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Application of the Numbered Heads Together Cooperative Learning Model for Increasing Students' Science Literacy Knowledge on Metabolism Materials

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Abstract: This research was conducted in class XII IPA 1 SMA N 1 Suwawa with the aim of knowing the literacy knowledge of students through the application of the Numbered Head Together cooperative learning model. The model used in this research is the Classroom Action Research Kemmis and Tagart models using 3 cycles, with research stages namely a) Planning, b) Implementation or action, c) Observation, d) Reflection. Based on the analytical instruments and analysis of scientific literacy-based learning outcomes, it can be seen that the NHT type cooperative learning model can increase students' scientific literacy knowledge which includes 3 indicators including scientific question assistance, explaining phenomena scientifically, and using scientific evidence , this is evidenced by improvements in the activities of teachers and students, as well as the improvement of learning outcomes achieved. The application of the NHT learning model can increase students' scientific literacy knowledge, because the application of the NHT learning model can help train and increase students' scientific literacy knowledge, especially in metabolic materials. The characteristics of metabolic substances which generally require more understanding can be complemented by the application of the NHT learning model which precipitates cooperation and *sharing* between peers which also requires responsibility for oneself due to random calling of noor. The advantages of the NHT learning model are that it can improve student achievement, are able to deepen student understanding, train student responsibility, delight students in learning, develop student curiosity and increase self-confidence also help increase students' scientific literacy knowledge because it involves students with their learning environment, and thinking activities together.

Keywords: CAR; Learning Outcome; Numbered Heads Together Scientific Literacy

Introduction

Education is one of the aspects that is the center of attention of the government in a country, because education is an important factor in increasing human resources for the progress of a nation, in Indonesia one of the main goals of education has been formulated in the 1945 Constitution in paragraph four, namely educating the nation's life. The progress of a nation is largely determined by the quality of human resources and the quality of human resources depends on the quality of education. Education begins with a learning process. One of the important things in the learning process is literacy activities. The application of scientific literacy in schools is to develop students' abilities to understand, communicate (orally or in writing) and apply scientific abilities in solving a problem.

The *Organization for Economic Cooperation and Development* (OECD) has announced the 2018 PISA (*Program for International Student Assessment*) score for Indonesia in the fields of literacy, mathematics and science which Indonesia ranks 70th out of 78 participating countries. The science subject taught in high school is biology, which is one of the subjects that is quite difficult to master and understand for high school students, this is because biology material is quite

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complex and abstract which contains facts, various concepts and information regarding the structure of living things and the chemical processes of living things (Murray, 2000).

Data on student learning outcomes of SMAN 1 Suwawa class XII IPA 1 on cell metabolism material shows unsatisfactory results, namely 65% in 2019, 65% in 2020 69% in 2021 so they do not meet the maximum completeness criteria (KKM), namely 70 In addition, students' literacy knowledge is also unknown because there has never been a measurement of student literacy before. The success of learning is determined by many factors, one of which is the teacher. Teachers have the ability in the learning process which also includes the ability to choose learning models that can motivate students to learn and achieve the desired learning outcomes (Liu, 2009).

The learning model chosen by the teacher should also involve students who have heterogeneous learning abilities, not only can the teacher provide learning, but their peers can also become tutors for other students who have abilities below average (Marks et al., 2013). This in addition to increasing the activity of students can also create a sense of tolerance among fellow friends and create self-confidence in learning, and will optimize their scientific literacy abilities. Haydon et al. (2010), suggested the ability to apply the NHT cooperative learning heterogeneous model can increase activities that are relevant to and have a significant impact on improving student learning achievement, and generate interest in group learning. The essence of learning through the *Numbered Heads Together* (NHT) type is the many opportunities it provides for students to *share* ideas and students consider the most appropriate answer so as to increase the spirit of student cooperation, besides that this learning model can be applied in the learning process to support the increase of students' scientific literacy, because the involvement of students indirectly trains students to share information and listens carefully so that participants are more productive in the learning process (Rahayu et al., 2018; Ardianto, 2016).

