Application of the contextual teaching and learning model as an efforts to improve student results and scientific performance of student physics

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Abstract. This study aims to improve student learning outcomes and scientific performance of physics. This research is a classroom action research. Subject from this study were students in the semester an odd number of school year 2018/2019 as many as 19 male students. This research implemented in two cycles with each cycle stage consisting of planning, action, observation/evaluation, and reflection. The results of this study indicate that 1) there is an increase in students' scientific performance. In the first cycle, the average value of performance the scientific achievement of students is 77.37 with a fairly high category, while at the second cycle increased to 87.90 with a very high category, 2) an increase student physics learning outcomes. In the first cycle, the average value of physics learning outcomes is achieved students are 73.00 while in cycle II it increases to 77.50. Research This class action is categorized as successful because it has reached the level of completeness Hornax of 94.7%.

1. Introduction

Basic philosophy, classroom action research is how to improve reality, which in this case is the reality of processes and learning outcomes, while research that is not class action is how to build knowledge based on research findings obtained. Education serves to create change towards a more innovative life. [1]. Education is not only one of the tools used to develop knowledge in schools but also used as an educational aspect. One aspect of education used in the globalization era is PAIKEM learning. PAIKEM stands for Active, Innovative, Creative, Effective and Enjoyable Learning. Various studies that lead to increased efficiency, service effectiveness and development as a consequence of an educational innovation have been carried out in curriculum implementation [2]. According to education is to prepare the younger generation who are not only just getting data, information, and knowledge, but more important is constructing understanding growing, insight, and developing wisdom [3].

The results of the preliminary observations of the authors at Singaraja State Vocational High School where the student's learning outcomes and scientific performance were obtained from data from interviews, observation, and documentation. The results of the researchers' observations of students in classroom learning can be summarized as follows, namely First, a teacher has involved students when participating in classroom learning, but in this case, the students are still less active in participating in classroom learning. This situation makes students only as listeners in carrying out the teaching and learning process, and the worse thing is the students just take notes when given an explanation of the subject matter. Teachers also use LKS, modules or other book sources more often as a benchmark in
teaching, and provide formulas in accordance with teaching materials and then practice the questions contained in the module. This situation causes students to not be able to respond well or capture lessons given when the teacher gives the concept of learning material. Second, the learning model that is carried out is still very conventional. It can be seen from the results of the data above which shows the model so that the students feel bored and bored when following the learning done by a teacher in the class. The conventional learning model carried out by a teacher when teaching in class makes students less active in participating in the learning provided by the teacher. Students only become listeners when given an explanation by the teacher. Learning is done should focus or direct students to the subject matter discussed at the initial meeting of the lesson, by relating material for the material given related to the social and cultural context, namely physical phenomena in everyday life. Third, management in the classroom is still lacking. This is because teachers rarely invite students to apply cooperative learning in class. Cooperative learning is intended to form heterogeneous study groups based on gender and student learning abilities. This results in students feeling that they are treated fairly. That is, there is no separation distance between students who have low, medium and high abilities. The formed learning group will increase the chances of students to increase their knowledge to be greater because students will easily discuss in their groups or between groups[4]

Contextual learning is a concept of learning that helps teachers connect between subject matter that is associated with students' real-world situations and encourages students to make connections between the knowledge that they click on and their application in daily life [4]. Contextual learning is a learning concept that helps teachers associate the material they teach with students' real world situations and encourages students to make connections between their knowledge and their application in their lives as family members and society [5]. This study aims to improve student learning outcomes and scientific performance of physics by using the Contextual Teaching and Learning (CTL) learning model.

Contextual learning explains learning occurs when students process information or new knowledge in such a way that it feels reasonable in accordance with the frame of mind it has [6].

2. Materials and methods
This type of research is classroom action research. The subjects of this class action research were all students of class XI 2018/2019 academic year, which amounted to 19 students, consisting of male students only and no female students. The objects of this study are student learning outcomes, student scientific performance, student responses, and Contextual Teaching and Learning learning models.

This classroom action research consists of two cycles. In each cycle is divided into 4 stages of activity, namely, (1) planning, (2) actions, (3) observation/evaluation, and (4) reflection. The research procedure was carried out before the researcher conducted an initial reflection aimed at explaining the problems and obstacles experienced by students and teachers [7]. The instrument of scientific performance data research of students refers to the scientific performance observation sheet, for learning outcomes refer to the final test of learning outcomes at the end of each cycle and student responses refer to the student response questionnaire [8].

