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## Development Module Biology Learning Completely By Conceptual Map For Student Grade Xi Of Senior High School

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### ABSTRACT

The Handbook that used by the SMAN 1 Tarusan students have some disadvantages such as presentation of the material still less complete, images contained in the Handbook are less attractive as the image presented in black and white, and the student handbook has not lead students to learn independently. With the condition of the materials of make students less interested in reading the book. For addressing reviews those problems then a charged Biology learning module supplemented with conceptual map. This research used IDI model which consists of three stages, define, develop, and evaluate. In the define stage, have analysis of curriculum, the material, and the students. In the development stage module design is done, after that module validation by the lecture. The module practicalities was taken by the practicalities questionnaire of teacher and students, and the efficacy evaluated from the students competence. The results showed that of Biology supplement by conceptual map obtained very valid category with a value of 82.14%. The practicalities of category by teacher's is very practical with a value of 86.25% and practicalities of category by students is very practical with a value of 83.29%. The modules developed have been effective in term of student's competence. It can concluded that the learning module development of Biology supplemented by conceptual map for student grade XI semester II senior high school were valid, practical, and effective.

**Key Words:** Biology Module, Conceptual Map, Efficacy, Practicality, Validity

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### INTRODUCTION

Problems of education quality has always been a major focus in the world of education in Indonesia. According to the Law of the Republic of Indonesia No. 20 of 2003 on the national education system of education serves to develop the ability and character development and civilization of the nation's dignity in the context of the intellectual life of the nation. With the aim of developing the potential of students, to become a man of faith and devoted to God Almighty, noble, healthy, knowledgeable, skilled, creative, independent, and become citizens of a democratic and accountable. Various efforts have been made by the government to improve the quality of education, among others, by perfecting the curriculum, providing the means and infrastructure, improving the quality of teachers by organizing the upgrading and improvement of teacher education, learning method and learning media were varied as well as the creation of learning environments conducive. All of it was intended to improve student learning outcomes in achieving the learning objectives. The learning process will be effective if all the factors that influence this process of mutual support. In addition, the



quality of learning increases when learning components can be optimally empowered to conduct improvement and renewal in the learning component.

One of the components that influence the selection of learning resources. Teacher as facilitator should be able to make a variety of learning resources. Among these are a source of learning modules, *handouts* and student worksheet (LKS). This can reduce the burden on teachers in presenting the subject matter to the students, so that more can nurture and develop students' learning activities. Based on the interview with the author of the teachers who teach Biology XI IPA SMAN 1 Tarusan is Mrs. Linda Yani, S.Pd on November 10, 2016 it is known that in the implementation of the learning process in the school biology teaching materials in the form of yet have a learning module. Teaching materials used during the learning process that biology books from publishers Yudhisthira. There are some problems in the textbook used in schools. First, the students are less interested in reading books related to instructional materials, teaching materials available for less varied and less attractive learners to learn. Second, presentation on some of the material that is in the handbook is still incomplete. *Third*, the image contained in the handbook less interesting, because the images presented in black and white.

Based on the results of questionnaires problems and needs analysis has been completed by 30 students who sit in class XI, obtained information that the implementation of learning Biology at SMAN 1 Tarusan on November 10, 2016 it is known that the low interest and motivation of learners in learning Biology using textbooks, and as much as 56.6% of students are less fond of reading for the teaching materials used learners only textbooks. A total of 76.7% of students expressed less attractive presentation of text books, because the material described is still long, and images are less attractive because of the black and white. Learners also stated that in the process of learning is not all learners actively participate or contribute as much as 53.3%.

Based on the problems that have been outlined, the development of teaching materials targeted and systematic. One teaching materials focused and systematic in order to provide information in understanding the biology course materials and instructions for use are clear about what students are modules. The module is a teaching material or a book made systematically with the aim that students are able to learn without or with the guidance of teachers.

The module has an advantage compared with other forms of written teaching materials, which have a more clear learning objectives and their accommodation to the speed difference the students to understand the material. This is consistent with the opinion Mulyasa (2006: 43) that the module is an instructional materials arranged in a systematic, operational and directed so that it can provide information and instructions for use are clear about what should be done by the students, and provide opportunities to students to measure learning progress which has been obtained.

