

SE-026

A GAMETOGENESIS MODULE DEVELOPMENT IN POE (PREDICTION, OBSERVATION AND EXPLANATION) ORIENTED MODEL

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ABSTRACT

The aim of this research was to create a valid and quality POE (Prediction, Observation and Explanation) oriented module based on the curriculum 2013 characteristic. The type of this research is the development research, which develop a Gametogenesis module in POE oriented model by using Borg and Gall's development theory, which consists of ten steps, namely: (1) Observation, (2) Literature Review, (3) Design Product, (4) Expert Validation, (5) Revision Module Draft I, (6) Preliminary Field Testing, (7) Revision Product Draft II, (8) Main Field Testing, (9) Final Revision and (10) Final Product and Dissemination. From the expert validation results, the material, presentation, readability and graphical aspect are in very good criterion or 87.5%, 85.41%, 85.71%, 85%, respectively. After doing revision I, then collecting result from preliminary field testing that the material, presentation, readability and graphical aspect are in very good criterion or 93.7%, 94.5%, 98.6%, 98.6%, respectively. Then continuing to revision II and before getting final product and dissemination, the main field testing was done that the results are very good criterion or 100% in every aspects.

Keywords: *Gametogenesis Module, POE (Prediction, Observation, Explanation).*

INTRODUCTION

One of the successes of the educational objectives based on Law No. 20 Article 3 on 2003 about National Education System is the increasing of student learning outcome in three aspects: cognitive, affective and psychomotor. So, it needs the teacher role in choosing a learning model that should be implemented to carry out the teaching and learning process in order to achieve educational goals. The unsuitable in choosing learning model for a material will have an impact on the low of student learning outcomes. It also occurs in SMAN 8 Medan. From observation, the student score for biologi in class XI IPA 1 academic year 2012/2013 for gametogenesis sub- topic was not pass of standard score or an average of 65.61, while the KKM is 75. Deeply observed to RPP and personal interview on February 28, 2014, the biology teacher who taught at that time, Drs. Sudirman, M.Si said that the learning model which was used for gametogenesis sub topic was direct instruction learning model. According to Saputra (2011), the learning process using direct instruction model will make students feel monotonous as receptors and executing the task from the teacher will be not motivated to be active in the learning process. Moreover, Setiawan, W., et al. (2010) found the learning process using direct

instruction model was no significant difference for the student's ability between the top and bottom groups in understanding the lesson.

Kumar, R. (2008) describe the Gametogenesis sub topic is about the process of the formation of sex cells in the gonads which are affected by several hormones. It is too abstract if students do not use media in the learning process. However, due to limitations for tools and materials from the school to observe this Gametogenesis process, it would require other media that help students understand about this sub topic. For example the use of student handbook is expected to assist students in learning gametogenesis sub topic.

Researchers have observed the biology book class XI Science SMAN 8 Medan published by Erlangga, focused in the matter of Gametogenesis subtopic. It turns out that this book is far from the characteristics of the curriculum 2013. This book is more appropriate if taught with direct instruction learning model. For example, gametogenesis mechanism which explains in book just directly focused at the end of the result of gametogenesis production by mitotic division, meiosis I and II. This book does not discuss the stages of how cells can change from diploid number of chromosomes to the haploid. This book also does not discuss why cells need to perform division mitosis and meiosis in gametogenesis. The condition of this book play a role in the low of student's biology score in class XI IPA 1 academic year 2012/2013. One of the solutions to this problem is to modify the student handbook, especially in Gametogenesis sub topic into Gametogenesis module based on POE (Prediction, Observation and Explanation). POE (Prediction, Observation and Explanation) is one of the learning model associated with the scientific approach that invites students to discover scientific truths.

According to White and Gunstone (1992), POE is a learning model that can help students turn out ideas, discussions, investigations and this model is often used in science and appropriate with physical context and real world and able to motivate students who want to observe a concept.

Addition, the POE effectivity was ever observed and the result can increase the student learning outcome for cognitive aspect in 14%, affective aspect in 5% and psicomotor aspect in 1% (Saraswati, 2011). While, based on Amanah's investigation in 2013, the effect of POE learning model to student's cognitive is (t count was 3.610 > ttabe 2.052) in p (sig). 0.001). This case means there is a very significant difference between students cognitive before and after being taught using POE learning model.

