



## The Development of *Gymnospremae* Interactive Media Android Based with The Discovery Learning to Improve Student Learning Result on Plantae Subject in Senior High School

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### Article Info

Article History:

Received : January 2020

Accepted : February 2020

Published : April 2020

Keywords:

Interavtive media

*Gymnospermae*, Discovery

Learning, learning result

### Abstract

Plantae is one of biology subjects at X grade. The school condition that located in the low area causing not so many diversity of plant in the school environment and there is no *Gymnospermae*. The learning method still using lecture with the help of power point and also teacher and student manual book. Students less active and do not really engage in the learning process so it influence the learning result. The aim of this study is to develop *Gymnospremae* Interactive Media Android Based (GIMA) with The Discovery Learning towards Plantae Subject in Senior High School. This study is a research and development (R&D) study with the phases of data collection, product design, product validation, product revision small scale testing, product revision, huge scale testing, product revision and final product. The assessment result of GIMA validation by subject expert is 91,67% (very valid) and by media expert is 100% (very valid). The media effectiveness which is seen from students learning result based on pre test and post test showed that there was an improvement of knowledge with N-gain average of 0,49 (moderate) and students classical thoroughness of 100%. Besides, GIMA is mentioned as a very practical based on the assessment of teacher's response in the amount of 85,41% and students in the amount of 83,12%. Based on the analysis of research result, it can be concluded that the developed GIMA is valid, effective, and practical in the learning process.

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p-ISSN 2252-6579

e-ISSN 2540-833X

## INTRODUCTION

The ideal biology learning process in the basis has characteristic of biology knowledge as a science that is included object and problem. Moreover, the biology learning process is expected to be oriented towards students (student centered). Students will try to build knowledge which is gained and actively engage in searching information. Plantae subject is one of biology subjects at X grade in the second semester. One of them is *Gymnospermae*. Seedy plant especially *Gymnospermae*, is generally found in the mountain range area. Therefore, the learning process of *Gymnospermae* need plants which is classified in that sub division as a learning source.

SMA Negeri 3 Demak is located in low area causing not so many diversity in the school environment and there is no *Gymnospermae*. The observation result together with the biology teacher of SMAN 3 Demak known that the learning process at school has already implemented 2013 curriculum. However, the biology learning process that goes on is not yet appropriate with the 2013 curriculum. The learning process uses lecture method with the help of power point also manual book of teacher and student. Lecture method does not give stimulus for students to understand and find the studied subject concept. That caused students less active at class in the on going learning process so it influences the learning result. Therefore, maximisation is needed and it should be done by teachers to create effective and efficient learning process. One way is by using discovery learning. Discovery learning is a learning model where students are guided to find and investigate about a concept so that the knowledge and skill which students' have are not the result from recalling but from their own discovery.

In the present, students' development generally in learning has already make the use of many sources of information such as internet that can accessed through smartphone, tablet, laptop, computer which connected to internet network. (Noviar, 2016). In smartphone which is using android operation system, there are many applications that can be easily downloaded or bought so that the information can be easily used (Fauziah, 2017). Smartphone is the newest generation of handphone that possible the user to do various activity in mobile. The development of mobile learning based on android Smartphone can improve students' learning interest (Alfiana, 2013).

The unification between discovery learning with the interactive media of *Gymnospermae* application android based in the plantae subject has superiority that is subject delivery done through direct experience process which can attract students' attention in finding the creation of a means concepts and also give chance to students to directly engage in the learning process. The result of the previous study done by Sumianingrum (2017) said that there is a difference of students' learning result between using discovery learning with the help of E-Learning application and discovery learning with presentation.

Based on the observation result of requirement and background above, the development of discovery learning helped by interactive media *Gymnospermae* android based is needed to improve the learning result of plantae subject in senior high school.