3. Results
Fluid is the one used to refer to all types of substances that can flow. Whether it's in the form of liquid or gas, as long as it can flow it will be called a fluid. Almost all forms of water and gas are called fluids. Because liquids and gases have the same physical properties, which can flow from one place to another. The simplest example of fluid is water and air. Data description of the results of this study are the same as Cycle II. Data collection for scientific performance aspects is carried out by observation methods that refer to the scientific performance observation sheet as shown in Table 1.
Table 1. Average values of scientific performance of students.

| No | Students | Average | Categories |
|----|----------|---------|------------|
| 1  | 1        | 90.0    | Very High  |
| 2  | 2        | 88.8    | Very High  |
| 3  | 3        | 86.3    | High       |
| 4  | 4        | 91.3    | Very High  |
| 5  | 5        | 83.8    | High       |
| 6  | 6        | 83.8    | High       |
| 7  | 7        | 88.8    | Very High  |
| 8  | 8        | 86.3    | High       |
| 9  | 9        | 90.0    | Very High  |
| 10 | 10       | 88.8    | Very High  |
| 11 | 11       | 85.0    | High       |
| 12 | 12       | 87.5    | High       |
| 13 | 13       | 87.5    | High       |
| 14 | 14       | 90.0    | Very High  |
| 15 | 15       | 88.8    | Very High  |
| 16 | 16       | 87.5    | High       |
| 17 | 17       | 93.8    | Very High  |
| 18 | 18       | 85.0    | High       |
| 19 | 19       | 87.5    | High       |
|    | **Average** | **87.9** |            |

Based on Table 1, the average value of students' scientific performance in the second cycle is 87.90. When reviewed by each child's score, it can be seen that as many as 10 children are included in the high category, and 9 children are very high. If converted to SDI and MI scale, it can be described as in Table 2.

Table 2. Criteria for the scientific performance of student observation results.

| No | Criteria       | Category       | (f) | (%)  |
|----|----------------|----------------|-----|------|
| 1  | $\bar{X} \geq 87.5$ | Very High      | 10  | 57.63|
| 2  | $80.0 \leq \bar{X} < 87.5$ | High        | 9   | 47.37|
| 3  | $62.5 \leq \bar{X} < 79.5$ | High Enough  | 0   | 0    |
| 4  | $37.5 \leq \bar{X} < 62.5$ | Not High Enough | 0  | 0    |
| 5  | $\bar{X} < 37.5$ | Very Low       | 0   | 0    |

4. Discussion

Based on the results of research that has been carried out for two cycles in class XI in the odd semester of the 2018/2019 academic year for the subject of temperature and heat shows that there is an increase in physics learning outcomes, scientific performance, and the quality of physics learning through the application of contextual teaching and learning models. As a supporter of this, the following will be conveyed a comparison of the value of students' scientific performance during the cycle I and cycle II.

There is an increase in the value of the scientific performance of students from cycle I to cycle II. At the first cycle, the average value obtained was 86.32 with a standard deviation of 7.5 while in the second cycle the average value was 87.90 with a standard deviation of 2.5. If the average value of students' scientific performance from the results of observations in the second cycle is compared with the standard of completeness of physics learning outcomes, then the value has met the KKM. This shows that this study has achieved the success criteria for improving the scientific performance of class XI students. Based on the Table above shows an increase in the average value of physics learning outcomes of
students from the first cycle, to the second cycle. The increase in average physics learning outcomes of students from the first cycle obtained an average value of 73.0 with a standard deviation of 3.1 and the average value of student learning outcomes for the second cycle was 77.5.

This study has fulfilled the success criteria that have been set, namely 75 to improve student learning outcomes. The analysis of the implementation of the contextual teaching and learning model in the first cycle and second cycle revealed that in the first cycle learning activities seemed not optimal. This is indicated by the presence of several abilities and behaviors of students who have not been in accordance with expectations and expected criteria. For example, there are still many students who have not dared to submit opinions, ask questions or respond to questions. Students also seem to have difficulties and focus less on attending class learning. This is understandable because students are not accustomed to learning with the learning model of contextual teaching and learning. The results of the research in the first cycle showed that the average value of scientific performance observed by students was 77.37 with a fairly high category [8]. This shows that there is no increase in the average value of the scientific performance of students in cycle I. So that the results obtained are not optimal when compared with the criteria of success of the study. There are still many students who reach a high enough category in the aspect of scientific performance and there are still many students who are below the minimum completeness criteria set. Judging from the scientific performance of students before and after the implementation of the first cycle, changes can be felt. An increase in performance can be seen from the behavior of students who are enthusiastic in carrying out practical activities and the ability of students to carry out practical activities. During the implementation of the first cycle of action, it was recorded that there were still some scientific performance capabilities of students who had not developed optimally [9]. The results of the study in the first cycle also showed that all students were unable to achieve the minimum completeness requirements of learning outcomes. All the optimizations and constraints experienced during the implementation of the action in the first cycle are then used as a reflection of the cycle I. The results of reflection in the first cycle are then used as material for improving the implementation of actions in cycle II.

