

# Ossification Learning Media Based on Android System For Improving of Concept Understanding

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**Abstract.** This study aimed to analyze feasibility, pre- and post-test student respons, and enhance student concept understanding by using ossification learning media based on Android system. This research and development (R&D) used ADD from ADDIE model. Ossification learning media based Android was made by contextual approach. The result from this study showed that ossification student learning media based Android was feasible used in learning activity from material aspect and media aspect. Students respons after used ossification learning media based Android suggest tha it was feasible. This media increased students concept understanding with gain score 0,64 (medium). The conclusion from this study, ossification student learning media based Android system was feasible and can improve student understanding at medium category.

## 1. Introduction

Learning biology is a form of interaction between students subject in the form of learners, which can manifest in the form of biological objects or events biology, and technology as a tool for learning. Learning biology has the goal of obtaining a more meaningful experience (understandable) [2]. Interaction of the above three factors can occur directly or indirectly. Direct interaction process is the phenomenon or biological phenomenon can be observed or allow to be done. Biological phenomena or symptoms that can not be observed or not allowed to do directly called indirect interaction. A biological phenomenon involving in the process or mechanism in the body is less capable of being observed by the naked eye without aids. Therefore, it is necessary to support instructional media competence in the learning process.

Learning to do in high school is not using a specific media variation with the latest technology-based so that students tend to get bored and less learning objectives achieved optimally.

Ossification mechanism is one of the difficult topics that teachers have difficulty explaining this ossification process. Learners also have difficulty explaining the mechanism of this ossification. The mechanism of reinforcement or ossification has not been incorporated in the learning media. This material contained in the curriculum regulations were written in 2013 KD 3.5 "*Describe the relationship between structure, function, and processes as well as disorders / diseases that can occur in the human motion system*".

Criteria for a good learning media for use in the learning process that the media can interpret an abstract concept into a concept that is easily understood by learners [8]. Contextual approach is a learning concept which presented a informasipermasalahan / phenomena in the real world into the

classroom by the teacher or teachers and to encourage learners to connect between a problem with the application of knowledge of learners [1].

Evolving technology is meant to clarify the subject of a competency. Based on observations conducted in SMA Negeri 1 Pleret optimal use of smartphones has not been used in learning. Smartphone educational content as a means of education to change the negative side of the smartphone into a positive side to increase and develop the science to be learned. Based on observations conducted in SMA Negeri 1 Pleret optimal use of smartphones has not been used in learning. Almost all learners have a smartphone with Android operating system. Penyusunan learning media can be used as a solution to find the concept of a competency context studied. Android-based learning media can visualize an object that does not allow viewing.

This study aims to determine the feasibility of learning media ossification of biological material based on Android, the response of students SMA Negeri 1 Pleret after using biology teaching media applications based on Android, and increase understanding of the concept before and after using instructional media ossification biology learning material based on Android.

## **2. Methods**

### *2.1. Types of research*

This study is *Research and Development* (R & D) with the ADDIE development model. The only study conducted up to the stage of Development (D2).

### *2.2. Time and Place of Research*

This research was conducted in September 2018-April 2019 with the translation of the preparation of the media in September 2018 and January 2019. The trial of instructional media is held on Monday, April 29<sup>th</sup>, 2019 at SMA Negeri 1 Pleret.

### *2.3. Research subject*

Subjects in this study are two teachers of biology with the criteria already finished studying biology undergraduate, had been taught to students on the subject of the formation of human bones have based smartphone Android or laptop running Windows, and be able to operate, as well as the students of class XI IPA 2 SMA Negeri 1 Pleret numbered 19 people.

### *2.4. Research procedure*

Research carried out by stages as follows:

Phase Analysis (Analysis). The analysis phase consists of three stages: analysis of competence, analysis of the characteristics of learners and instructional analysis. Stage Design (Design). The design phase consists of three stages: stage of collecting the subject of competence, stages of design / construction of the scenario presentation of subject matter competence, and the design stage design (storyboard) of instructional media applications. Learning Media Preparation Phase (Development) [10]. The development phase consists of 8 stages: pre-formulation, formulation, review 1, revision 1, review 2, revision 2, and limited testing.

### *2.5. Data analysis technique*

The data analysis technique used to analyze the product of learning media descriptive data. The processed data in this analysis technique is derived from the assessment review and response test results instructional media use Android on the learner.