In biology there are many concepts that must be understood students. The concept can be defined as a mental organization and categories of thought or idea. The concept has



categories that include objects (*objects*), events (*events*), people (*people*), ideas (*ideas*), and symbols (*symbols*) (Vans Cleaf, 1991 in Lufri, et al., 2007: 154 ). In connection with this study, the module will be accompanied by a concept map. Map concept (*conceptmap*) is a diagram showing the interrelationship between the concepts as representations of meaning (*meaning*) (Lufri, et al, 2007: 154). Through the concept maps can steer students master the concepts properly.

Giving modules that include concept maps are expected to help learners to more easily understand the material and help students to learn meaningful. Meaningful learning can be realized if the new knowledge can be associated with existing knowledge. Map concept also helps students to examine and reflect on the changes in the organization of knowledge for learning, so emphasize the constructive nature of learning (Roth and Roychoudhury, 1993 in Lufri, et al., 2007: 163).

Development of teaching materials has been done by the module Efdillah Biology (2013). The results showed that that the modules produced very valid, very practical, effective and can improve the quality of teaching biology. Very high student motivation and learning activities of students during the learning process using the module also good. Based on the description above, the purpose of this research is to produce a modules Biology learning completely by conceptual map for the second semester class XI SMA valid, practical, and effective.

## MATERIAL AND METHODS

This study is a research & development (Research and Development) to produce learning modules berbantuan Biology concept map for the second semester grade students in high school. This study uses a model of IDI (*Instructional Development Institute*). The model consists of three stages of development, namely Phase pendefenisian (*define*) is done by conducting interviews with teachers and students, curriculum analysis, and review of the literature. At this stage of development (*develop*) done is to design products and to test the validity, whereas the assessment phase (*Evaluate*) is to test the practicalities and test the effectiveness of the product. The data obtained is the result of the validity of the test sheet charging by some experts (for the validity of test data), the results of filling the questionnaire (for the practicalities of test data) and the results of the observation sheet replenishment and learning about the test results (the data for effectiveness).

## RESULTS AND DISCUSSION

The study produced product in the form of learning modules bernatukan Biology concept map for the second semester grade students in high school. This study uses a model of IDI (*Instructional Development Institute*). The model consists of three stages of development, namely Phase pendefenisian (*define*) is done by conducting interviews with teachers and students, curriculum analysis, and review of the literature. At this stage of development (*develop*) done is to design products and to test the validity, whereas the



assessment phase (*Evaluate*) is to test the practicalities and test the effectiveness of the product. The data obtained is the result of the validity of the test sheet charging by some experts (for the validity of test data), the results of filling the questionnaire (for the practicalities of test data) and the results of the observation sheet replenishment and learning about the test results (the data for effectiveness).

The resulting module is declared valid, practical, and effective based on validity, practicalities, and the effectiveness of which has been done so it can be used as one of the alternative materials that can be used for teaching biology in schools.

**Validity module biology learning completely by conceptual map specialist assessment:** Based on the validation of modules Biology learning completely by conceptual map by four validator with very valid criteria with the average value of the validity of 82.14%. Validity assessment results obtained from the analysis of the data the validity of which was awarded in each validator with four aspects of assessment, namely the didactic aspect, constructs, techniques, and languages. According Trianto (2010: 55), valid means assessment has been providing accurate information about the teaching materials developed.

An examination of the didactic modules developed otherwise very valid with an average value of 81.25% for the material refers to the curriculum KTSP. This module made in accordance with SK and KD to be achieved in the matter of coordination and reproductive systems, as well as supporting the existing understanding on the material concept of coordination and reproductive systems.

