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The Relationship between Nutritional Status and Learning Pattern with Learning Outcomes of Biology Student of Universitas Negeri Semarang

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Abstract

The aim of the research to determine the effectiveness of contextual learning with Arthropoda preservation of high school students learning outcomes. The research was conducted at SMA N 1 Bulu Sukoharjo Regency by Pre-Experimental Design. The sample were X IA 1 and X IA 4 which taken by purposive sampling technique. The results showed that there was an influence on the results of psychomotor learning in the category very effective with value of 85,94%, while the results of cognitive learning is in the category less effective with 48%. The average of the student's questionnaire responses after joining the learning was in very good criteria. Generally, the teacher and the students also gave good responses on the implementation of the learning. The conclusion of the research is the application of contextual learning with Handout and preserved Arthropoda not yet effectively applied in learning.

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INTRODUCTION

Active learning can be done to all disciplines in education. Biology learning is one of the disciplines that the object of study covers living creatures and the environment. Animalia is one of biology topics for X graders in second semester. Animalia studied in class X second semester include ten phylum (Irnaningtyas, 2013). Preliminary research with a questionnaire stated that 47% students in SMA N 1 Bulu Sukoharjo regency had difficulties to understand the topic because of its wide and complexity. Syllabus requires that students to be able to apply the classification principles to categorize animals into phyla based on morphology, body symmetry, body cavity, reproduction and presenting data on the comparison of traits (BSNP, 2016).

Preliminary research by interviews with one of the biology teachers SMA N 1 Bulu Sukoharjo Regency stated that the learning methods used in teaching Animalia includes group discussion and observation. The teacher instructs students to bring the animals that are easily found in the neighborhood or around the school. The method used by the teacher is of course good, but there is still lack the animals brought by students less varied. Biology teachers recommend using animals that are easy to carry by students such as Arthropodae. Arthropodae can be used as a learning media for students because the Arthropodae phylum species is the greatest number compared to other phylum about 80,000 species (Kastawi *et al.*, 2013).

Biology teacher SMA N 1 Bulu Sukoharjo Regency using media was quite variated during learning Animalia, there were textbooks, students' worksheet (LKS), and LCD projector. This is certainly good, but the teacher is still constrained by the media and teaching materials. LCD projector is only available in laboratories and teaching materials are lent to students during learning and should be returned when learning is over. Biology teachers recommended using other textbooks that are more varied and interest. Students are passionate and make it easier for students to understand the material.

The lesson that suits the problem in SMA N 1 Bulu Sukoharjo Regency is using the right method and media of learning. Selection of learning methods that are appropriate for students by optimizing student activeness is a contextual method. The contextual method is a method of learning by doing scientific activities so that students can relate to the knowledge with their experiences in everyday life. Contextual learning can increase student learning activities by improving group work (Setiawan, 2008). Contextual learning can facilitate students to understand learning materials (Suniati *et al.*, 2013).

Implementation of contextual learning of course required appropriate learning media that can facilitate students understand the material. The handout is a teaching media that contains solid content and concise, so students easily to understand the learning materials (Hera *et al.*, 2014), Handouts developed with color images to attract students to learn and understand the material. The developed handout is done by utilizing the natural environment of rice fields, soccer field, and river as a learning resource for students. Arthropodae in rice fields, soccer fields, and rivers can be used as objects of study in the handout. Based on the description of the problems can be explained that through contextual learning with handout and Arthropodae preservation can improve the understanding of student concepts and help teachers in providing understanding to students.

RESEARCH METHOD

This research was conducted in SMA N 1 Bulu Sukoharjo Regency in Odd Semester of the academic year 2017/2018. The design used in this research was pre-experimental design with one shot case study (Sugiyono, 2015). The sample used was two classes, included class X IA 1 and class X IA 4. The sample was determined by purposive sampling.



Picture 1. Display of handout



Picture 2. The sample of Arthropods that used in learning

The data collected in the form of main data and supporting data. The main data are learning outcomes to measure students' cognitive and psychomotor aspects. The cognitive tests were given at the end of the meeting as a posttest. Students' observation sheet (Lembar Kerja Praktikum / LKP) as a result of students' psychomotor learning was assessed during the lesson and the end of the lesson. Supporting data was in the form of response sheets (students and teachers). The responses (students and teachers) were taken after the lesson ends with a questionnaire of student and teacher responses. Lessons applied in the classroom were consistent with the syntax of contextual learning with handout and *Arthropod* preservation.