Product quality data analysis techniques. Data analysis techniques used by using qualitative descriptive analysis techniques. Qualitative data is a compilation of data on media that contained the instructional media preparation process, criticisms, and suggestions dai matter experts, media specialists, teacher of biology and biology teaching media practitioners ossification (learners) to illustrate the feasibility of such media. Data quality instructional media products ossification (ossification mechanism) in the form of qualitative descriptive data. Data obtained from the reviewer,

calculated the frequency of occurrence of each criterion. The criteria that have frequency of occurrence of the most (mode) or a percentage of the greatest the conclusion quality Android-based learning media called "The Secret of Ossification". Learning media can be said to be feasible if it has a value of either mode with the minimum criteria / approved which can be seen by the percentage equation as follow:

$$\text{Percentage of each criteria} = \frac{\text{Total Frequency of each criteria}}{\text{Total Frequency of all criteria}} \times 100$$

Percentage of data processing results categorized by using the scale to determine the level of validation of learning media [12] :

Table 1. Interpretation of Criteria Learning Media Percentage

Figures	Information
0% - 20%	Very less worthy
21% - 40%	Less deserving
41% - 60%	Pretty decent
61% - 80%	Decent
81% - 100%	Very decent

Analysis of the level of concept understanding of learners obtained from the data before (Pre-test) and after treated (Post-test). Data from pre-test and post-test scores were analyzed using a gain to determine the understanding of the concept of learners before and after using the instructional media. Ternomalisai gain score analysis aims to determine the increase in the study of students ie before and after the learning. The increase in the average score of the pre-test and post-test calculated using average gain ternomalisasi corresponding gain following equation:

$$\text{Gain score } (G) = \frac{\text{Posttest Score} - \text{Pretest Score}}{\text{Ideal Score} - \text{Pretest Score}}$$

The table below shows the high and low gain score category normalized. Criteria for an improved understanding of the concept of learners before and after using Android-based instructional media ossification under the name "The Secret of Ossification" rated with the highest scale of  $0.70 \leq g \leq 100$  which indicates an increased understanding of learners before and after using a medium of learning is high, while the lowest scale of  $-1.00 \leq g < 0.00$  which showed a decline in students understanding before and after using Android-based learning media [17].

Table 2. Gain Value Score Interpretation

Value (G)	Level Relationships
$0.70 \leq g \leq 100$	High
$\leq 0.30 \ g < 0.70$	Moderate
$0.00 < g < 0.30$	Low
$g = 0,00$	No increase
$\leq -1.00 \ g < 0,00$	There was a decrease

### 3. Results and Discussion

This research applies have the kind of R & D (Research and Development), which means research that aims to produce a specific product which is then tested the effectiveness of these products [14]. The model used ADDIE model problem which has been limited to ADD. ADD procedure includes three main stages: stage Analysis (analysis), stage design (design), and the Development stage (drafting).

The analysis phase is to set and define the needs analysis in terms of the preparation of teaching media. The analysis conducted in this study is the analysis of learning needs conformity with the

applicable curriculum, analysis of the characteristics of learners, and instructional analysis. At this stage of observation in SMA Negeri 1 Pleret. The results of the analysis phase consists of several stages, including:

### 3.1. *Competence analysis*

Competence is a basic reference which must be mastered by the learner on a section of the material provided in teaching and learning. Competence analysis has the objective to analyze the curriculum used in schools, namely curriculum 2013 curriculum revision in 2016. This became the object of analysis such as identification of core competencies (KI) and basic competence (KD) subject matter of ossification (bone formation mechanism). Based curriculum is used and the problems found in the process of learning, the curriculum can be obtained on the analysis set out in the following :

Core Competencies. Understand, implement, analyze the factual knowledge, conceptual, procedural sense ingintahunya based on science, technology, art, culture, and humanities with human insight, national, state, and civilization-related causes of phenomena and events, as well as applying procedural knowledge in the field specific studies according to their talents and interests to solve the problem.

Basic competencies. Describe the relationship between structure, function, and processes as well as disorders / diseases that may occur in the motion system in humans [4].

Indicator. Specifying the type of bone, explaining the distribution process of ossification, mention of the support process of ossification, mentioning abnormalities, treatment and prevention of diseases associated with ossification and mention the technology associated with ossification.

