



## The Development of Nervous System Problem-Based Module with Character of Conservation

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### Abstract

Nervous system teaching materials available in schools do not contain scientific-related content as mandated by the 2013 curriculum. In addition, teaching materials also do not contain student character reinforcement content. The purpose of this study is to develop "Nervous Problem-Based Module with a Conservation Character" as a nervous system learning supplement. This type of research is Research and Development (R&D) following ten steps; identification of potential and problems, data collection, product design, product design validation, product design revisions, small-scale trials, product revision I, large-scale trials, product revision II, and final products. The research subjects were students of class XI of SMA N 1 Bae Kudus. Nervous Problem Based Module with the Conservation Character tested the feasibility, readability, and effectiveness. Feasibility tests obtained very valid results. Readability test results were very valid. Test effectiveness by applying Nervous Problem Based Module with a Conservation Character in learning, obtained effective results and can be used in learning. The insertion of the conservation character reinforcement in the module gives positive results on the character of students. It can be concluded that "Nervous Problem Based Module with a Conservation Character is decent and effectively applied in the nervous system learning.

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## INTRODUCTION

The learning activity which is conducted in schools is carried out according to established rules, namely 2013 Curriculum. The 2013 curriculum mandates that in the learning process is done contextually, where students are actively involved in the learning process that constructs their knowledge (Selvianiresa & Prabawanto, 2017). Apart from the learning model used, the learning resources used also play a role in helping students understand the material.

Observation results from teaching materials used in Biology learning in schools have not contained scientific-related content, one of them is the nervous system material. Even though there are many materials that can be studied in learning through nervous system phenomena in everyday life. The use of phenomena related to the appropriate material, can encourage students to find out more and explore the nervous system material. The learning method that utilizes the phenomenon is Problem Based Learning (PBL). PBL is one of the scientific learning models suggested by the 2013 Curriculum. PBL aims to train students to use knowledge and critical thinking in explaining a phenomenon or problem (Adiga & Adiga, 2015; Zhang *et al.*, 2015; Mansor *et al.*, 2015; Sahyar *et al.*, 2017). The presentation of phenomena as a learning source can be packaged in a module. The module is a handbook that is personally owned by students, so that students can learn a material independently with minimal teacher support (Setyowati *et al.*, 2013; Herman *et al.*, 2016; Irawati, 2015).

In line with the betterment and improvement of students' learning outcomes in the cognitive aspects, the government also promotes character reinforcement education. The education of character building in the process is adjusted to the level of education taken by students. The higher the level, the character education can be delivered more abstractly, so that students can develop it by themselves (Suwarna & Suharti, 2014).

Based on the description of the problems above it is necessary to develop a module that has a scientific approach, uses phenomena in everyday life, is arranged in accordance with the PBL steps and contains character reinforcement content. It is expected that with the use of "Nervous Problem Based Module with a Conservation Character" as a learning supplement for nervous system material can help students achieve maximum learning outcomes, both regarding their knowledge and character they have.

## RESEARCH METHOD

The research used was Research and Development (R&D) by using 10 steps, namely identification of potential and problems, data collection, product design, product design validation, product design revision, small-scale trial, product revision I, large-scale trial, revision product II, and final product. The subjects of this study were students of class XI of SMA Negeri 1 Bae Kudus. Nervous Problem-Based Module with the Conservation Character was tested its feasibility, readability, and effectiveness. Feasibility test was by expert nervous system material and module media expert. The module readability test was by 10 students of class XI MIPA 5, who were randomly selected and the Biology teacher of class XI.

The effectiveness test is done by applying the Nervous Problem Based Module with a conservation character in the nervous system learning in the class, namely class XI MIPA 7, using a research design One group pretest-posttest design. Indicators of the module's success are, (1) the average validation results of media and material experts with minimum valid criteria, (2) the readability of the module gets a minimum valid result, and (3) the percentage of students who get KKM scores more than 75% of the total students in the class and N-gain results are at least in the

medium criteria, and the results of the student attitude scale show that 75% of all students in the class are at minimum high criteria.

## RESULTS AND DISCUSSION

Nervous System Problem-Based Module with a Conservation Character” is arranged by including phenomena around the students to be used as illustrations in understanding the nervous system material. The stages of discussion of the phenomenon are prepared using PBL syntax. The reasons for using PBL are because this model is designed to use phenomena or problems as a basis for student learning, thus helping to improve their knowledge and understanding (Moutinho *et al.*, 2015; Burrow, 2018). In addition, PBL is one of the scientific approach learning models, so students can learn to use scientific thinking in addressing a phenomenon.