## THE RESEARCH METHOD

This study was done in SMA Negeri 3 Demak in odd semester year 2018/2019. This study is a *Research and Development* (R&D) study with the phases of data collection, product design, product validation, product revision small scale testing, product revision, huge scale testing, product revision and final product. The research design uses One Group Pre-test and Post-test Design. The develop product is interactive media *Gymnospermae* android based (GIMA). Small scale testing in this study took sample of 10 students in XI MIPA 3. Huge scale testing was done to students of XI MIPA 2. The media is said valid if the percentage of assessment by media or subject validator is > 62,5%. The learning result analysed by using N-gain and said complete classically if the amount of student which fulfill the KKM is achieve 85%. Media is said practical if the percentage of teachers and students response assessment is > 62%.

## RESULT AND DISCUSSION

The following data is the research result of validity, effectiveness, and practicability of interactive media *Gymnospermae* android based in plantae subject in senior high school.

### Validity of interactive media *Gymnospermae* android based

Validity assessment is done by media expert. Feasibility of interactive media *Gymnospermae* android based from the aspect of media gain maximum score that is 12 and included in the category of very proper with percentage of 100%.

**Table 1** The expediency assessment result of interactive media *Gymnospermae* android based by media expert

No.	Aspect	Obtained score	Maximum score
1.	Visualisation	4	4
2.	Navigation	4	4
3.	Animation	4	4
<b>Score in total</b>		12	12
<b>Percentage criteria</b>		100%	

Very valid

There are three aspects valued, visualisation, navigation, and animation. The visualisation aspect obtained assessment with very good criteria because the font used is clear, proportional font size, exact space arrangement. Then, balanced of picture and words location and also contrast color selection so it gives fascination to user in using the application. The second aspect is navigation which is valued very good because icon shape is proper enough with the function, the navigation icon is easily found so it can help the user go to the desirable part. The third aspect is animation which is scored maximum 4 and included in the very good criteria because the movement space of object is clear, the picture shown is interesting and presenting the subject well. However, there are some things that still need to be revised like the questions in evaluation towards KD and indicator of KD adjustment and also relevant picture.



**Picture 1** Revision of question

The assessment of feasibility of subject is done by subject expert. The feasibility of interactive media *Gymnospermae* android based from the aspect of subject obtained 11 from the maximum score 12 and included in very good category.

**Table 2** The assessment result of feasibility of interactive media *Gymnospermae* android based by subject expert

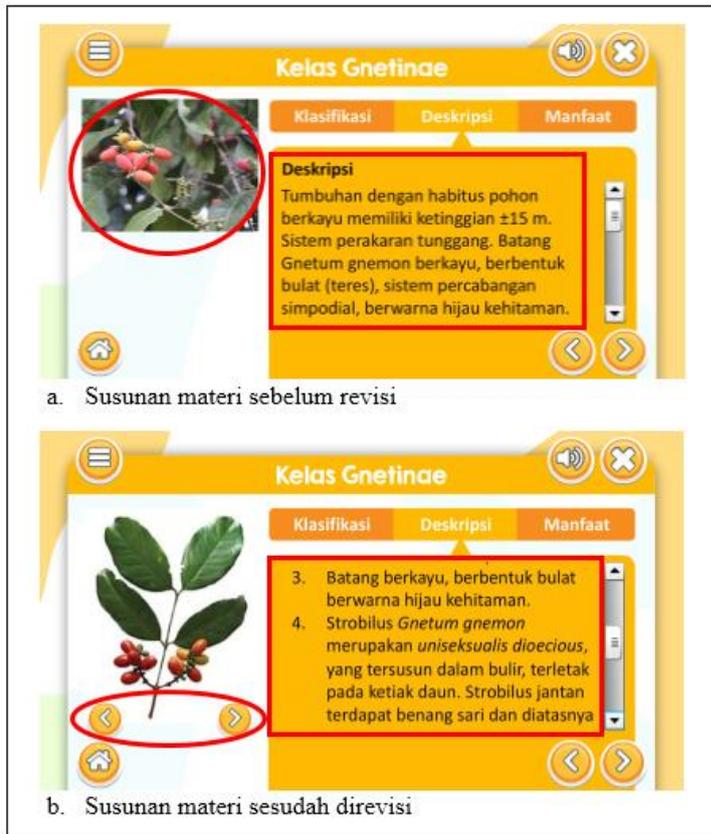
No.	Aspect	Obtained score	Maximum score
1.	Compatibility between subject and indicator	4	4
2.	Subject systematic	3	4
3.	Media delivery	4	4
<b>Score In total</b>		11	12
<b>Percentage Criteria</b>		91,67%	Very valid