Then, from the aspect of the construct, from the aspect of modules developed constructs expressed with the very valid category with an average value of 85.00%, since the module has instructions for use, the material presented has been systematic. Concepts that are presented in accordance with the indicators of learning. Berbantuan biology learning module concept maps have the sort order of subjects according to student ability level, and have instructions for students on topics to be discussed. This is in accordance with the opinion Vembriarto (1985, *in* Prastowo 2011: 114-118) that one load module structure has a module operating instructions. On the matter of coordination and reproductive systems There are many concepts that must be understood students. Presentation of concept maps at the beginning of the material can lead students to discover the concepts that exist in the system of coordination and reproductive material, so that these modules can motivate students to learn and lessons can be more effective and attractive. This is in line with the opinions Lufri, et al (2007: 163) that maps the concept is ideal to help students examine and reflect on their knowledge.

Judging from the technical aspects, the modules are developed with very valid category with an average value of 84.82%, as already complied with the technique that relates to the picture presented in the module supports the understanding of the concept of matter, the digestive system, the respiratory system, the system excretion, coordination system, reproductive system, and immune system. The use of letters and writings in this module has been right. The picture is displayed according to the original form in order to make students



more easily recognize objects that are described, as well as to support and clarify the content of the material. This is explained by Sadiman, et al (2012: 29) that one of the advantages is that it can overcome the image limitation of space and time. Then, the combination of colors used in the modules Biology learning completely by conceptual map is enough contrast and sharp and does not disturb the focus of learners while reading the module.

Last validity assessed aspects of language. Assessment of the aspects of the language of the module that was developed in the category valid with an average value of 77.50. This is due to the structure of sentences used in the modules Biology learning completely by conceptual map in accordance with Indonesian Spelling, according to the student's level of understanding, simple, clear, and unambiguous, making it easier for students to understand the learning activities in the module, and communicative. Hamdani (2011: 224) states that to be considered in the preparation of the module is the precision in setting the sentence so that the module is composed communicative and easy to use as a study guide for students. This is confirmed by Prastowo (2011: 123) that the sentences presented in the modules should not be too long. The point is simple, concise, clear, and effective. Thus the students easily understand.

The fourth aspect of the validation votes modules Biology learning completely by conceptual map that has been described is a unified whole and support each other to perfection modules Biology learning developed concept maps. Based on the analysis of the validity of the obtained average value of 82.14% with a very valid category. According Arikunto (2008: 58), if a data generated from a product is said to be valid, it can be said that the product provides an overview of the development goals correctly and in accordance with reality and real used.

#### **Practicalities module biology learning completely by conceptual map by teacher:**

Data analysis results showed that the practicalities of teacher modules Biology learning completely by conceptual map produced meets the very practical category with an average value of 86.25%, in terms of the aspects of ease of use, presentation and time.

Rate the practicalities of the aspects of ease of use that are in the category of very practical with an average value of 90.00%. This indicates that the module developed is easy to use by teachers because it already comes with instructions for use, allows teachers to give a correct explanation of the concepts of biology to students, especially in the matter of coordination system and the reproductive system. Learning activities in the module arouse the curiosity of students in order to make students become active in the learning process. Ministry of Education (2008: 9) as professional teachers are required to create and develop teaching material itself, is beneficial to obtain teaching materials in accordance with the curriculum and the learning needs of students, not dependent on the textbook that is, teaching materials are becoming richer because it was developed using various references, add to the repertoire of knowledge and experience of teachers in writing and teaching materials will build effective learning communication between teachers and students because students will feel more confident of his teacher.





Judging from the aspect of the presentation, the modules Biology learning completely by conceptual map is very practical in the category with an average value of 87.50%. This indicates that the module is being developed has an attractive appearance, the type and size of paper used is clear and easy to read, pictures that exist on the module support the study of matter and the concept of learning on module in accordance with the indicator set. This is in accordance with the opinion Prastowo (2011: 74) states that one of the printed materials development technique is the ease of reading. As well as modules designed draw will increase the interest of students to read (Prastowo, 2011: 27).

Viewed from the aspect of learning time, use the modules Biology learning completely by conceptual map by teacher is very practical in the category with an average value of 81.25%. This suggests that modules Biology learning completely by conceptual map can provide benefits in terms of efficiency of learning time. This is in line with the statement of Ministry of Education (2008: 5) that the function module is able to overcome the limitations of time, space, and power sense, both students and teachers.