In addition to discussing material in terms of the nervous system material, several phenomena that are also used as a reflection for students can strengthen the character he has. Some phenomena that exist focus on strengthening the character of caring and responsibility towards peers, so that it can be a reflection for students. Loading character strengthening material in teaching materials can support teachers and schools in the context of efforts to strengthen student character education (Jaya *et al.*, 2014).

Nervous System Problem-Based Module with the Conservation Character” is made in modules. The reason of choosing module is because the focus of the instructional material developed is general and specific learning objectives, specifically discussing specific material, containing the subject matter learned, student worksheets, and student evaluation sheets (Prastowo, 2012). The module trains students to be able to study independently with minimal teacher assistance and can help students improve their knowledge and learning outcomes (Lepiyanto & Pratiwi, 2015; Susilawati *et al.*, 2016; Adyana & Citrawathi, 2017).

The design of “Nervous Problem Based Module with Conservation Character” that has been made is validated to material and media experts. This stage aims to see how feasible the module is in terms of material and presentation. The validation results are shown in Table 1 below:

**Table 1** Result of Feasibility Test

Feasibility	Validator	
	Content	Media
Content	16	-
Linguistic	14	-
Presentation	22	18
Graphics	-	13
Total	52	31
Maximum score	60	33
Persentase	86%	94%
Average	90%	
Criteria	<b>Very Valid</b>	

The validation result of “Nervous Problem Based Module with a Conservation Character from both experts is good, which is in very reasonable criteria. The aspects of the content of the Nervous Problem Based Module with a Conservation Character are in accordance with the applicable curriculum, which is in accordance with the basic competencies, and the indicators to be achieved so that they can guide students in learning. Linguistic aspects get good results by using good Indonesian language so that the sentences arranged make it easy for students to understand the material (Itaristanti, 2015).

The aspect of presentation of Nervous Problem Based Module with a Conservation Character gets good results. Nervous Problem Based Module with a Conservation Character” has fulfilled the

requirements for preparing the module, so if it is not confused be used. The module contains the initial section in the form of concept maps, usage instructions, material descriptions, student worksheets, material descriptions, evaluations, and answer keys (Prastowo, 2012).

The graphical aspect of Nervous Problem Based Module with a Conservation Character gets good result. The cover display has shown relevance to the contents in the module, writing components has used the appropriate type of writing and size so it is easy to read. The illustrations or pictures are also proportional and attractive size to support material discussed. An interesting illustration can also add value to the module (Kasmaienezhadfar *et al.*, 2015; Eitel & Scheiter, 2015). Even so, there is a need to improve the layout of the writing with illustrations or images so that they do not overlap.

Nervous Problem Based Module with a Conservation Character” that has been validated by experts, then carried out a small-scale trial to determine the level of readability. The trial involved students and teachers as the subject. The results of student readability are shown in Table 2 below:

**Table 2** Result of Readability (n=10)

No	Statement	Average Score
1.	The type of letters used are appropriate and readable	2.7
2.	The font size used is easy to read	2.5
3.	The font color used is appropriate and readable	2.6
4.	The vocabulary used is easy to understand	2.1
5.	Writing error is less than 10 words	1.7
6.	Submission of material is concise and clear	2.5
7.	Between paragraphs or between sentences are related	2.4
8.	The sentence is clear and does not cause many meanings (ambiguous)	2.2
9.	Content structure and sentence are coherent and easy to understand	2.3
10.	Pictures/illustrations/graphs is in appropriate size and clear	2.6
11.	The cover presented by the theme of the material	2.6
Number of Average Scores		26.2
Percentage		79%
Criteria		Very Valid

In line with the assessment results of students' readability, the results of the assessment of readability from Biology teachers also showed the same results, which is very valid. This shows that the use of the type, size, and color of the letters used are appropriate. Writing and submission of material are also good, it's just that there is a need for improvements for some typos that need to be corrected and the structure of questions that need to be clarified to make it easier for students to understand.