The validation result by subject expert obtained 11 from maximum score 12 with the percentage of 91,67% and included in very proper category. The subject that is contained in media that developed is already proper with the indicator that included general feature identification, mention parts of *Gymnospermae*,



classifying *Gymnospermae*, life cycle of *Gymnospermae*, and describe the role of *Gymnospermae*. The subject expert appraises from the subject systematic aspect obtained 3 with good criteris. The subject is delivered logically and in harmony but less cohesive so that he subject expert give suggestion to fix the quality of the media, one other thing is subject structure should be arrange in integrative. Therefore, the subject structure in media improved to be better in integrative so that easily to be understood. From the aspect of subject deklivery, subject expert gives maximum score 4 with very good criteria. The picture in media is clear, the proper words with exact grammar and terminology. However, there are some words that need correction because of typo in the process of writing. Purwaningtyas (2017) mentioned that with harmonious picture and also narratve text make students think appropriately with the picture given si that it can be delivered and accepted well.

**Picture 2** Revision of the process of writing error



**Picture 3** Revision of subject composition

The validated and repaired product by subject expert will be next tested. The function of small scale testing is to test the readability of interactive media *Gymnospermae* android based which has been developed. The test is done towards 10 students of XI MIPA 3 year 2018/2019. Sample taken is by using simple random sampling because sample collection is done by simple way with consider population as homogeneous based on teachers' information. The trial procedure is done with students installing the interactive media *Gymnospermae* and then tries the whole menu in the application. Next, students are required to give assessment towards application by using questionnaire contained response about the user of interactive media *Gymnospermae*.

The result of questionnaire from biology teacher obtained score of 41 from maximum score of 48 included in very proper category with the percentage of 85,41%. While the result of small scale testing score from 10 students obtained the percentage of 85,20% and included in very proper category.

**Table 3** The assessment result of readability of interactive media *Gymnospermae* android based by biology teacher

No.	statement	Obtained score	Maximum score
1.	The navigation button on the <i>Gymnospermae</i> application is clear and easy to use	3	4
2.	The used sentence in <i>Gymnospermae</i> application is clear and easy to understand	3	4
3.	Proper font, not so big or too small	4	4
4.	The explanation in <i>Gymnospermae</i> application is clear and easy to understand	4	4
5.	The picture in <i>Gymnospermae</i> application is clear and easy to understand	4	4
6.	The presented picture helps to understand the subject	3	4
7.	The presented video can be well used	3	4
8.	The content of video helps to understand the subject	3	4

9.	The color in <i>Gymnospermae</i> application is precisely combined	3	4
10.	The appearance of <i>Gymnospermae</i> application is generally interesting	4	4
11.	<i>Gymnospermae</i> application is able to help to understand the subject	4	4
12.	<i>Gymnospermae</i> application is suitable to be used as a learning media	3	4
<b>Score in total</b>		41	48
<b>Percentage</b>		85,41%	
<b>Criteria</b>		Very good	

**Table 4** The research result of readability of interactive media *Gymnospermae* android based by student

No.	statement	Obtained score	Maximum score
1.	The navigation button on the <i>Gymnospermae</i> application is clear and easy to use	32	40
2.	The used sentence in <i>Gymnospermae</i> application is clear and easy to understand	34	40
3.	Proper font, not so big or too small	37	40
4.	The explanation in <i>Gymnospermae</i> application is clear and easy to understand	31	40
5.	The picture in <i>Gymnospermae</i> application is clear and easy to understand	32	40
6.	The presented picture helps to understand the subject	30	40
7.	The presented video can be well used	37	40
8.	The content of video helps to understand the subject	34	40
9.	The color in <i>Gymnospermae</i> application is precisely combined	37	40
10.	The appearance of <i>Gymnospermae</i> application is generally interesting	35	40
11.	<i>Gymnospermae</i> application is able to help to understand the subject	34	40
12.	<i>Gymnospermae</i> application is suitable to be used as a learning media	36	40
<b>Score in total</b>		409	480
<b>Percentage</b>		85,20%	
<b>Criteria</b>		Very good	

### The effectiveness of interactive media *Gymnospermae* android based

The effectiveness of media is seen from cognitive aspect of students learning result based on the result of pre-test and post-test by using N-gain test. The result comparison between pre-test and post-test using N-gain test to know the improvement of learning result after joining the learning process by using interactive media *Gymnospermae* android based, also classical thoroughness of students learning result obtained from students LDS score.