This study aims to increase students' scientific literacy knowledge through the application of the NHT type cooperative learning model with the research hypothesis that the application of the NHT type cooperative learning model can increase students' scientific literacy knowledge.

Method

The type of research used in this research is PTK piral model from Kemis and Tagart. This research was conducted in three cycles, each cycle consisting of two meetings. The method used to collect data in this study uses a test method and a non-test method (Arikunto, 2006). The test technique uses item items as an instrument, non-test techniques in the form of observation sheets equipped with an observation rubric. Data comes from primary data and secondary data. The primary data source is obtained from the test results. while the secondary data source is obtained from the results of observing the implementation of learning by applying NHT. Indicators of success in this study were 75% for observing classroom management by the teacher and observing student activities, and 75% for student learning outcomes seen from scientific literacy.

Results and Discussion

The results of the instrument analysis test in this study showed that in cycle 1 it could be seen that 13 aspects were included in the bad category (≤ 50%). Then 3 aspects are included in the less good category (51-70%) as many as 3 aspects. As well as 2 aspects that are included in the good category.

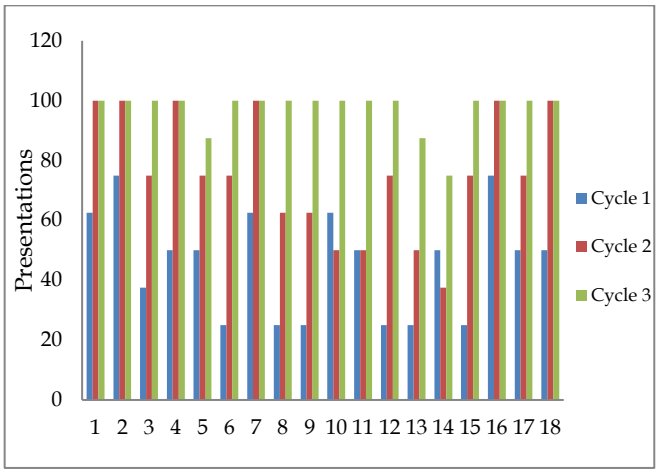

Figure 1 . Graph of Class Management in cycle 1

Aspects that do not meet the success indicators, namely 75% get improvement in cycle 2 after the teacher has started to get used to the application of the NHT model, this is evidenced by class management starting to improve in cycle 2, namely in the bad categories (≤50%) into 4 namely aspects 10, 11, 13 and 14. Unfavorable aspects (51-70%) reduced to 2 aspects , good category (71-85%) as many as 6 aspects, namely aspects number 3, 5, 6, 12, 15 and 17 , and 6 other aspects are included in the very good category ≥85%.

Classroom management improvements are continuing, and teachers have been able to carry out the NHT learning process, this can be seen in (Figure 4.1) cycle 3 in that almost most of the aspects have met the very good criteria, while 3 of them have been included

in the good category, namely aspect 5 Organizing students in groups, with heterogeneous abilities 13 Giving awards to active students and 14 Providing opportunities for students to conclude material.

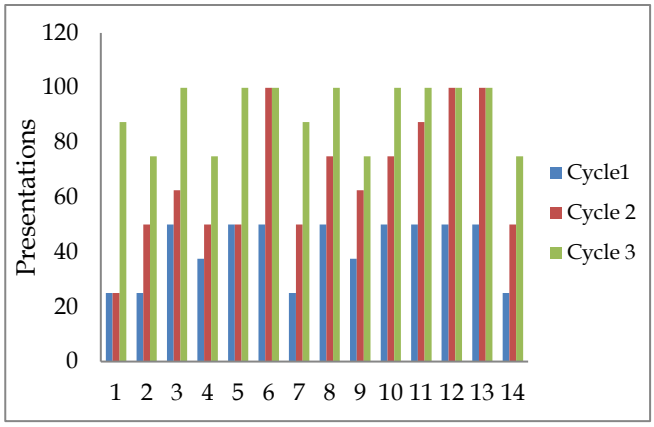

Figure 2 . Student Activity Graph

Based on the results of the instrument analysis, the percentage of student activity in (Figure 4.2) can be seen that some aspects are included in the bad category (≤ 25%), namely aspects 1, 2, 7 and 14 . While the other 10 aspects are included in the less good category (26-50%). Cycle 1 is the stage when the cooperative learning model of the NHT type was first applied, the students' activities had not reached the good (51-75%) or very good (76-100%) categories.

