



## Botanical application: Android-based learning media to enhance interest in learning plant material

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Article Information	ABSTRACT
Submitted: 2021-01-31 Accepted: 2021-03-31 Published: 2021-05-02	<p>Balikipan Botanical Garden School has a very supportive learning environment, especially in studying plant material, but there are still many students who show low interest in learning so that an application in the form of android application to foster student interest in learning related to plants. This research aims to determine the feasibility of the botanical application as the further development of a flash application with the same theme to enhance interest in learning plant material. This research is used Research and Development (R&amp;D) with ADDIE model which includes the analysis, design, development, implementation, and evaluation stage. The data were collected using a questionnaire to measure students' learning referring to Mitchell's theory with 25 questions. The result showed that the botanical application is feasible to use with a score of 3,86 (feasible) and 4,16 (very feasible) according to media and material experts, and also a score of 4,47 (very feasible) according to the students. It also can enhance interest in learning plant material at the significance level of <math>0.002 &lt; 0.05</math> with 46,6% of students reach the high criterion and the other 53,3% reach the moderate criterion of interest. This android-based of botanical application turns out to be able to enhance interest in learning about plant material due to learners' option to choose learning content depending on their interest.</p> <p><b>Keywords:</b> Application; media; flash; plant; interesting</p>
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## INTRODUCTION

Learning interest is an important role that contributes to the learning process and achievement (Harackiewicz et al., 2018). An effective learning process can be influenced by student interest, where more interested students can improve learning that can lead to better achievement (Zhu & Zhou, 2012;

Roure et al., 2019). One of the interests that can be engaged is situational interest, which is caused by a stimulus from the environment (Lee et al., 2011), where the teacher has control over students' interest in learning by creating an appropriate learning environment. According to Wang (2017) in his research, the combination of outdoor and media learning in education and classroom has a positive effect on learning satisfaction and learning interest. Also, the real-object media is more effective than PowerPoint media especially for students with a relatively low level of interest to learn (Sitanggang et al., 2019). Chen & Xia (2012) said media who integrated with different media elements such as text, sounds, images, and animation can give students the convenience to conceive words data and understand teaching objects, also it makes learning more vivid and intuitive, because of quick and efficient to handle. Yang (2015) also said that the combination of media elements can improve students' information reception effect, and deepens students' memory and understanding of knowledge with its vivid pictures, videos, and refined language.

One school that has real objects in a supportive learning environment, especially on the topic of plants, is the Balikpapan Botanical Garden School. An interview with the school headmaster Mr. Wahyudi (on 5 December 2018) said that various interesting programs were developed at the school, including collaboration with the Balikpapan Botanical Garden which produced a mini-laboratory for cultivation, especially for endemic plants typical of Kalimantan such as meranti, bankerai, and ironwood. However, there is no media application for learning that can also support this environment. Based on observations, most students showed less interest in plant material, even though the environment was very supportive of these conditions. Some indicators of student disinterest can be seen from students tend to be passive, like to wait for instructions or wait for the teacher to give assignments; rarely learning new material by themselves; not determined to focus on learning, they tend to only memorize and not develop learning materials; also likes to avoid difficulties and prefer to copy answers from others. Çimer (2012) identified that many concepts or topics in biology, which include water transport in plants perceived as difficult to learn by secondary school students. Etobro & Fabinu (2017) also stated that the concept of plants has a difficulty level of 50.3%. Fauzi & Mitalistiani (2018), added that plant tissue also includes the topic that is often chosen as the third most difficult topic by students.

For this problem, an effort is needed to attract students' interest in plant material, one solution that is deemed appropriate is through android application. This selection is due to the advantages of four factors such as the speed and the efficiency of the application in providing data exactly by the user command, productivity, and creativity, and also flexibility (Said et al., 2018). This is following the current goal of education 4.0, which is directing the alignment of learning with technology to produce an innovative future education model (Wallner & Wagner, 2016). The botanical application is the continued development of a flash application with the same theme but further developed in the android system. The difference between this botanical application with other android applications is that this application stores data related to the real plants in the botanical garden school of Balikpapan so that the development of this application can help students in this botanical garden school to learn according to their environment. The integration between media and school environment has a positive vital result in learning interest and better academic performances by students because it can improve their learning interest by comparing the information from the media with the real object in their surroundings (Oktavian & Aldya, 2020; Sithole, 2017). Then based on the description above this research aims to determine the feasibility of the botanical application to enhance interest in learning plant material especially in the Botanical Garden School of Balikpapan.