**Table 5** The result of *Pre-test*, *Post-test* and N-gain of the user of interactive media *Gymnospermae* android based plantae subject

No.	Aspect	explanation
1.	Average of <i>pre-test</i>	60,15
2.	Average of <i>post-test</i>	79,96
3.	Maximum score	100
4.	Average of N-gain	0,49
5.	N-gain Criteria	Moderate

The average score of students pre-test is 60,15 while the average score of post-test is 79,96 so that the average score of N-gain obtained 0,49 and included in the moderate criteria. This shows that there is an improvement of students learning result after using interactive media *Gymnospermae* android based on plantae subject in the learning process so it can be mentioned that it is effective.

**Table 6** The recapitulation of classical thoroughness value

subject	Research result
Amount of student	35
Thorough student	35
Incomplete student	0
Percentage of classical thoroughness	100%
Highest score	93,3
Lowest score	76,6

The students learning result is said classically thorough if the amount of students who achieve the minimum learning mastery (KKM) is 85%. Students achieve KKM of 100% so that included in classically thorough category.

The learning process is done by using application media of *Gymnospermae* with discovery learning. The given task during learning process is LDS used as a discussion as long as the learning process to know the classical thoroughness. Those tasks is presented by the representative of each group and discussed together at class. The learning process using application media of *Gymnospermae* with discovery learning can be said successful. It is supported by the result of N-gain test of students learning result that shows there is a score ascension in pre test and post test with moderate criteria. Moreover, the result of student discussion has achieve classical thoroughness of 100%. Anidityas (2012) said that the use of visual aid can optimize students learning result which is proved from students classical thoroughness that achieve 89,58%. Based on pre test which has been done towards 35 students, only 4 students who achieve KKM. The average score of students pre test is 60,15 with the highest score of 86,6 and the lowest score of 40. While in the post test result, 31 students who achieve KKM obtained the average score of post test is 79,96 with the highest score of 100 and the lowest score of 53,3. The result of pre test then compare with the result of post test to kow the N-gain score. The average of N-gain is 0,49 and included in moderate criteria. There is an improvement in pre test and post test, yet the range between pre test and post test is not quite far. This can be said that student ability is average. The media is said effective eventhough the N-gain score is moderate because there is still an improvement on the obtained score after the treatment using application media of *Gymnospermae*. This shows that there is an improvement on students learning result using applicaton media of *Gymnospermae*. However, there are 4 students who do not achieve KKM. Two of them are experiencing the descent of post test score. This is caused by less distinct of *Gymnospermae* application utilizing instruction and the subject in the *Gymnospermae* application cannot be understood clearly. There is the difference of student ability in processing the obtained subject and remembering the subject which is learned. Moreover, there are some factors which cause the student obtained score did not achieve KKM those are student being active in the learning process, not because of anxiously learn but to gather with friends of group and also playing with the applicaton media of *Gymnospermae* so that they did not maximum in following the learning process.

Based on the obtained result, learning process using interactive media *Gymnospermae* android based with discovery learning can improve student learning result. In the previous, student has already got plantae subject by teacher yet the learning process is still one directed teacher to student. Students only receive information during the learning process. The method that often used is lecturing and taking notes amf also doing the task. The amount of sudents who pay less attention and actively participated in the learning process make the students feel tired, bored and less minded towards the subject given so that the obtained learning result is not satisfying. This is proved with the score achievement of most students who is post test under KKM.

Discovery learning has syntax in the learning process which conventional learning does not have. Student being active in the learning process using discovery learning is a process of beginning phase form stimulation phase, problem identification, data collection, data preparation, verification, and generalization which are phases in discovery learning. Those phases support student to be more active during the learning process at class. However, there are some obstacles in the early process of beginning learning process which is when student installing the application, they need much time so that the learning process delivered too fast. Discovery learning needs teacher ability to control student in discussion and also manage class and time so that the learning process can run effectively. Teacher also has a role in motivating the student during the learning process and guides the student in making the same concept of subject learning in order to be easily understood.

