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The Development of *ProBSTAD* Teaching Materials with Conservation Vision on the Learning of the Nervous System in MA

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Abstract

ProBSTAD teaching materials have the advantage of presenting learning objects in a concrete manner so that it is good to add to the learning experience. The scientific approach links learning the material with everyday life. The nervous system material is closely related to the real life of living things. This study aims to develop *ProBSTAD* teaching materials with conservation vision with valid, feasible and effective criteria. This research was carried out at MA Nurul Islam Kriyan. The research subjects consisted of 37 students. The results showed the validation scores by the media and material experts were 92% and 94% with very valid criteria. The results of teacher and student responses were obtained on average 94% and 755 with very good and good criteria. Cognitive learning outcomes of students with N-gain obtained an average of 0.76 with high criteria for planting attitudes of class XI students obtained an average score of 84% in very high criteria. Based on the results of the study, it can be concluded that the teaching material of *ProBSTAD* with conservation vision has been valid, feasible, and effectively applied to the learning of nervous system material in MA.

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INTRODUCTION

Teaching materials are all forms of material in the form of a systematic set of materials that are used to assist teachers/instructors in carrying out learning activities and allow students to learn. In addition to learning instructional materials, the application of learning approaches must also be considered. The scientific approach, in addition to making students more active in constructing their knowledge and skills, can also encourage students to conduct investigations to find facts from a phenomenon or event. Teaching materials used in schools in addition to not integrating character education, most have not had interactivity (Sholekah & Nugrahaningsih, 2014).

Learning activities using the *ProBSTAD* learning model the teacher places students as objects in the teaching and learning process so that students do not only act as recipients of the lesson through verbal explanations of the teacher, but students also play a role in finding the core of the material by discussing in groups so that students do not easily feel bored in class. In learning with the *ProBSTAD* model, students actively solve problems that encourage them to become active and teachers only act as facilitators (Habook and Nagy, 2016).

In this case, students hold a very dominant role in learning, so it can be said to be more student-oriented. Thus the implementation of the *ProBSTAD* learning model is expected to be active students and can cooperate well so that it is more dominant in the teaching and learning process (Mahaputa, 2016). The development of teaching materials includes several principles, namely the principle of relevance (the learning of the subject with basic competencies), adequacy (the material taught is sufficient to help students in mastering basic competencies), consistency (consistency of basic competencies that must be mastered by students).

The results of observations in the learning of the teacher have not applied a book in which to apply problem learning that can be found in everyday life. Therefore, teaching and learning activities are not teacher-centered, one model of student-centered learning is applied by emphasizing the scientific process. The scientific approach emphasizes more on students as subjects of learning that must be actively involved (Kusmaryono & H. Suyitno, 2016).

Based on the explanation above, the researcher conducts research on the development of teaching materials in which there is scientific learning, applying attitudes and conservation. The teaching material is entitled *ProBSTAD* (Problem Based Student Teams Achievement Division) with the hope that students will be more active and able to cooperate well so that they are more dominant in the teaching and learning process.

RESEARCH METHODS

This research is a Research and Development (R & D) research. This research was conducted at MA Nurul Islam Kriyan in the academic year 2017/2018. The research subjects were class XI consisting of 37 students.

The data in this study include observational data on the potential & problems obtained through teacher interviews and then analyzed descriptively qualitative and questionnaire needs of students which were analyzed quantitatively descriptive percentage, teaching material validation data by the media and materials using media validation questionnaires and material analyzed descriptive quantitative percentage, the data of the results of the feasibility test of the instructional material were obtained through the responses of teachers and 10 students of class

XI using teacher and student response questionnaires which were analyzed by quantitative descriptive percentage, effectiveness test data obtained through students' cognitive learning outcomes and assessment of attitudes toward class XI students. Cognitive learning results in the form of pretest and posttest were analyzed quantitatively using N-gain, assessment of the planting of attitudes toward students was obtained through questionnaire assessment of students' attitudes and analyzed by descriptive quantitative percentage.