### 3.2. *Analysis of Characteristics of Students*

Researchers can identify the characteristics of learners so knowing the needs in learning and to consider the drafting of the implementation of learning by using this analysis. Analysis of the characteristics of learners disusuaikan with the characteristics of learners. This character has a function that the media which have been prepared in accordance with the characteristics of learners, so that the message contained in the medium can be conveyed to the user application. Based on the results of classroom observations and interviews to teachers, most learners have to have a smartphone with Android operating system and occasionally when the learning process is ongoing. The use of smartphones has not been used as a medium of learning in spite of occasional use learners in the classroom [9].

### 3.3. *Instructional analysis*

Instructional analysis is a breakdown phase Competence analysis. These specifications are stated to know the indicators of learning achieved learners and to formulate approaches used in the media. Analysis at this stage implemented Biology Teacher SMA N 1 Pleret. Researchers can determine the learning process on the subject of ossification and the problems that arise when teachers membelajarkan materials to learners with the usual methods do teachers. Researchers may also consider the appropriate media to the problems teachers face when teaching.

Learning biology with materials ossification (ossification mechanism in humans) is less effective. Learners are less able to understand the process of ossification because learning is only available pictures and explanations that are less detailed [16]. Students are less able to explain back subjects related to the mechanism of ossification. In addition, the lack of material resources ossification animation which tends to slightly so that learners are less able to explain the return of the material presented. SMA N 1 Pleret also have limitations biology book, this can be mitigated by the availability of Biology Student Worksheet (*LKPD*), but according to teachers it is also less effective due to the material presented in *LKPD* is minimum and less learned [13].

Results of the assessment material aspects are performed by two subject matter experts and two teachers of biology as a subject matter expert is as follows:

Table 3. Truth Concept Assessment by lecturer Expert Matter and Biology Teacher as expert materials

REVIEWER	Frequency of Assessment Criteria	
	True (B)	One (S)
A	70	0
B	70	0
C	70	0
D	70	0
Σ	140 items	0 items
%	100%	0%
feasibility material	VERY DECENT	

The assessment results are 100% correct concept and 0% false concept. The fourth subject matter experts consisting of two faculty subject matter experts and two teachers of biology as a subject matter expert concluded that 100% of the material presented in the app invaluable with the correct category. Percentage conclusion of truth material contained in the product of learning media and compared with the interpretation of the eligibility criteria table indicates that the application of instructional media learning media "The Secret of Ossification" otherwise very decent. Advice and inputs provided subject matter experts cartilage as a template that is contained in the fetus until the toddler: coupled with the caption "In the adult bones are still cartilage in certain organs".

The results of the media in general eligibility assessment conducted by two experts of material obtained results:

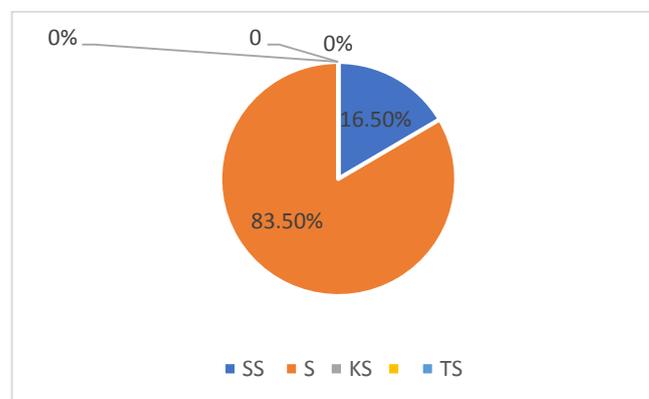


Figure 1. Comparative Assessment Feasibility Study by the second Media Expert Media and 2 Teacher (Blue: Very good, Brown: Good).

Biology learning media applications have eligibility percentage reaches 100%. Obtaining this percentage is obtained from the sum of which amounts to a category strongly agree and agree 16.5%, amounting to 83.5%.