### The practicality of interactive media *Gymnospermae* android based

The practicality data of media obtained based on the result of questionnaire of teacher and student response. The result of questionnaire assessment of teacher response obtained 85,41% while student obtained 83,33% and included in practical category.

**Table 7** The questionnaire result data of teacher response towards interactive media *Gymnospermae* android based on plantae subject

No.	Statement	Obtained score	Maximum score
1.	The clarity of main competence and base competence	3	4
2.	The suitability between subject and indicator	3	4
3.	Clear font	3	4
4.	Proportional font size	3	4
5.	The aptitude between background color and text	3	4
6.	User clarity	3	4
7.	Easy of choosing the menu	4	4
8.	Interesting presented picture	4	4
9.	The suitability of picture to clarify the subject	4	4
10.	Media can be used in various place, time and condition	3	4
11.	Media used has characteristic of fun	4	4
12.	Media can train student's self employed in learning	4	4
<b>Score in total</b>		41	48
<b>Percentage Criteria</b>		85,41%	
very practical			

Based on the questionnaire of teacher response towards the use of *Gymnospermae* application obtained percentage of 85,41% and included in very practical category. Teacher appraises that the use of *Gymnospermae* application android based is interesting and extremely agree if it is used as a learning method. This is proven with the question of teacher response towards the easy of choosing menu, interesting given picture and clarify the subject, media used is fun, and also media can train student to easily gained highest score, while in other question obtained score of 3. The easy of media that can be used each time in offline and with the appearance of interesting visualization which make student not easily bored in learning. Therefore, this media is good to be use in the learning process. Moreover, the technology development in this era experiencing rapid furtherance so it causes the alteration in teaching and learning. As the use of technology in learning such as mobile learning, it can give variation of learning media so it does not cause boredom towards student.

**Table 8** The questionnaire result data of 35 students response towards interactive media *Gymnospermae* android based on plantae subject

No.	statement	Obtained score in total	Msximum total score
1.	<i>Gymnospermae</i> application is easy to use	117	140
2.	The layout appearance of <i>Gymnospermae</i> applicaton is clear, interesting, and easy to understand	116	140
3.	The instruction of the use if <i>Gymnospermae</i> application is clear and easy to understand	117	140
4.	The presented picture is clear, interesting, and suitable with the subject	119	140
5.	The words in <i>Gymnospermae</i> application is clear, easy to read and to understand	117	140
6.	The subject in <i>Gymnospermae</i> application is clear and easy to understand	114	140
7.	Learning by using <i>Gymnospermae</i> application is more fun than just read books	117	140
8.	<i>Gymnospermae</i> application can help me to learn independently	114	140
<b>Score in total</b>		931	1120
<b>Percentage</b>		83,12%	
<b>Criteria</b>		Very practical	

Based on questionnaire of student response, it is obtained percentage of 83,12% and included in very practical category. Student gives positive response towards the use of *Gymnospermae* application as a learning media. In the forth statement, it is obtained maximum score mention that the given picture is clear, interesting, and suit the subject. Student consider that the use of *Gymnospermae* application in the learning process is easier to understand, more interesting and fun.. Kholina (2013) said that the use of multimedia which contains picture, animation and video can create fun learning atmosphere so that it make student easier to understand the subject. Fun learing condition can make student more motivated to study (Suryorini et al., 2013).

## CONCLUSION

Based on the research result, it can be conclude that interactive media *Gymnospermae* android based on plantae subject is very valid, effective, and practical. Validation towards interactive media *Gymnospermae* android based on plantae subject is done by subject expert and media expert which result is included in very valid criteria because visualization, navigation, and subject contain is very well valued. The use of interactive media *Gymnospermae* is effective to improve cognitive learning result and student skill so thath it can be used as a learning source on plantae subject. The practicality test obtained positive response from teacher and student so that interactive media *Gymnospermae* very practical to be used in the learning process.

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