RESULTS AND DISCUSSION

Validation of Teaching Materials by Experts

The development of *ProBSTAD* teaching materials with conservation vision on nervous system learning was validated by two experts, namely media expert lecturers and material experts. Teaching materials are said to be valid if the percentage of assessment by media and material validators is> 62%.

The validation phase by the media obtained a score of 92% in the very valid category. This is because teaching materials are prepared according to the textbook assessment criteria according to BSNP. Components assessed by media experts are components of presentation and graphics including an assessment of the parts of *ProBSTAD* teaching materials, about appearance, legibility, print quality, and content of teaching materials. According to Putri (2017), the use of media in the learning process influences students' motivation to learn. The media compiled in this study are the teaching materials of *ProBSTAD* with the vision of conserving valid nervous system material used as student teaching materials. This is in line with research conducted by Pratiwi (2014) showing that biology teaching materials based on SAVI approach meet very good validation criteria with 92% validation percentage and into the validity category is very valid.

After validation by media experts, the next step is validation teaching material that was also carried out by the biology lecturer at Semarang State University. The material in the video is assessed based on the component aspects of the content and aspects of the component. Valid on aspects of the content feasibility component, all aspects get the maximum score, that is 4. On the component aspect of presentation, namely the completeness and quality of teaching materials, and interactivity, get a score of 3, while for contextual and actuality, ease of teaching material, systematic, coherent, logical flow is clear, clarity of description, discussion, and examples contained in the teaching material of *ProBSTAD* get the highest score, that is 4. Expert material suggests that teaching materials can already be implemented in class learning

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Feasibility test by teachers and students. This stage is carried out by giving questionnaires to the students and teachers. The teacher response data obtained from 1 biology teacher at MA Nurul Islam Kriyan. The results of the teacher's questionnaire responses showed a very applicable response to the development of conservation-oriented *ProBSTAD* teaching materials that is 94% so that the teacher strongly agrees with the statement that the teaching material of *ProBSTAD* has conservation vision on learning the nervous system material suitable for use in classical learning in schools. The teacher argues that the application of the contextual element is very appropriate to do in the study of biology. The subject matter of the nervous system contained in the teaching materials of *ProBSTAD* this learning is in accordance with

basic competencies. The teacher also revealed that the pictures and explanations in the teaching material of *ProBSTAD* with conservation vision on the nervous system learning guided students to understand the concept, so that the teacher was interested in using the teaching material of *ProBSTAD* with a vision of conservation in the nervous system learning.

After the feasibility test has been conducted by the teacher, the next step is the feasibility test by the students by giving a questionnaire on students' responses to the teaching material of *ProBSTAD* with conservation vision. Students are given the opportunity to see *ProBSTAD* teaching materials to provide an assessment of teaching materials. From the student response questionnaire data obtained an average score of 75% with criteria can be applied. The result data shows that *ProBSTAD* teaching materials with conservation vision on nervous system learning can help the learning process to be more effective. Students seem to enjoy the atmosphere of learning because it is not as usual as they only listen to what the teacher says, students also look more happy, interested, and motivated in this learning activity so that the students' attention and enthusiasm to learn become higher. Students argue that the pictures and information in the teaching materials of *ProBSTAD* with conservation vision on nervous system learning are easy to understand, making it easier for them to understand the concept of the nervous system material. Students feel happy and interested in following the nervous system learning using *ProBSTAD* teaching materials as learning media. This is because in the previous learning the teacher did not provide much media validation in learning. This achievement is due to the presentation of interesting teaching materials and many images and striking color selection so that students are interested in learning nervous system material. Student learning outcomes can be increased if students feel happy with the learning process they do (Rigos & Ayad, 2010).

The Effectiveness of *ProBSTAD* Teaching Materials Conservation Vision on Learning the Nervous System

Teaching Materials *ProBSTAD* Conservation Vision is being tested on a large scale by using it in the learning process. The trial was conducted in one class, namely the XI MIPA MA Nurul Islam class. The effectiveness of teaching materials is seen from the value of *pretest-posttest* to be seen classical completeness and N-gain value obtained by students for cognitive aspects. The post-test conducted at the end is in line with the opinion of Suastika & Safrina (2016) that the posttest or final test is done to see the progress of students in learning, formulating analysis and reflection for the next action. Student learning outcomes are shown in Table 1.