METHODOLOGY

This research was conducted at SMAN 8 Medan, in Jalan Sampali No. 23, Medan, North Sumatra, Indonesia. The population includes all students of class XI IPA at SMAN 8 Medan

were grouped into four classes with a total of 163 students. While the sample selection used purposive sampling by the reason of class XI IPA2 and XI IPA3 have the same number of students that each of the number of students was 41 students and also have very similar homogeneity based on the average score of the last semester of biology , were 79.07 and 79.05 respectively .

The research method used was a development research design as described by the theory of Borg and Gall. This method consists of ten main stages: (1) Identify the problem and potential, (2) Collecting Information and Learning Literature, (3) Product Design (Develop Module concept I), (4) Validation Module Concept I (Validation was done by Design Expert and content), (5) Revised Module concept I, (6) Preliminary tests conducted on two biology teachers and four students at the same school, (7) Revised Product Module Concept II, (8) Main test which is done in two classes XI Science from the same school, (9) Final Revised product (Review), (10) End products and Dissemination.

The instruments used in this study were module validation questionnaire and module testing questionnaire. The questionnaire was made by researchers based on the requirements of good quality modules and before used, the questionnaire has been validated by experts (Drs. Zulkifli Simatupang, M.Pd). The second instrument was the multiple-choice questions as collecting test data on Gametogenesis and has been validated by the expert validator.

RESULT AND DISCUSSION

Description of Module Development. The first thing to do in this study was the identification of problems and potential by analyzing the results of learning outcome, teaching style and learning resource. The analysis showed that the average student learning outcomes XI IPA 1 TP. 2012/2013 on the sub-topic Gametogenesis incomplete or under 75, with an average of 65.61. The results of the analysis of teachers' teaching styles that teachers do not implement learning model that supports the development of these three aspects of student learning outcomes, but only focus on cognitive aspects. While the results of the analysis of learning resources or student handbook for Biology class XI IPA SMAN 8 published by Erlangga was still far from the characteristic of the curriculum in 2013.

After doing identification of problems and potential, the next thing was collecting information and instructional literature with formula 4W + 1H (What, Who, Why, Where and How) to discover what products can help resolve this problem. -What Product will be developed in this research? "Module-based POE" -Who is the object of research for this development? "Students XI IPA SMAN 8 field." -Why Is the Gametogenesis Module in the POE model chosen as the planning for this product development research? "Because the material Gametogenesis

in the student handbook can not be implemented using a scientific approach. Content is only worth taught in the direct instruction model. Thus, researchers are trying to modify the student handbook into a module-based Gametogenesis POE models, because POE is one of the learning model that supports the curriculum 2013 "-Where is the development of research done? "The SMAN 8 Medan" -How is the Gametogenesis in POE Module Model developed? "By doing Borg and Gall theory method.

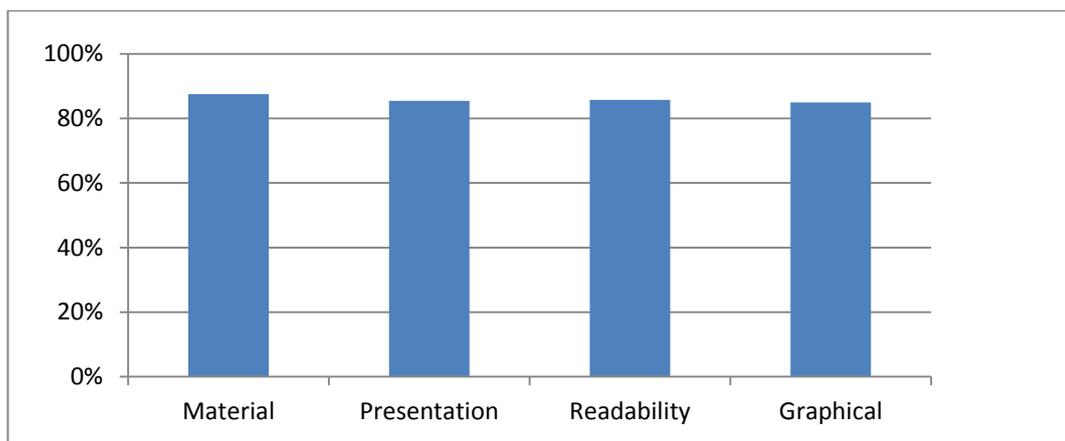
The module concept produced refers to the several books related to module development and gametogenesis book. The concept of this first module must be validated by expert lecturers to improve the design and content of the quality of the module, ie 1) Dra. Melva Silitonga, MS. as a content expert (Lecturer of Anatomy and Physiology, Faculty UNIMED), 2) Dr. Hasruddin, M.Pd. as expert in module manufacturing design of POE (Lecturer Faculty and Graduate UNIMED).