The application of the next NHT learning model is carried out in cycle 2 after going through the reflection stage. Based on the percentage of student activity in (Figure 2) it can be seen that the aspects included in the not good category (≤ 25%), namely aspect 1. Meanwhile, 5 aspects are included in the unfavorable category (26-50%), namely aspects 2, 4, 5, 7 and 14. Improvements in student activity began to be seen in this cycle as evidenced by the achievement of aspects that were included in the good category (51-75%) into 4 aspects including aspects 3, 8, 9, and 10, and aspects with the very good category (76- 100%) achieved 4 aspects namely aspects 6, 11, 12, and 13. The increase in student activity in cycle 3 experienced improvements with the achievement of aspects that were included in the very good category (76-100%) as many as 10 aspects. While the other 4 aspects are included in the good category (51-76%), namely aspects 2, 4, 9, and 14.

Analysis of scientific literacy competency aspects based on the pretest is used to determine students' scientific literacy abilities in each indicator. Based on the calculation of the average value of each scientific literacy competency indicator in the pretest cycle 1 to cycle 3, the average value of each scientific literacy indicator is obtained as follows:

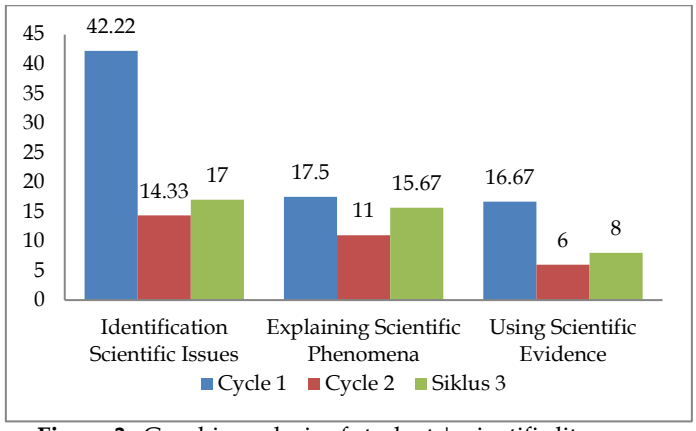

Figure 3 . Graphic analysis of students' scientific literacy based on *pretest scores*

Based on the picture above, it can be seen that in cycle 1 , the average value for the indicator identifying scientific issues was 42.22, then for the indicator explaining phenomena scientifically it was 17.5 and 16.67 for the indicator using scientific evidence. Furthermore, in cycle 2, the average value for indicators of identifying scientific issues was 14, 33, then for indicators explaining phenomena scientifically at 11 and 6 for indicators using scientific evidence. Whereas in cycle 3 the average value for indicators identifying scientific issues was 17, then for indicators explaining phenomena scientifically were 15, 67 and 8 for indicators using scientific evidence.

The average value of student learning outcomes which showed the level of scientific literacy, showed an increase which could be observed in Figure 4. identify scientific issues with an average score of 96 .67 while the lowest average score is in the aspect of using scientific evidence with a score of 20.