#### **Practicalities module biology learning completely by conceptual map by students:**

After the learning process using the modules Biology learning completely by conceptual map are finished, and students are asked to complete a questionnaire practicalities. Questionnaires filled out by 36 students of class XI IPA 1 SMAN 1 Tarusan. The results of data analysis showed that the practicalities of student modules Biology learning completely by conceptual map produced meets the very practical category with an average value of 83.29%, which is viewed from the aspect of ease of use, presentation and time.

Judging from the aspects of ease of use, the modules Biology learning completely by conceptual map is very practical in the category with an average value of 83.93%. This suggests that the modules Biology learning completely by conceptual map makes it easy for learners in the learning process. Instructions for use modules can be clearly understood by learners and concepts that are presented in accordance with the indicators of learning modules, making it easier for students to understand the concepts in the material coordinate system and the reproductive system. This is in line with the opinions Lufri, et al (2007: 164) that biology as a subject that contains concepts and associated hierarchically will be more easily understood if studied by applying learning strategies with a concept map.

Judging from the aspect of the presentation, the modules Biology learning completely by conceptual map is very practical in the category with an average value of 85.06%. This shows that the look, design color, type and size of text, the language of the module make students interested in reading. In line with the opinion of Sanjaya (2010: 171) says that the use of teaching materials in the form of modules to increase student interest in learning so that the students' attention to the lesson will be increased. Pictures displayed on this module after the explanation of a subject matter. It is intended that the material easily understood by students. The picture is displayed according to the original form in order to make students more easily recognize the objects described and have a clear picture captions. Image is an effective visual tool because it can be visualized, something which is described in more



concrete and realistic. The information submitted can understand easily because of the expected results closer to reality through images that are shown to children and results received by children will be the same (Asnawir and Usman, 2002: 47).

Viewed from the aspect of learning time, use modules Biology learning completely by conceptual map is very practical in the category with an average value of 80.90%. This suggests that the biology of learning modules berbantuan own concept maps can provide benefits in the efficiency of the learning time. In line with the opinions Sukardi (2008: 52) states that practicality can be seen from the time of execution should be short, quick, and precise.

**Effectiveness module biology learning completely by conceptual map:**

Effectiveness modules Biology learning completely by conceptual map views of competency assessments of cognitive, affective, and psychomotor. Cognitive competencies through a written test in the form of multiple choice questions. Affective competence through evaluation sheets attitude assessed by observers during the learning activities. While the observers were observed psychomotor competencies during practical activities.

**Cognitive competence:** cognitive competence of student learning results on cognitive competence (knowledge) is obtained by performing daily tests on the material coordinate system and the reproductive system. The use of the learning module concept maps berbantuan Biology otherwise be able to improve student learning outcomes in the cognitive (knowledge), because the results of the assessment has met KKM otherwise determined by the school.

The average results compared with KKM value processing, so that the individual will be obtained mastery in basic competence with the material coordinate system and the reproductive system. KKM for subjects of Biology at SMAN 1 Tarusan is 75. Of the 36 students who follow an evaluation of the materials coordination system, 32 students obtained value  $\geq 75$ , while 4 students do not complete. While the reproduction material obtained value  $\geq 75$  34 students, while the two students did not complete. The evaluation of the results obtained an average grade 80.67% mastery on the material system of coordination and 84.55% in the material reproduction system with complete categories.

According Permendikbud (No. 104 of 2014: 12) every learner is said to be complete learning (mastery individual) when the value obtained by learners  $\geq 2,67$  and one class is said to complete the learning (classical completeness) if there is a class in 75% of learners thorough study. It can be concluded that learning using learning modules Biology charged concept map on the material coordination system and the reproductive system is effectively used in the learning process because it can improve student learning outcomes, this is because the presentation of the material in the module there is a concept map so as to attract the attention and interest of the students to learn. Student learning outcomes after learning the Biology module charged concept maps showing excellent results.