## RESEARCH METHODS

This research is Research and Development (R&D), with ADDIE methods from Dick and Carey (Sabri & Abdul, 2020), consist of analysis, design, development, implementation, and evaluation. Start with the analysis stage, by analyzing the problem in school needs. Then the design stage is carried out by making the storyboard of the botanical application. The development stage of the application is carried out by using a java programming language as the language and Eclipse for the programming environment, and also an android virtual device. This application is also validated by media and material expertise as a provider of criticism and suggestions on applications developed so that the level of validity can be determined. This implementation stage is carried out in a botanical garden school in early 2019 where the Covid 19 epidemic had not yet occurred. However, this research did not carry out further in implementation with the big scale of students. The implementation was using quasi-experiment with one group pretest-posttest. The questionnaire was given to 30 students in the small scale of testing, to see about the practicality of product that is developed, and also to see the increase of student interest in learning about plants while using this botanical application as measured using interest questionnaire by reviewing the aspects of attention, feelings of pleasure, involvement, and meaningfulness of students referring to the theory of (Mitchel, 1993). The data were analyzed by using paired sample T-test to know the increase of interest in learning plants before and after using the botanical application.

## FINDINGS AND DISCUSSION

The ADDIE model starts with the first phase by defining the learning theory including many factors such as learning environment, learning design, and learning interaction; Needs analysis is carried out to identify, consider and determine the needs needed in schools so that the learning is given to students functions and is under the conditions at school. To fulfill this, observations and interviews were carried out with various parties in the school. The in learning environment shows that there has not been much exploration carried out by students in the school environment to study material related to plants even though the school is a botanical school, besides that there are difficulties in understanding some concepts related to the process due to the limitations of the media. So a botanical application with android based is needed and suitable for the school environment because it's easy to carry anywhere (Narayanasamy, 2013). Furthermore, in the learning design, an analysis is carried out on the learning and the assignments that will be given which include the elaboration of the curriculum and the identification of the depth and breadth of competencies that must be developed.

Based on the results of observations on the learning tools used, the learning model used is discovery learning with basic competencies in the plant world, namely KD 3.8 classifying plants into divisions based on general characteristics, and linking their role in life, so that students can explore examples. Other plants that have the same characteristics in the school environment are very potential in training students' interests. This is based on considerations regarding the optimization of the use of the school environment, where learning obtained outside the classroom will increase the interest of students, besides that if students are faced with a real environment as it will help construct their knowledge with the knowledge they learn with existing facts so that they will help students understand concepts.

Then in learning interaction, because there is still minimal interaction with the learning environment, the use of the application can provide opportunities for students to learn the material independently, so that students can participate actively and not only as recipients of the information.

Besides, it can also help students to understand deeper concepts when compared to PPT or textbooks, including the existence of real pictures according to the conditions around students, it will be easier to help students understand, the presentation of images and text together will make it easier for the student to learning rather than being presented separately as in a book, there are animated videos and text to facilitate understanding of the reproduction process, there are also games to hone students' abilities, and there are practice questions that provide direct feedback, and there is a glossary to make it easier for learners when there are terms that are not understood (Liaw & Huang, 2012).

The second stage has created a design of the android application for the development phase. The software used is an android development kit with an android virtual device and using a smartphone device, with a thumb-focused interaction model. The aim is that applications can be run using one hand, making it easier for user navigation The language used is the Java programming language with the use of Eclipse to display images, text and questions, and illustrations (Abe & Owoeye, 2012). Besides, this application also provides settings for the sound to make it more attractive. This botanical flash application menu includes instructions for use, student competencies based on the 2013 curriculum, seed plant material, illustration videos, quizzes, games, and glossaries, ending with a bibliography, and application developer profiles. This application has an APK format and a capacity of 87 MB and can be operated with an Android-based smartphone.

Then, in the development stage, it uses the validity of the expert judgment on the material and media aspects. The result shows an average rating with a score range of 1.00-5.00 obtained value from media experts with a score of 3.86 in the category "feasible"; from the material expert with a score of assessment by teachers with a score of 4.16 in the category of "very feasible". The criteria of validity of this android-based are shown in Table 1 and Table 2 below.

**Table 1. The Validity of Botanical Application by Media Expert**

No	Aspects	Score	Category
1.	Unctionality	4.00	Feasible
2.	Ease of navigation	3.71	Feasible
3.	Application performance	3.80	Feasible
4.	Ease of operation	4.00	Feasible
5.	Feasibility of the android app	3.80	Feasible
	<b>Average</b>	<b>3,86</b>	<b>Feasible</b>

**Table 2. The Validity of Botanical Application by Media Expert**

No	Aspects	Score	Category
1.	Validity of material	4.65	Feasible
2.	Material finesse	4.00	Feasible
3.	Suitability of material with students	4.20	Very feasible
4.	Communicative	3.80	Feasible
	<b>Average</b>	<b>4,16</b>	<b>Very feasible</b>

In the implementation stage, a small-scale test is occurring. Consist of 30 students in one class, this test is was conducted to determine the practicality of botanical applications in learning material about plants in the school environment, by using the questionnaire the result shows that the score is 4.47 which means the application is very feasible to use. The criteria of validity of this android-based are shown in Table 3 below.

Besides that, at the implementation stage, measurements were also made of the interest in learning about plant material while using botanical applications, using the questionnaire from Mitchels'

theory with 25 questions consist of attention, pleasure, involvement, and meaning aspects. By using paired sample T-test, the results are shown in [Table 4](#) below.