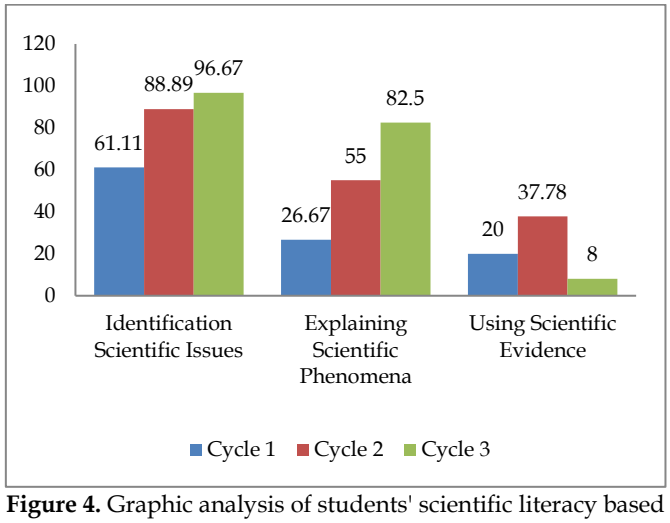

Figure 4. Graphic analysis of students' scientific literacy based on *pretest scores*

Figure 5. Cycle 1 Research Documentation

Figure 6. Cycle 2 Research Documentation

Figure 7. Cycle 2 Research Documentation

Based on these results it can be seen that the application of the NHT learning model can increase students' scientific literacy knowledge, because the application of the NHT learning model can help practice and upgrade knowledge literacy science participant educate specifically on material metabolism (Purwanto, 2014). The NHT learning model has excess d can Upgrade achievement study participant educated, capable deepen understanding participant teach, train not quite enough answer participant educational, fun participant educate in learn, develop curiosity know student and increase trust themselves (Kurniasih, 2015). The application of the NHT learning model can help practice and Upgrade knowledge literacy science participant educate specifically on material metabolism.

NHT learning model prioritizes settlement problem in a manner group could Become solution on difficulties experienced participant educate this. The applied NHT learning model with notice able participant learn, concluded discussion, solving problem in a manner together and next with gift question by the teacher to participant teaching done with scrambled number practice participant educate for could work same with well, looking information, sharing with persistent and seriously, so knowledge literacy science participant educate also will increase. activity study in a manner group could expand outlook and build interpersonal skills for relate with student others (Rahayu et al., 2018).

Aim main in application of learning model's cooperative is for students could study in a manner group together his friends with method each other value opinion and give opportunity to others for put forward idea for put forward his opinion in a manner group. With apply learning models cooperative student possible for reach success in learn, as well could practice student for have skills, fine Skills thinking (thinking skills) as well Skills social (social skills), eg Skills put forward opinion, accept. suggestion and input from others, work together, a sense of solidarity, and reduce emergence behavior deviate inside class (Afandi, 2018). The NHT learning model is focused learning on ability study student for construct mean draft for himself themselves (Mursalin et al., 2018). Happening change as results from the learning process could showed in various shape, like skills, habits, attitudes, knowledge or appreciation (acceptance or award) this is what it's called optimal learning (Bachtiar et al., 2018). Learning models cooperative NHT type boost involvement student in analyze covered material in something lesson and evaluation understanding student to content, so does the learning process teach will more effective because student will have more understanding good about material lesson (Pratiwi, 2019; Fakhriyah, 2017). Application of the Numbered Heads Together (NHT) learning model to draft science could Upgrade interest student to science Leasa et al. (2017), this influential on knowledge literacy owned science (Gultepe & Kilic, 2015).

Conclusion

Based on the results of the research and discussion, it can be concluded that the scientific literacy knowledge of students in class XII IPA 1 SMA N 1 Suwawa can be continuously improved by using the NHT learning model. This can be seen from the analysis of improving student learning outcomes which are also supported by classroom management observation instruments and students during the learning process. In addition, it is

also based on the results of the *pretest* and *posttest* on the material on metabolism cycle 1 on the understanding of metabolism and the role of enzymes in it, as well as material on cycle 2 Catabolism and cycle 3 Anabolism which refers to 3 aspects of scientific competence. The data obtained shows that for class XII IPA 1 SMA N 1 Suwawa the highest scientific literacy competency is in aspect 2 explaining phenomena scientifically and the lowest is in the aspect of identifying questions scientifically and the N-Gain value is included in the medium category.

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Conflicts of Interest
The authors declare that there is no conflict of interest regarding the publication of this paper.

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