Table 1 Cognitive learning outcomes of students

Data	XI IPA		
	Pretest	Difference	Posttest
Highest score	68	25	93
Lowest score	16	44	60
Average	39	40	79

Based on Table 1 it is known that the cognitive learning outcomes of class XI students show that average of posttest is higher than the average of pretest score. To determine the significance of improving student learning outcomes, normality gain (N-gain) measurements were taken from the pretest and posttest values. N-gain measurement results on class XI can be seen in Table 2.

Table 2 Student N-gain measurement results (n = 37)

Category	Criteria	XI IPA	
		Total	**%**
$0.70 \leq g \leq 1.00$	High	24	65%
$0.30 \leq g < 0, 70$	Medium	13	35%
$0.02 \leq g < 0.30$	Low	0	
N-gain class		0,76	
Criteria		High	

Implementation of teaching materials for effectiveness testing with the sample used is class XI. The total number of students is 37 students. The data were taken in this effectiveness test in the form of student learning outcomes (cognitive) and questionnaires of student cooperation attitudes. Effectiveness test was carried out in two meetings with the first meeting conducted pretest to find out the students' initial knowledge of the nervous system material, distribute teaching materials and discuss the questions contained in the teaching material then present the results of the discussion in front of classmates, and the second meeting students were still discussing the questions contained in the teaching material then presents the results of the discussion in front of classmates, then students are given a posttest to find out whether there is an increase in students' knowledge about the nervous system after using *ProBSTAD* teaching materials with conservation vision.

Based on the results of the effectiveness test, the implementation of teaching materials for *ProBSTAD* with a vision of conservation in the nervous system learning in MA Nurul Islam Kriyan has a positive impact on the achievement of cognitive learning outcomes and an assessment score on the attitude towards students. Cognitive learning results showed that the posttest score was higher than the pretest with N-gain analysis of the XI class obtained a score of 0.76% in the high criteria. Achievement of cognitive learning outcomes shows that learning using teaching materials is effective in helping students understand the material. The higher the students 'knowledge, the higher learning outcomes are obtained (Lisdiana et al., 2017).

The improvement in students' understanding is influenced by several factors, such as the addition of material and problems that are solved by group discussion. Increasing students' interest and motivation to learn makes students better understand the material taught by the teacher (Fatonah, 2017). Learning activities by using problems can improve the cognitive learning outcomes of students, not only that learning by using problems can improve students' analytical skills (Astuti, 2016). According to Birgili (2015) learning whose learning environment uses problems can develop students' creativity and critical thinking, not only that even learning that uses a problem can increase students' curiosity and adult attitudes (Shaer and Gaber, 2014). The results of the calculation of N-gain values indicate the level of understanding of students after learning. This is because the teaching material used comes from the real environment, so students are more interested in reading and student learning outcomes increase (Hamidah et al., 2017)

In addition to improving students' cognitive learning outcomes, *ProBSTAD'*s teaching materials with conservation vision can have a positive impact on assessment score planting

attitude towards students after using *ProBSTAD* teaching materials with conservation vision. The character values of Unnes conservation are religious, honest, caring, tolerant, democratic, polite, intelligent and tough (Ridlo & Irsadi, 2012). The goal of Unnes conservation character education is to foster student personality according to the noble character in life. The application of contextual elements in learning can improve students' attitudes before and after learning, while also being able to optimize the emergence of intellectual potential, creativity, and emotional intelligence. Character values are developed through the learning process (Sukaesih & Kartijono, 2014). The high level of psychomotor learning outcomes is not a dominant factor in learning, this can be seen in the results of observations of students' activities that are evenly distributed between activities using media, interacting with teachers, working independently and in groups (Syahdiani et al., 2015)

CONCLUSION

Based on the results of the analysis and discussion that has been carried out, it can be concluded that the existing teaching materials and teachers used in the nervous system learning still have little to do with everyday phenomena or problems, the feasibility of *ProBSTAD* teaching materials with conservation vision is declared very valid by the validator, and the effectiveness of the material teaches *ProBSTAD* is stated to be applicable in the learning process.

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