Nervous Problem Based Module with a Conservation Character” then is tested on a large scale by using it in the learning process. The trial was conducted in one class, i.e class XI MIPA 7 of SMA Negeri 1 Bae Kudus. The effectiveness of the module is seen from the value of pretest-posttest to see classical completeness and N-gain value that is obtained by students for cognitive aspects, while the affective aspects are obtained from the results of self-assessment using scale. Students' learning outcomes are shown in the following Tables 3, 4 and 5:

**Table 3** Data of Cognitive Result (n=39)

Data	Pretest	Posttest
Maximum score	55	90
Minimum score	20	40
Student complete	0	30
Student uncomplete	39	9
Classic completeness percentage	0%	77%

**Table 4** Data of Students *N-gain* (n=39)

<i>N-gain</i> Criteria	Students	<i>N-gain</i> Average
Minimum	6	0.13
Medium	31	0.54

*continue*

Maximum	2	0.78
Average Criteria		<b>0.49</b> <b>Medium</b>

**Table 5** Result of Students Attitude Questioner (n=39)

Kriteria	Jumlah siswa	Persentase
Very high	17	43%
High	22	56%
High Enough	1	1%
Total	39	100%

Nervous System Problem-Based Module with the Conservation Character” can help students understand the material. It is indicated by the results 77% of students have the value of achieving KKM. While the results of the N-gain value are in the medium criteria. These results indicate that the use of “Nervous Problem Based Module with a Conservation Character” in learning can help improve their knowledge and understanding in the nervous system material. Contextual teaching materials can help students learn (Lisdiana *et al.*, 2016). The phenomenon presented makes students emotionally interested, because they have often experienced, heard or seen, so that they are more easily accepted (Abdullah, 2012).

The learning series which is contained in the “Nervous System Problem-Based Module with a Conservation Character” participates in encouraging active learning students. The use of PBL syntax makes students work with a scientific mindset, ranging from observing, asking, guessing, testing and presenting results. This is in accordance with what was stated by Simone (2012) and Prasasti *et al.* (2016). All these stages encourage students to participate actively while discussing the phenomena being studied. Learning with a scientific approach encourages students to actively participate during learning (Setiyadi *et al.*, 2017). Understanding the material obtained by students independently during learning can make it last longer, this result is supported by the research of Hastuti *et al.* (2015). PBL encourages students to get a thorough understanding (Rahayu & Anggraini, 2018). The use of PBL also encourages students to care, be responsible, and cooperate with their friends in completing their assignments.

The use of module supports the learning process (Rufii, 2015; Cruz, 2015) and improves students’ learning outcomes (Adibniya *et al.*, 2012; Paspasan, 2016; Khabibah *et al.*, 2017; Zulfadli, 2017). Nervous Problem Based Module with a Conservation Character” in the form of module helps students learn the nervous system more effectively, because in the focus of the module discusses the material. Nervous Problem Based Module with a Conservation Character” contains clear instructions, so students can learn independently. In addition, students can also learn according to their level of ability. The use of module in the learning process according to Ali (2010) frees students to study according to their level of understanding.

The effectiveness of Nervous Problem Based Module with a Conservation Character in learning is also supported by the results of student and teacher responses after using it in studying the nervous system. The results of student responses indicate that the Nervous Problem Based Module with a Conservation Character gets applicable criteria. Nervous Problem Based Module with a Conservation Character” helps them in learning so that most of them have passed the KKM and the results of the average N-gain value of students are in the medium criteria. In addition, the material presented in the module that is in accordance with the basic competencies to be achieved is enough to help students in the learning process, indicated by the posttest scores of students experiencing an increase from the pretest Nervous Problem Based Module with a Conservation Character can be used as a companion to other teaching materials, thus adding to the wealth of reference in learning.

Nervous Problem Based Module with a Conservation Character also contains character education content so that it participates in realizing the character strengthening education of students. Character education can be inserted in teaching materials (Sholekah & Harini, 2014; Aryani *et al.*, 2015). The character reinforcement is inserted in conservation corners in certain parts of the module, so students can read them while learning material. Engraving the character of students in learning can be done by listing it in the learning tool book used (Aisyah *et al.*, 2015). Simple things in learning can encourage students to strengthen their character (Ridlo & Irsadi, 2012). The conservation corners in the module contain phenomena related to the nervous system, but contain a moral message to strengthen the character of students, thus affecting their affective learning outcomes.

The character of students' conservation in this case regarding the character of caring and being responsible for fellow peers is assessed using an attitude scale. Attitude is a reflection of how someone's character. From the results of the attitude scale through self-assessment was found that students have a caring attitude and good responsibility towards peers. These results indicate that the character of students' conservation, especially caring and responsibility towards peers is in line with the knowledge they have. This caring attitude and responsibility towards peers is seen when students respond to stimuli in conservation corners in the module. Students give positive responses and opinions about how it should be when events occur around them.

## CONCLUSION

Based on the results of data analysis and discussion of research results, it can be summarized as follows: (1) feasibility of Nervous Problem Based Module with the Conservation characters get very valid results (2) legibility of the Nervous Problem Based Module with the Conservation Character” is very valid, and (3) Nervous Problem Based Module with the Conservation Character” is effective to be used in nervous system learning.

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