Methods of data analysis in this study were data analysis of students' cognitive learning outcomes from posttest, psychomotor learning result data from student LKP answers, student response analysis, and teacher response analysis on contextual learning process with handout and *Arthropod* preservation.

Table 1 Criteria of Effectiveness of Contextual Learning with Handout and *Arthropod* Regarding Students' Learning Outcome

Score Interval	Criteria
76% - 100%	Very effective
51% - 75%	Effective
26% - 50%	Less effective
0% - 25%	Ineffective

RESULTS AND DISCUSSION

The effectiveness of Contextual Learning from Student Cognitive Learning Outcomes

Table 2 The effectiveness of Contextual Learning Implementation with handout and *Arthropod*Preservation from Cognitive Learning Outcomes of Class X IA 1 and X IA 4

Grades	Values		Number		Percentage effectiveness
	Highest	Lowest	Student	Student complete	
X IA 1	97	50	22	9	41%
X IA 4	90	60	22	12	55%
Average					48%

Assessment of cognitive learning outcomes of contextual learning with handout and *Arthropods* preservation was implemented after learning process. Students used handout as a teaching material during in learning process. *Arthropods* are used as learning media. Students used LKP as ingredient a learning material in classifying *Arthropods* and the handout was to help classifying *Arthropods* during the learning. Students who had difficulty classifying *Arthropod* used the handout to help them.

The analysis result of effectiveness application contextual learning with Handout and *Arthropods* preservation in terms of cognitive learning outcomes of class X IA 1 students based on Table 2 shows that the learning application achieved 41% effectiveness. These results, when compared to predefined effectiveness criteria, indicate that contextual learning with handout and *Arthropods* preservation are less effective for cognitive learning outcomes. The analysis result effectiveness application of contextual learning with handout and *Arthropods* preservation in terms of cognitive learning result of grade X IA 4 students reached 55%. The results compared to the predefined effectiveness criteria indicate that contextual learning with handout and *Arthropods* preservation was quite effectively when applied in learning to cognitive learning outcomes.

The data of contextual effectiveness learning with handout and *Arthropods* preservation shows that it is less effective applied to student cognitive learning result. This is happened because of several factors, the first is the teacher. The teacher who was supposed to teach was Biology teacher, but due to certain constraints, the researcher became the teacher. The new teacher who is the researchers, still lack of teaching experiences to manage the classroom and made students less enthusiastic in learning. The teachers' competency and classroom management will affect student achievement (Inayah *et al.*, 2013). This suggests that the professionalism of the teacher is needed for the students to be more responsive to the school environment (Angelle & Teague, 2014). Students were less comfortable because they had never met before. Before going study it should be ensured that the classroom teacher really has ready to teach according to the contextual learning syntax.

The presence of a new teacher is also related to the second factor of learning method used. The classroom teacher had been using group discussion methods during the lesson. Students were not familiar with new contextual learning method applied. This is relevance with the opinion of Siagian (2012) a habit of learning that is done in a relatively long time and continuous will be embedded in students and difficult to accept new things. New learning methods should be stimulated to attract students' attention through novelty, strange, different from others and contradictory to stimulate students' curiosity (Aritonang, 2008). Students actually had a lot to questions about how to do the observation sheet, but it had not been able to stimulate students' curiosity on the material. This shows that contextual learning could not be accepted by the students.

Lesson syntax was less emphasized in certain sections as in attribution and interpretation stages. It is shown by some students who had no idea of the learning material that is *Arthropods* classification. It is important to emphasize the attribution stage to the students because this stage can direct the students to find and derive conclusions based on concepts they find through group discussion (Fayakun & Joko., 2015). Teachers continued the learning at the interpretive stage, some groups are still confused about how to classify *Arthropodae*. This is indicated that certain groups still not appropriate in filling observation data. This was happened because most students only followed and wait teacher's instruction (Sambada, 2012). This shows that the importance of emphasizing the activity of asking, finding and reflection for students respond to the activities undertaken. This activity also requires the teacher as a facilitator to facilitate the students to do the classification activities, as a proof of student scientific activity.