After validating of the first module by experts, then found lack. Thus, researchers have to renew and improve the shortcomings before the preliminary test take a place. The preliminary test carried out by spreading the questionnaire about the quality of the module concept I to the 6 subjects at school. Six subjects consist of two Biology teachers and 4 students from XI IPA outside the sample. Shortcomings and suggestions from this preliminary test would be considered and studied again as a material revision to establish the module concept II. After that, the main test would be done by the sample classes. This stage aims to assess the deficiencies or obstacles that arise when studying Gametogenesis use this module then able to improve it further. In the main test, the researchers were always evaluating and reviewing the questionnaire and students learning outcome after using the module. Based on these data, all suggestions and shortcomings repaired again. After completing all these methods, the Gametogenesis module based on POE model can be published.

Description of the validation, preliminary test and main test result. Below are the description of validation by two experts, design expert and content expert.

Table 1 Hasil Perbandingan skor validasi ahli pada setiap aspek penilaian Modul berbasis model POE SMA Negeri 8 Medan TP. 2013/2014

No	Aspek	Persentase	Kriteria
1	Materi	87.5%	Sangat baik
2	Presentasi	85.4%	Sangat baik
3	Readabiliti	85.7%	Sangat baik
4	Grapikal	85%	Sangat baik

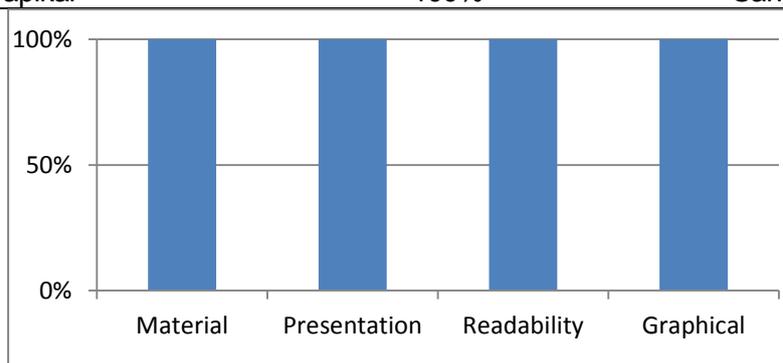


Gambar 1 Perbandingan skor validasi ahli pada setiap aspek penilaian Modul berbasis model POE SMA Negeri 8 Medan TP. 2013/2014

The comparison results when the preliminary test scores in every aspect of the model-based assessment POE module SMAN 8 Medan academic year 2013/2014 showed that the material aspect is the lowest, or 93.75%, followed by the presentation aspect 94.5%, while the readability aspect and graphical aspect in 98.6% collectively. However, the fourth aspects are very well criterion and just needs a little improvisation.

Tabel 3 Hasil perbandingan skor saat uji utama pada setiap aspek penilaian Modul berbasis model POE SMA Negeri 8 Medan TP. 2013/2014

No	Aspek	Persentase	Kriteria
1	Materi	100%	Sangat baik
2	Presentasi	100%	Sangat baik
3	Readabiliti	100%	Sanagt baik
4	Grapikal	100%	Sangat baik



