

Profile of Scientific Approach Activities on the Application of the Students' Worksheet Based on The Learning Cycle Model in Biology Classroom

Muhiddin Palennari
Department of Biology
Universitas Negeri Makassar
Makassar, Indonesia
muhiddin.p@unm.ac.id

Hamka Lodang
Department of Biology
Universitas Negeri Makassar
Makassar, Indonesia

Abd Jalil
Department of Biology
Universitas Negeri Makassar
Makassar, Indonesia

Abstract—This study aims to determine the scientific approach activities to the application of the student worksheet based on the learning cycle model on biology materials learning, junior high school students, which has been developed using the 4D model. This type of research is descriptive, with the research subject being students of class VIII in SMP Negeri 18 Makassar consisting of 30 students. The instrument used is the observation sheet of the scientific approach activities and the student response questionnaire on the use of worksheet. Data analysis used descriptive statistics. The results showed that the highest scientific approach activity was observing activity (94.11%), while the lowest was reasoning activity (49.99%). While for student response data shows that the positive response of students is 95.42%. The conclusion from the study is the application of the worksheet based on learning cycle model, it can foster the scientific approach activities of students, and students provide a positive response to the application of this student worksheet.

Keywords—student worksheet, scientific approach, learning cycle model

I. INTRODUCTION

Education is one important aspect that it sustains a country's development. The quality of a nation, inevitably, is measured from the education system. Concerning to Education system in Indonesia, the survey reveals that Indonesia is 108 of the world's education quality. While in ASEAN, the position is the fifth after Singapore, Brunei Darussalam, Malaysia, Thailand with the rate 0.603. Even though the quality of education in Indonesia is under Palestine, Samoa, and Mongolia, it is only 44% of the generation complete secondary education. While 11% of students are failed to complete their education, it becomes worst since the young learners; event adult learners brawl on public places that is enable to enlarge the impact for society [1].

Government Law number 58 on 2014 had declared the curriculum of 2013 that one of the scientific objectives for junior high school level is integrating real-world experience through designing, and hypothesizing, assembling instrument, collecting data, processing, interpreting and communicating the result. Furthermore, the government regulation number 103 on 2014 concerned on scientific approach for young learners and young adults curriculum consisting of observing, questioning experimenting, associating and communicating [2].

The curriculum of 2013 application will contribute to learning activities since it applies a scientific approach. It makes some schools with a lack of supporting systems on integrating this curriculum, such as worksheet, laboratory practical guidance and learning media experience some problems on teaching biology. The worksheet is one of the simple support that can be used to observe, to conduct experiments and even more to demonstrate scientific investigation. Trianto [3] elaborates that worksheet is enabled to be developed by teachers and be used in the learning activities based on the aims of subject and students need.

According to [4] explained that a worksheet making has to meet the standard of didactic, constructive and technic. Didactic means giving effective ways of teaching and learning process by understanding the students need and triggering the students to develop their skill. Constructive in line with the classroom language on constructing the worksheet, while the techniques are covered on design, font, and pictures.

It has been Granted that scientific approach has been adapted into the curriculum, yet it currently needs a comprehensive strategy to trigger the students to evolve on it. One of the learning models to improve the scientific approach is a learning cycle. This is student-centered learning integrated with an inquiry-based approach [5]. Post Learning Cycle model only consisted 3 phases but currently, [6], has written that it has been extended to 7 phases: eliciting, engagement, exploration, explanation, elaboration, evaluation, and extend. [7] reveal that the learning cycle model enhances students to participate in learning activities. It also shows that the mastery of learning concept on scientific approach integration can be achieved through learning cycle model.

Another finding on learning cycle interprets that learning cycle contributes to learning activities. Lee [8] had applied the learning cycle on plant nutrition subject. Wilder dan Shuttleworth [9] integrated learning cycle on a cell as well as Mac Kenzie applied this model on introducing living things and non-living things, and Schlenker et al. [10] applied 5E cycles on carbon dioxide subject. These findings elaborate that learners activities with scientific approach were triggered by learning cycle. Hence, this research aimed to investigate the learning cycle model on enhancing students' learning activities integrated by the scientific approach. This is mainly because an educator has to count on appropriate

strategy and model on the learning process. This research, hence, aims to trigger the learning activities on scientific approach by applying the worksheet on the learning cycle model in Biology for grade VIII Senior High school.

II. RESEARCH METHODS

This descriptive research will provide the profile of scientific activities consisting of observing, questioning, experimenting, reasoning and communicating. The subject of the research is 30 students on grade VIII, SMP Negeri 18 Makassar. The research instruments are observation sheet and the questionnaire on the worksheet implementation. Data collection will be conducted during the learning process, and it will be analyzed by the descriptive statistic.

III. RESULTS AND DISCUSSION

The results of data analysis in Table 1, shows that the highest scientific approach is observing activity at 94.11%, and the lowest activity is the reasoning of 49.99%. "Observing" is the first activity, due to learning activities are facilitated by various objects, it must be experienced directly by students. Moreover, the student's worksheet is also equipped with various activities, accordance with 7E learning cycle, for example in the exploration phase, and students are facilitated to observe objects that have presented in students worksheet. In "observing" activities, direct observation of learning objects is a priority, so the students get objective data from facts. Also, the 'observe' activity, students prioritize the meaningfulness of the learning process. This method will foster the curiosity of students so that learning will be effective. As stated by Ligon et al. [11], the learning cycle can help students develop their observation skills.