Pramitasari *et al.* (2011) says that the emphasis of contextual learning can be done by assigning group tasks, inviting students to be actively involved in discussions and presentations, and providing assessments of various aspects such as exams, assignments and presentations. Teachers are assigned to provide ease of learning to students by providing adequate facilities and learning resources

(Haryono, 2009). Teachers should not play a full role in delivering concepts, but organize environments and learning strategies that enable students to learn. Contextual learning requires students to actively seek their knowledge (active student learning). So that the important role of students as implementers is very influential in learning.

Material emphasis was made using *Arthropodae* preserved media as a learning medium. *Arthropodae* used as learning mediums have been made two months before learning. The duration of the process of making *Arthropodae* make the colors and shapes changed and the smells arise. The unpleasant smell made some students feel dizzy and uncomfortable. Learning using *Arthropodae* that are still alive can be presented as a medium of learning. *Arthropodae* presented do not cause unpleasant odors and colors and shapes are still original. Previous research suggests that learning using *Arthropodae* specimens stimulates students to incorporate various senses and is effective against student activity (Retnaningsih *et al.*, 2012).

The degree of difficulty of the cognitive outcomes can also affect student learning outcomes. Posttest presented is made up of the analytical problems at the cognitive level of C4 as much as 43% of the total question. The problems presented as multiple choices expected students could analyze complex problems. Students who have the ability to analyze their cognitive can separate objects from their surroundings, so that their perceptions will remain strong (Siwa *et al.*, 2013). However, some students' understanding has not been strongly constructed, especially the way Arthropod classified. This caused some students got posttest values below the KKM.

Effectiveness of Contextual Learning from Student Psychomotor Learning Outcome

Table 3 The effectiveness of Contextual Learning with Handout and Arthropodae Preservation from the Evaluation of Students' worksheet in Class X IA 1 and Class X IA 4

Classroom	Aspek Assessed				Number			Percent Effectiveness
	Result of observation	Conclusion	Answer question	Present the results of observation	Score	Maximum score		
X IA 1	3,5	3,8	3,5	3,2	14	16	87,50%	
X IA 4	3,0	3,5	3,7	3,3	13,5	16	84,38%	
Average								85,94%

The students' skills assessments from worksheet indicates that the students' skills of observations, inferring conclusion, answering the questions, and presentation at class X IA 1 reach 87.50%. The results are then compared to the criteria of effectiveness and indicates that the level of psychomotor activity of students of class X IA 1 is in very well category. The assessment of students class X IA 4 in responding to worksheet shows that the students' skills of arranging the observation result, making conclusion , answering the question, and presenting the observation result is 84.38%. The results are compared with the criteria of effectiveness and reveals that the level of students' psychomotor activity at class X IA 4 is also included in the very well category.

The contextual learning effectiveness with handout and *Arthropods* preservation in general is very effective applied to student psychomotor learning result. This is because students are facilitated by workhseet and *Arthropods*. Students' observation activities assessed as students psychomotor value. Practical activities undertaken by students during learning include presenting observations, drawing conclusions, analyzing the role, and communicating the results of observations in front of the class. This is consistent with research that learning done with practicum activities which can improve students' scientific skills (Elliot, 2012).

The first psychomotor activity was when students completed the results of observation on worksheet. Students made observations of *Arthropods* preservation, and fill the results of the

observations columns available in worksheet. Students are also assisted in conducting observations with the *Arthropods* preservation. However, some students have not yet correctly classified *Arthropod* animals. Some students were still experiencing confusion, especially in classifying activities because this activity is the first time done by students. Classification activities can be done more effectively with the learning that builds the students' social paradigm that knowledge is related to the phenomena students encounter in the neighborhood (Ekeke, 2011).

The second psychomotor activity of the students is making conclusion. Students were helped by the conclusion column on the worksheet. This activity allows students to conclude observations. A further psychomotor activity was to analyze the role of *Arthropod* to life. Students analyzed together the role groups of some preserved *Arthropod*. Students who had difficulty in analyzing the role were given the opportunity to explore other sources such as books, internet and handouts used as learning media. Handout presented also contains the role of *Arthropod* which can be used as a reference for students. Thus, with the help of other media able to facilitate psychomotor activity in analyzing the role of Arthropodae. Lisdiana *et al.* (2016) says that the *Handout* can be used and valid in lesson study.

The last psychomotor activity in contextual learning was communicating observation results. The results of the observations that were obtained later by the group were presented in front of the class. Group representatives made presentations including observations, conclusions and the role of *Arthropod*. This activity were assisted by *Arthropodae* preservation. It facilitated students because in previous activities students were given the opportunity to conduct discussions and observations of *Arthropod*, conclude and analyze the role. It can be a stock for students to perform activities to communicate the results of observation.