**Table 3. The Validity of Botanical Application by Students**

No	Aspects	Score	Category
1.	Ease of operation	4.75	Very feasible
2.	Ease to understand	4.20	Very feasible
	<b>Average</b>	<b>4.47</b>	<b>Very feasible</b>

**Tabel 4. Paired Sample T-Test Interest in Learning Plants**

Aspects	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
				Lower	Upper			
Pretest – Posttest	-13.178	11.580	3.373	-7.937	-4.076	-3.946	29	.002

From the results of [Table 4](#), it shows that the significance score is  $0.002 < 0.005$  which means that there is a difference in the average student interest in learning before and after using botanical applications, which means that there is an effect of using these applications on student interest in learning, especially in material about plants. It is shown that from 30 participants, the criterion of student's learning interest achieved ranged between moderate ( $64,13 \leq x < 71,33$ ), and the high criterion ( $71,33 \leq x$ ). 46,6% amount reach high criterion, which means there are 14 students were have high interest, and the other 53,3% reach moderate criterion, which means there are other 16 students were have moderate interest after learning by using the android-based botanical application.

It shows that the android-based of botanical application has several benefits that can attract students' interest in learning. [Narayanasamy \(2013\)](#) said that mobile learning has advantages for learners because they have the option to choose to learn content depending on their interest. also said that android can be used at any time, and in any space or place because it enables personalized one-to-one interaction between the individual and the device. This application was also easier to accommodate several mobile devices in a classroom than several desktop computers and also allows learners to easily obtain information and learning materials effectively and efficiently with the result of increasing the competence of learners ([Nassuora, 2013](#)).

This Botanical application also fulfilled display aspects such as text, audio, video, images, graphics, and animation, and fulfills essential components in aspects of the learning process, such as discursive, adaptive, interactive, and reflective ([Erlina et al., 2018](#); [Alomary et al., 2016](#)). When compared with the use of power points such as research conducted by [Abusharib et al. \(2015\)](#), approximately half of the students (52%) reported that the most boring factor in the presentations was the large number of slides being presented, and about (54%) of the students considered that dim light was the first distracting factor. Which mean that the botanical application based on android can be more useful because it contains more of games, image, text, and simulation. The display of android-based of Botanical application can be shown in [Figure 1](#) below.

The android-based of botanical application is very helpful because it uses plants around the Botanical Gardens school as a source of information so that students can observe and prove the information presented in the application with real plants. Learning is also said to be more successful if the object studied is a real object in the surrounding environment, so that interaction with the environment can also be important ([Abe & Owoeye, 2012](#); [Raven et al., 2017](#)).





Figure 1. Display of Biotanical Flash Application (Source: Personal Documentation, 2018)

In interactive activities, students can interact actively and improve their experience with a botanical application, this is because of the combination of audio, video, graphics, images, and animation elements. This process can be attractive and can generate feelings of pleasure, attention, interest, and student involvement (Tan et al., 2010). And in reflective activities, students reflect on all their learning experiences so that they adjust their conceptions, which will then be transformed into assignments into tests.

Interest in learning has a very important role because it is also related to students' conceptual understanding. Wigfield dan Cambria (2010), said that interest includes affective and cognitive components as part of individual activities, where the affective component is related to feelings related to the involvement of students in an activity, while the cognitive component is related to the perception of what students should do in their involvement and thoughts about an activity. When a person learns more about a topic, they become more skilled and knowledgeable. This increase in knowledge will have a positive impact because individuals who feel competent and skilled in their involvement in a task will spend more time with these activities and find meaning and relevance in their activities. Individual goals can also contribute to developing interests by getting them to engage more deeply, develop their competencies, and explore the topic further. Students who have an interest in one type of topic can have great strength so that it can make students willing to take the time to think, have dialogue, and create ideas in meaningful ways (McCarthy, 2014; Amjah, 2014).

## CONCLUSION

The development of botanical application based on android are feasible to be used, with the validation of the media and material expert and also students. The score from media experts is 3.86 in the category "feasible"; while material experts gave a score of 4.16 in the category of "very feasible" to be used. The 30 students also gave a score to determine the practicality of botanical applications in learning material about plants in the school environment, the result shows that the score is 4.47 which means the application is very feasible to use. This botanical application also can enhance student

interest in learning about plant material by achieved a range between moderate ( $64,13 \leq x < 71,33$ ), and the high criterion ( $71,33 \leq x$ ). 46,6% amount reach high criterion, which means there are 14 students were have high interest, and the other 53,3% reach moderate criterion, which means there are other 16 students were have moderate interest after learning. This is due to the combination of various elements such as text, audio, video, images, graphics, and animation and the use of native plant objects as the main source. This combination can foster discussions between students and teachers on discursive processes, can more adaptive, because learning is following the environment with the variety of plants in botanical garden schools and can maximize interaction and involvement in learning plants, but this increase will be more significant if the implementation stage carried out on a larger scale of students for further application development.

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