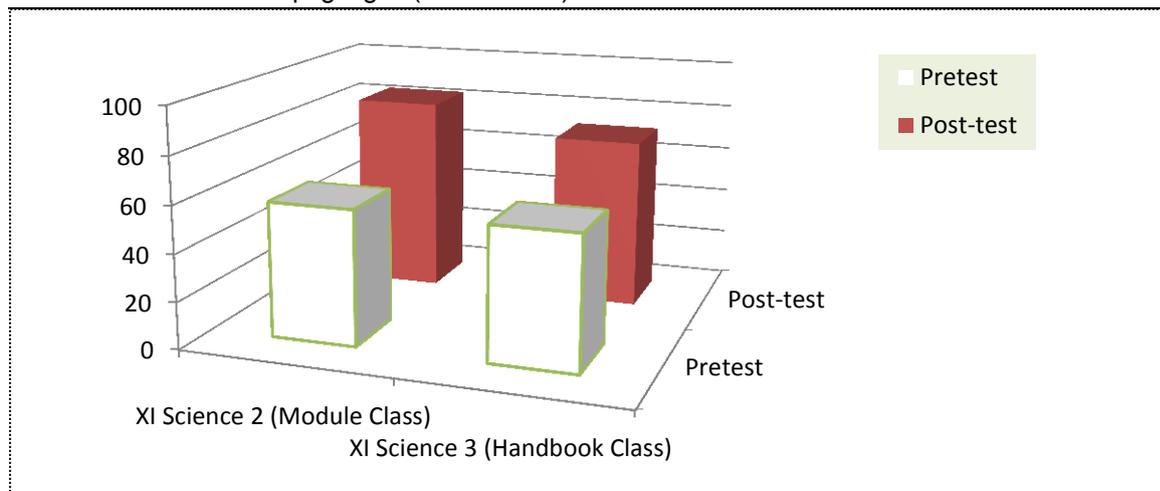
Gambar 3. Hasil perbandingan skor saat uji utama pada setiap aspek penilaian Modul berbasis model POE SMA Negeri 8 Medan TP. 2013/2014

The comparison score from the main test on every aspect for Gametogenesis module in POE oriented model in SMA 8 Medan TP. 2013/2014 showed that all aspects are at a very good criteria are equally 100%.

Description of the student's learning outcome. Here is a description of the learning outcomes of students of class XI IPA 2 as the sample which used a Gametogenesis module in POE oriented model in studying gametogenesis and XI IPA 3 as a control class that used the current student handbook to learn gametogenesis.

Tabel 4 Review hasil pretest dan post test kelas XI IPA 2 dan XI IPA 3

No	Sample Class	Pre-test	Post-test
1	Kelas Modul (XI Science 2)	57.43	83.82
2	Kelas Buku pegangan (XI Science 3)	56.53	72.45



Gambar 4 Review hasil pretest dan post test kelas XI IPA 2 dan XI IPA 3

CONCLUSION AND PROSPECT

The conclusion that can be drawn from this study are:

- 1) Module Gametogenesis based POE (Prediction, Observation and Explanation) is conducted by the Research and Development (R & D) by Borg and Gall, who has ten stages, namely: (1) Identify the problem and potential, (2) Collecting Information and Learning literature, (3) Product Design (Developing concept Module I), (4) concept Validation Module I (Validation is performed by Expert Design and content), (5) Revised concept Module I, (6) Preliminary tests conducted on two teachers of Biology and four students in school the same, (7) Revised product Concepts Module II, (8) Main test done to two grade XI of the same school, (9) Final Revised product (Review), (10) End products and Dissemination) .
- 2) The results of the comparison scores validation expert on every aspect of the model-based assessment POE module SMAN 8 Medan TP. 2013/2014 showed that the material aspects with the highest percentage of 87.5%, followed by readabiliti aspects of 85.71% and by 85% presentation aspects. However, the fourth aspect is the criteria very well and just needs a little improvisation.

- 3) The results of the comparison scores when initial test on every aspect of the model-based assessment POE module SMAN 8 Medan TP. 2013/2014 menunjukkan that the material aspects of the lowest, or 93.75%, followed by the presentation aspect of 94.5%, while the aspect readability and graphical equally 98.6%. However, the fourth aspect is the criterion very well and just needs a little improvisation.
- 4) The results of the comparison scores when the main test on every aspect of the model-based assessment POE module SMAN 8 Medan TP. 2013/2014 showed that all aspects are at a very good criteria are equally 100%.
- 5) Gametogenesis module in POE based model is appropriate as a good learning source, especially in sub-topic Gametogenesis XI IPA at SMAN 8 Medan.

Prospects are expected from this research are: 1) To biology teachers can use Gametogenesis module in POE (Prediction, Observation and Explanation) oriented model in learning process as an alternative media in improving student learning outcomes, 2) To the next researcher is expected to continue research on this module to do some improvisation design and content of the module in order to provide greater feedback on student learning outcomes.

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