TABLE I. DATA OF SCIENTIFIC APPROACH ACTIVITIES, ON THE APPLICATION OF THE STUDENT'S WORKSHEET, BASED ON THE LEARNING CYCLE MODEL

| No | Scientific Approach Activities | Activities 1 (%) | Activities 2 (%) | Average |
|---------|--------------------------------|------------------|------------------|---------|
| 1. | Observing | 100 | 88.23 | 94.11 |
| 2. | Questioning | 55.88 | 55.88 | 55.88 |
| 3. | Experimenting | 76.47 | 64.70 | 70.58 |
| 4. | Reasoning | 58.82 | 41.17 | 49.99 |
| 5. | Communicating | 97.05 | 67.64 | 80.58 |
| Average | | 77.64 | 63.52 | |

Furthermore, the second activities are communicating activity. It is because, the students having the desire to convey the results of their work, that has been prepared, before their friends. The work delivered is an indicator of success when working on the student worksheet. Therefore, students have high enthusiasm to show their success.

Unlike other activities, "reasoning" is the third activity. This is because reasoning activity is difficult for students. This activity has not become the habit of students during learning. Besides, generally, the teachers are less empowering the students thinking skills and rarely accustom students with reasoning. Meanwhile, reasoning activities can be accustomed to students, if the teacher uses a model or learning strategy that can train high-level students. Reasoning can train students, especially in the initial learning activities by asking analytical questions. Therefore, reasoning skills need to be accustomed during the learning

process when the teacher implements the student's worksheet based on the learning cycle model. However, in this study, it was found that students have begun to improve the habit of connecting, between one concept with another concept and the facts from observations with conclusions written in the student's worksheet.

Furthermore, the results of data analysis of student responses to the student's worksheet based on the learning cycle model are shown in Table 2. It can be seen, that students gave a positive response with a percentage of 95.42%. This is because the learning cycle model students worksheet is different from the general student's worksheet. In this the learning cycle model students worksheet, students are trained to think systematically and work in stages following the 7E learning cycle stage.

TABLE II. DATA OF STUDENTS RESPONSES FOR STUDENT WORKSHEET BASED ON THE LEARNING CYCLE MODEL

| No. | Assessment Indicator | Response | | Percentage | |
|----------------------|---|--------------|-------------|--------------|-------------|
| | | Yes | No | Yes | No |
| 1. | The appearance of <i>student worksheet</i> is interesting | 24 | 0 | 100 | 0 |
| 2. | The substance of <i>students worksheet</i> is interesting | 24 | 0 | 100 | 0 |
| 3. | Instructions, instructions, and questions are easy to understand | 24 | 0 | 100 | 0 |
| 4. | The substance of <i>students worksheet</i> is easy to understanding | 24 | 0 | 100 | 0 |
| 5. | Illustrations / images are easy to understand and clarify the description | 23 | 1 | 95.84 | 4.16 |
| 6. | <i>Students worksheet</i> provides the students with an initial understanding | 22 | 2 | 91.67 | 8.33 |
| 7. | <i>Students worksheet</i> guides the students to give a simple explanation | 23 | 1 | 95.84 | 4.16 |
| 8. | <i>Students worksheet</i> guides the students to build basic skills | 23 | 1 | 95.84 | 4.16 |
| 9. | <i>Students worksheet</i> guides the students to conclude | 23 | 1 | 95.84 | 4.16 |
| 10. | <i>Students worksheet</i> guides the students, to make further explanations | 23 | 1 | 95.84 | 4.16 |
| 11. | <i>Students worksheet</i> guides the students, to set strategies and tactics | 19 | 5 | 79.17 | 20.83 |
| Total Average | | 22.90 | 1.10 | 95.42 | 4.58 |

Likewise, the 'questioning' activity is still relatively low because the questioning activity is not students habitual. Most students have the feeling of being embarrassed to ask questions during the learning process. The result shows that students have low curiosity. Therefore, 'questioning' activity is very important for students. It can be stimulated by show conflicting phenomenon to students.

The learning cycle model phases can foster scientific approach activities. Thus, students will complete the tasks in the student's worksheet. Students are trained to learn and work according to certain guidelines. For example in the engagement phase, in this phase students are invited to make predictions about the phenomena that will be studied. In this activity, the teacher can present the phenomenon in the form of pictures related to the subject matter so that students will

practice observing the object. The existence of a phenomenon from images presented, it can stimulate students to ask questions at the same time.

Other activities can also be raised in other phases. For example in the exploration phase, we can be raise observing, recording data, choosing variables, designing and planning experiments, conducting inferences and formulating hypotheses, and organizing findings activities [6]. These activities provide learning experiences for students so that they consider their learning is full impact learning. As mentioned by Qarareh (2012), that the students are actively involved in the learning cycle model. The same thing was stated by Heinrich et al. [12] that the learning cycle trains students to apply scientific processes.

Also, the student's worksheet is prepared by combining 7E learning cycle stages, with scientific approach activities. In the student's worksheet, various scientific approach activities can be carried out by students. These activities involve a variety of skills such as observing, trying, reasoning and concluding and communicating the results of work so that students felt happy and trained with new learning patterns.

Applying the student's worksheet makes students able to carry out activities with the guidance from the teacher. Learning material presented in students worksheet is based on facts or phenomena, so students do not fantasize. The student's worksheet encourages students to practice critical thinking and reasoning. Thus, the learning cycle model of student's worksheet can improve the enthusiasm of students in the learning process.

IV. CONCLUSIONS

From this study, it can be concluded that the first, application of students worksheet based on leaning cycle models, can improve scientific approach activities. The second is, students, provide a positive response to the implementation of the learning cycle models of student's worksheet. This student's worksheet based on leaning cycle models still lacks, so it is suggested to display more interesting material and illustrations/ images, presenting

activities that can increase the scientific activities of students and presents simple activities.

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