The implementation of learning in cycle II has been more optimized in accordance with the results of reflection of learning activities in cycle I. Based on the results of the research in the second cycle, it was revealed that there was an increase in scientific performance achieved by students when compared with the results achieved in cycle I. The results showed average scores the scientific performance of the results of the observation in the second cycle was 87.9 which was in the very high category. This shows that this study succeeded in achieving success criteria in improving the scientific performance of class XI students. Judging from the frequency distribution of scientific performance scores in the second cycle, it is known that there is an increase in the number of students who have high and very high scientific performance and no students have moderate scientific performance. This means that the contextual teaching and learning model applied in the first cycle and the second cycle has been able to facilitate the development of students' scientific performance abilities [10]. The implementation of learning through the syntax of a systematic contextual teaching and learning model turns out to be able to develop students' scientific performance abilities which include: 1) ability to formulate problems, make hypotheses, practice goals and set work steps, 2) ability to use lab tools and materials, make observations, draw conclusions on the results of lab work and collaboration in groups, 3) Skills to present and discuss, 4) collaboration in groups, 5) ability to draw conclusions and make reports in writing and make conclusions [11].

5. Conclusions
The application of contextual teaching and learning models in physics learning can improve the scientific performance of class XI students in the 2018/2019 academic year. This can be seen from the increase in the average value of scientific performance achieved by students. In the first cycle, the average value achieved by students was 77.37 with a fairly high category. In the second cycle, the average value of students' scientific performance increased to 87.9 with a very high category. The application of contextual teaching and learning models in physics learning can improve physics learning
outcomes of students of class XI academic year 201382019. This can be justified based on the increase in the average value of student physics learning outcomes. In the first cycle, the average value of learning outcomes achieved by students is equal to 73.0. In the second cycle, the average value of learning outcomes increased to 77.5. The response of class XI students in the 2018/2019 school year to the application of the CTL learning model in physics learning is in the positive category with an average score of 39.3.

References
[1] Suastra I W 2009 Pembelajaran sains terkini: Mendekatkan siswa dengan lingkungan alamiah dan sosial budaya (Singaraja: Universitas Pendidikan Ganesha)
[2] Mulyasa 2006 Kurikulum tingkat satuan pendidikan (Bandung: PT Remaja Rosdakarya)
[3] Santyasa I W 2006b Pembelajaran inovatif: model kolaboratif, basis proyek, dan orientasi NOS. Makalah. Disajikan dalam Seminar di Sekolah Menengah Atas (SMA) Negeri 2 Semarapura Tanggal 27 Desember 2006, di Semarapura.
[4] Johnson E B 2011 CTL (Contextual Teaching And Learning) (Jakarta: Perpustakaan Nasional)
[5] Nurfilah N 2009 Penerapan model contextual teaching and learning (CTL) dengan menggunakan metode eksperimen sebagai upaya untuk meningkatkan prestasi belajar dan kinerja siswa tentang suhu dan kalor kelas X di sman 1 luragung kabupaten kuningan tahun ajaran 2008/2009 (Yogyakarta: Universitas Ahmad Dahlan)
[6] Usman M U 1999 Menjadi guru profesional (Bandung: Remaja Rosdakarya)
[7] Brookfield S D 1987 Developing critical thinkers (San Francisco: Jossey-Bass)
[8] Charles C, Whisler R and Vesta 2012 Contextual teaching and learning for practitioners Journal for the Adult and Career Education 1-5
[9] Fatemil R, Shakerian S, Ghanbarzade M, Habibi A and Moghaddam F 2012 The comparison of dynamic volumes of pulmonary function between different levels of maximal oxygen uptake Journal for Applied and Basic Sciences 3 (3) 667-664
[10] Kretschmann R 2012 What do physical education teachers think about integrating technology in physical education? European Journal of Social Sciences 27 (3) 444-448
[11] Liu H C and Lee M K 2012 Dynamic modeling of damping effects in highly damped compliant fingers for applications involving contacts Journal of Dynamic Systems, Measurement, and Control 134 (1-9)