Good psychomotor activities also due to media help. Media aids used in psychomotor activities were *Arthropods* and handout. *Arthropods* preservation plays a role in facilitating students in observing and presenting the results of observations. An *Arthropod* is a visual medium capable of explaining the material about the body parts of the species in detail and also able to increase student activity. Handouts containing information about common features and classification of *Arthropods* in the student environment may help in classifying and analyzing the role. So the media in the form of preservation and handout could help students in carrying out psychomotor activities.

Another factor that makes students good psychomotor activity is the exixtence of worksheet. The observation sheet helped students in carrying out observation activities on *Arthropod*. The content were data fields of observation results including classification, conclusions and roles. Learning with the help of this medium makes learning interesting because students are taught how to find ideas and solve problems to develop students' science process skills (Anisa *et al.*, 2014). So that the worksheet was able to help students carrying out good psychomotor activities. This is supported by the results of research which states that almost students love the innovation in learning, especially the priority of student activeness and direct involvement with experience (Hayati *et al.*, 2013).

The psychomotor activity of class X IA 1 students is more active in learning than class X IA 4. High student enthusiasm for learning can be caused by several factors, one of which is the time slot. The lesson in class X IA 1 was held from first hour to the third. Class X IA 4 learning was from the fourth to the sixth hour. The time slots the lesson affect student's motivation, which further can give significant influence on the learning outcome (Sutrisno & Budi, 2016).

Students responded to the application of contextual learning with handout and *Arthropod* preservation that has been done. Students' responses to the application of contextual learning with handout and *Arthropod* preservation were obtained from questionnaires. Assessment of student responses used was based on the assessment by BSNP 2016. The results of the analysis of student responses to the application of contextual learning with handout and *Arthropod* preservation include three aspects: media display used, presentation of material and the benefits of contextual learning

with handout and *Arthropod* preservation. Student responses to the application of contextual learning with handout and *Arthropod* preservation are presented in Table 4.

Table 4 Student Response to Contextual Learning with Handout and *Arthropods* Preservation of High School Students Learning Outcomes

Class	Display Handout (%)	Presentation of material Handout (%)	The benefit of contextual learning with Handout and Arthropod preservation (%)
X IA 1	88,64	84,66	87,82
X IA 4	91,5	88,06	84,41
Average	90,07 Very good	86,36 Very good	86,12 Very good

The analysis results that students' responses to the appearance and content of handouts used during the learning provide excellent ratings with 90.07%. Result analysis of student responses to the presentation of the material handout also gives a very good assessment with 86.36%. The results of the analysis of contextual learning with handout and *Arthropods* preserves also get excellent ratings from students with 86.12%. Thus, in general the students responded very well to the use of handout and the application of contextual learning with handout and *Arthropods* preservation.

The teacher's response to the application of contextual learning is used to find out the teacher's assessment of the learning that has taken place. The teacher's response sheet to the application of contextual learning with handout and *Arthropods* preservation contains 9 statements. Implementation of contextual learning with handout and *Arthropods* preservation based on teacher response results presented in Table 5.

Table 5 Teacher response to Contextual Learning with Handout and *Arthropods* Preservation of High School Students Learning Outcomes

No	Teacher's response	Average (%)	Criteria
1	Display and content from the media Handout used in the lesson	95	Very good
2	Teaching contextual learning with Handout and Arthropod preservation	100	Very good
	Teacher's response to the implementation of contextual learning with Handout and Arthropod preservation	97,5	Very good

The analysis of teacher's responses to the application of contextual learning with handout and *Arthropods* preservation includes teacher's responses to display and media content and learning implementation. The results of the analysis on display and media content showed that in general the teacher responded very well 95%. The results of the analysis on the application of learning, teachers also provide a very good response 100%. In general, the teacher responded very well to the application of contextual learning with Handout and Arthropodae preservation with a percentage of 97.5%.

CONCLUSION

Contextual learning with handout and *Arthropod* preservation has not been effectively applied in learning. The acquisition of cognitive learning results indicates this are less influential on the category less effective with the acquisition of percentage effectiveness of 48%, whereas with the results of psychomotor learning has been very effective with 85,94% of effectiveness.

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