**Affective Competence:** affective competence obtained from observations of the attitudes of students during the learning by using modules Biology learning completely by conceptual map. The use of the observation method is based on the assumption that affective characteristics can be seen from the behavior or actions are displayed. Competence affective observed are showing curiosity and ability to work in teams. Results observer ratings for affective competencies obtained very effective category. This suggests that learning activities using the learning module concept maps charged Biology is able to develop and implement the values of scientific attitude of students. This is consistent with the results of research Fitri (2015) which states that the use of learning modules that include concept maps Biology able to develop affective competencies of students, this is based on the results of his research on affective competencies categorized as very effective.

**Psychomotor Competence:** Competence hereinafter that psychomotor competencies students on practicum. Psychomotor competence gained from observation by the observer using psychomotor observation sheet and an assessment rubric provided. Psychomotor competence includes the student's skills in conducting lab practicum and the final activity in the material coordinate system. Results of votes on the observer's assessment material psychomotor coordination system has a very effective criteria, it starts from the skills of learners recorded the results of the lab to create a skills lab report. According Lufri, et al (2007: 36) states that the experimental method providing the opportunity for students to both individuals and groups to conduct experiments in laboratory or field, in order to prove the theory for the students. Increased psychomotor competence of learners due to the learning process that uses modules Biology learning completely by conceptual map can help guide and direct students in an experiment so that learners easily develop skills psikomotor.

## CONCLUSIONS

Based on the results of testing and development has been conducted on the modules Biology learning completely by conceptual map was concluded that the modules Biology learning completely by conceptual map for class XI student of the second semester of high school that was developed has been expressed very valid by the validator categorized as very valid, very practical pursuant to test the practicalities of teachers and students, and is very effective on the competence of cognitive, affective and psychomotor. Modules Biology learning completely by conceptual map have been declared valid, practical, and effective, so it is recommended to be used by a Biology teacher as teaching materials in the learning process. For researchers who will continue this research, it is advisable to make innovations in the next study to support the learning process at school.

## REFERENCES

- [1] Arikunto, S. 2007. *Dasar-dasar Evaluasi Pendidikan*. Jakarta: Bumi Aksara.
- [2] Asnawir dan Usman, M.B. 2002. *Media Pembelajaran*. Jakarta: Ciputat Press.
- [3] Depdiknas. 2008. *Panduan Pengembangan Bahan Ajar*. Jakarta: Direktorat Jenderal Manajemen Pendidikan Dasar dan Menengah.





- [4] Efdillah, S. 2013. Pengembangan Modul Pembelajaran Biologi Berorientasi Sains Teknologi Masyarakat (STM) disertai Peta Konsep Pada Materi Pokok Bioteknologi Untuk Sekoah Menengah Pertama. Tesis. Padang: Universitas Negeri Padang.
- [5] Fitri, R. 2015. Pengembangan Modul Pembelajaran Biologi dengan Pendekatan Contextual Teaching and Learning Yang Dilengkapi Peta Konsep Untuk SMA Kelas XI. Tesis. Padang. Universitas Negeri Padang.
- [6] Hamdani. 2012. *Strategi Belajar Mengajar*. Bandung: CV Pustaka Setia.
- [7] Lufri., Arlis, Y. Yunus., dan Sudirman. 2007. *Strategi Pembelajaran Biologi*. Padang: UNP Press.
- [8] Mulyasa. 2006. *Kurikulum yang Disempurnakan*. Bandung: Rosda Karya.
- [9] Sadiman, A.S. R. Rahardjo, Anung Haryono, Rahardjito. 2012. *Media Pendidikan*. Jakarta: Raja Grafindo Persada.
- [10] Sanjaya, Wina. 2010. *Strategi Pembelajaran Berorientasi Standar Proses Pendidikan*. Jakarta: Prenada Media Group.
- [11] Sukardi, M. 2008. *Evaluasi Pendidikan Prinsip dan Operasionalnya*. Yogyakarta: Bumi Aksara.
- [12] Trianto. 2012. *Model Pembelajaran Terpadu*. Jakarta: Bumi Aksara.
- [13] Prastowo, A. 2011. *Panduan Kreatif Membuat Bahan Ajar Inovatif*. Yogyakarta: DIVA Press.