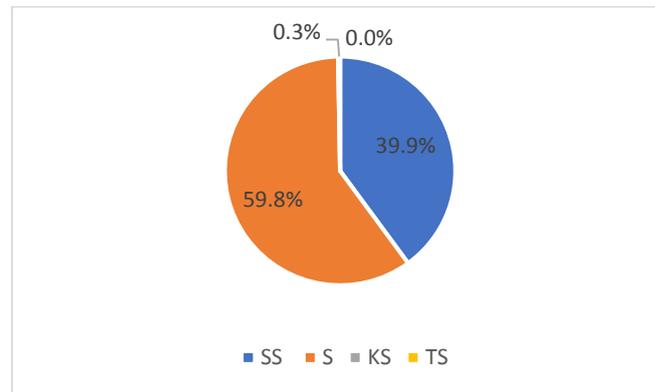


Figure 1. Comparative Assessment Feasibility Study by the second Media Expert Media and 2 Teachers as Media Expert (Blue: Very good, Brown: Good).

### 3.3.1. Aspect of Graphics Content

Aspects of display quality associated with shapes, colors, layout or placement of text, images, audio, video, and consistency the key as a learning medium. Color works well if the appearance be able to clarify vision in capturing objects / text presented. Video function properly if capable of displaying a moving story for later playback into the appropriate motion desired length (there are controls for meghentikan or repeat video) [5].

Based on the results of the assessment by two lecturers media experts and two teachers of biology as media experts, graphic aspect in the application of learning media by expert lecturers media get the highest category that agree with the percentage reached 100% of the assessments is agreed amount to 45% and ratings agree amounted to 55%. Obtaining percentage feasibility study media aspects of material that is 100% conformity. If the table is converted into a percentage of instructional media interpretase criteria it can be concluded that the graphic aspect, the media application has a very decent category. It shows that the media developed, choosing colors, layout or placement of text, video and consistency amber button as a display medium of learning is very good. Provision of color in the media application learning so that the impression has been good contrast and video use in accordance with the material presented [11].

### 3.3.2. Eligibility aspect of Contents

Contents feasibility aspects rated by two professors of media experts and two teachers of Biology as a media expert. Fourth reviewer media application rate of learning "The Secret of Ossification" has a value feasibility of material amounted to 100%. The percentage amount consisted of 37.5% of votes 62.5% strongly agree and agree. The value tegolong very feasible when converted into percentage interpretase criteria table instructional media it can be concluded that the feasibility aspect of content, the media application has a very decent category. This shows that in the media that are developed, the suitability of the material is good or in accordance with the curriculum [7].

### 3.3.3. Eligibility aspects Presentation

Presentation feasibility aspects rated by two professors of media experts and two teachers of Biology as a media expert. Fourth reviewer media application rate of learning "The Secret of Ossification" has a value which amounts to 98.8 feasibility matter%. The percentage amount consisted of 52.3% votes and 46.6% strongly agree agree. The value tegolong very feasible when converted into percentage interpretase criteria table instructional media it can be concluded that the feasibility aspect of content, the media application has a very decent category. This means that in the development of instructional media have used material explanation compiled from simple to complex making it easier for learners to

learn. Besides the features, images, animation, and video will appeal to students that will raise interest in learning [6].

#### 3.3.4. Linguistic aspects

Criteria relating to language, among others, the clarity of language and suitability of the language. Clarity of language is the language used so easily understood communicative learners. While the appropriateness of the language which is the language used in the media according to the developmental stage of learning learners [15]. Based on the assessment of the linguistic aspects of media experts of the obtained ratings as much as 25% strongly agree and 75% disagree. Acquisition of eligibility percentage aspects of language learning media is 100%. If the table is converted into a percentage of instructional media interpretase criteria it can be concluded that the suitability of the material aspects, the media application has a very decent category. This means that the language used in teaching media facilitate learners in the learning and the language used in accordance with the stages of development of learners [3].

#### 4. Conclusion

Based on data analysis has been carried out, it can be concluded that:

Instructional media applications based on Android ossification biological material is already fit for use and meet the criteria in terms of aspects of biology teaching material (100%) and the media was (99.72%) with a very decent category. Response learners SMA 1 Pleret after using instructional media applications based on Android biology result eligibility percentage of 97% with a very decent category. Media can improve the understanding of the concept of learners to gain score of 0.64 results were included in the medium category.

#### Suggestion

Learning media ossification Android-based biological materials have deficiencies in the preparation or presentation. From this necessary criticism and suggestions as perfecting the preparation of these media include: Preparation of instructional media applications limited only to the stage of development (development), further research is expected to continue research with the phases of implementation (implemetation), and Evaluation (evaluation). The study, conducted by researchers are still limited to one school, so that the media needs to be tested more than one school to be eligible for use in large scale.

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