtained a percentage of 82.05% in the good category.
3. Android application-based learning media using smart apps creator (sac) on the mitotic and meiosis cell division material developed has met the criteria of effectiveness with the percentage of student activity during 2 meetings of 79.53% with good criteria. For the cognitive domain learning outcomes test, classical completeness was 86.20% and was at 75 (above the KKM). For a comparison of the average pre-test and post-test scores, there is a difference of 57.18, while the N-Gain value of 0.750 is included in the high criteria, and for the N-Gain the percent score is 75.08% and is included in the effective category. Based on the results of the study it can be concluded that learning media based on android applications using smart apps creator (sac) on cell division material is very valid, practical, and effective for use in the learning process.

## **REFERENCES**

Ahmad Zaki, Diyan Yusri,. (2020). "Using Learning Media to Improve Student

- Achievement in PKN Lessons at Darussa'adah Private High School, Kec. Dairy Base." *Al-Ikhtibar: Journal of Education* 7(2), 809–20.
- Script, Bambang Mulyasa and. (2021). *Implementation of the Revised 2013 Curriculum: In the Industrial Age 4.0.* Jakarta: Earth Script. Page 75.
- Arikunto. (2010). *Research procedures: a practical approach.* Jakarta: Earth Script. Page 37.
- Cecep Kustandi, Sutjipto. (2011). *Learning media: Manual and digital.*
- Hake. (1999). "Analyzing change/gain scores." *AREA-D American Education Research Association's Division.D, Measurement and Research Methodology.*
- Hamalik. (2003). *Teaching Planning Based on Systems Approach.* Jakarta: Earth Script. Pages 50-53.
- Harahap, Hasmi Syahputra. (2019). "Development of Macromedia Flash-Based Biology Interactive Teaching Media in Computers on Human Respiratory System Material." *Jurnal Pembelajaran dan Biologi Nukleus*, 5(2), 54–66.
- Indriyani, Lemi. (2019). "Utilization of Learning Media in the Learning Process to Improve Students' Cognitive Thinking Ability." *Proceedings of the National Education Seminar, FKIP, Sultan Ageng Tirtayasa University* 2(1), 17–26.
- Koohang. (2007). *Learning Objects and Instructional Design.* California: Informing Science Press. Page 22.
- Lambert. (1960). *Early Childhood Education.* Boston: Allyn and Bacon. Page 438.
- Lefrida, Rita. (2016). "The effectiveness of implementing contextual learning with the REACT strategy (Relating, Experiencing, Applying, Cooperating, and Transferring) to increase understanding of Fuzzy Logic material." *Journal of MIPA Education FKIP UNTAD* 16(3):35–40.
- Magdalena, Ina, Riana Okta Prabandani, Emilia Septia Rini, Maulidia Ayu Fitriani, and Amelia Agdira Putri. (2020). "Analysis of Teaching Materials Development." *Journal of Education and Social Sciences*, 2(2), 170–87.
- Mustafida, Fita. (2013). "Based Learning Media Studies." *Madrasa: Journal of Basic Education and Learning* 6(1), 77–96.
- Nuryasana, Endang, and Noviana Desiningrum. (2020). "Development of Teaching and Learning Strategy Teaching Materials to Increase Student Learning Motivation." *Journal of Research Innovation* 1(5), 967–74.
- Permendiknas. (2006). "Minister of National Education of the Republic of Indonesia." No. 22 Year 2006. *Global Shadows: Africa in the Neoliberal World Order*, Vol 44(2), 8–10.
- Rudi Susilana, Cepi Riyana. (2009). *Learning media: nature, development, utilization, and assessment.*

- Rusman. (2008). "Jigsaw Cooperative Learning Model." 99 halaman.
- Siti, Suprihatin. (2020). "Teachers Innovate Teaching Materials as a Step to Improve Student Learning Outcomes." *Journal of Economic Education UM Metro* 8 (1).65–72.
- Sukardi. (2013). Classroom Action Education Research Methods: Implementation and Development.
- Yuberti, Y. (2021). Development of Smart Apps Creator-Based Mobile Learning as a Physics Learning Media. *Physics and Science Education Journal (PSEJ)*, 1(2),12-19

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