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THE APPLICATION OF AUTHENTIC ASSESSMENT WITH FEEDBACK TO IMPROVE THE COMPETENCE OF MTS STUDENTS IN CONSTRUCTING A SCIENTIFIC REPORT OF MOTION MATERIAL IN SCIENCE LEARNING

PENERAPAN PENILAIAN OTENTIK DENGAN *FEEDBACK* UNTUK MENINGKATKAN KEMAMPUAN SISWA MTS DALAM MENYUSUN LAPORAN ILMIAH PADA PEMBELAJARAN IPA MATERI GERAK

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ABSTRAK

Penelitian ini dilakukan untuk mendeskripsikan penerapan penilaian otentik dengan feedback dalam pembelajaran IPA materi gerak yang dapat meningkatkan kemampuan menulis laporan ilmiah dan menganalisis peningkatan kemampuan menulis laporan ilmiah siswa kelas VIII G MTs Negeri 2 Kota Bandung. Penelitian yang dilakukan merupakan penelitian tindakan kelas. Subjek penelitian adalah 35 orang siswa kelas VIII G yang terdiri dari 18 laki-laki dan 17 perempuan. Tempat penelitian dilaksanakan di Madrasah Tsanawiyah Negeri 2 Kota Bandung pada semester genap tahun pelajaran 2014/2015. Indikator keberhasilan dari penelitian tindakan kelas yang dilakukan adalah minimal 80% dari siswa memiliki kemampuan menulis laporan ilmiah dalam kategori baik (dengan skor minimal 80). Hasil penelitian menunjukkan bahwa kami telah berhasil menerapkan penilaian otentik dengan feedback yang dilakukan guru dalam pembelajaran IPA materi gerak untuk meningkatkan kemampuan siswa MTsN 2 Bandung dalam menyusun laporan ilmiah. Kemampuan menulis laporan ilmiah siswa mengalami peningkatan siklus I ke siklus II yang semula sebesar 14 % menjadi 83 % jumlah siswa yang berkategori baik.

ABSTRACT

This research was carried out to describe the application of authentic assessment with feedback in science learning of motion material which can increase the grade VIII G MTs Negeri 2 Kota Bandung students' ability of making scientific reports and to analyse the increase. This classroom action research was performed at Madrasah Tsanawiyah Negeri 2 Kota Bandung in the even semester 2014/2015 academic year with 35 students consisting of 18 boys and 17 girls as the subjects. The success indicator of the research was a minimum of 80% of the students were able to make scientific reports in good category (with minimum score of 80). The result showed that the application of the authentic assessment with the feedback increased the ability of students of MTs Negeri 2 Kota Bandung in writing the scientific reports. There was an increase of students' ability in writing the scientific reports from the first cycle to the second one. Initially, 14% of the students got good category in the first cycle. This number increased, then, to 83% in the second cycle.

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Keywords: feedback, scientific report, authentic.

INTRODUCTION

Science subject is essentially a study about natural phenomena in the form of facts, concepts, principles and laws derived through a series of scientific process. The subject of natural science has three components which cannot be separated, the products, the scientific process, and scientific attitude. Scientific process contains both working and thinking met-

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hod. Scientists use various scientific attitudes to conduct their research. Thus, the subject has the characteristics to provide a hands-on experience for students to develop the competence in exploring and understanding the surrounding universe scientifically through observation and experimentation (Bybee, 2006). In line with it, Gega (1995) stated that "the imperatives from science as a discipline are found in how scientists go about finding out-process; and what scientists have found out-knowledge ".

With reference to the above description, therefore, the learning of science in school the students must be conditioned to behave like a scientist. It is also one of the purposes stated implicitly in the learning of science in junior high school (SMP/MTs); that is students can do scientific inquiry to cultivate the ability to think, behave, and act scientifically as well as to communicate (BNSP, 2006). Through learning science, it is expected that junior high school student (SMP/MTS) will develop into someone who has a scientific literacy which is characterized by having the ability to understand the facts, concepts, and principles of science. They are also expected to have the capability of scientific thinking and process skills to discover the concepts of science, to communicate findings, to be able to solve problems, to apply science in everyday life, and to have scientific attitudes (Modul 2 Praktik Pembelajaran Yang Baik SMP/MTs USAID PRIORITAS, 2014). It is, therefore, students must be trained to discover knowledge through scientific process. For example, to recognize that metal expands when heated then inductively students have to conduct experiments to heat various types of metals and observe the results. Subsequently, the students have to make scientific reports to communicate their findings to become a verified science just like many previous scientists that discovered any new knowledge. The ability of students to make a scientific report based on the data obtained from experiments involves an aspect of process skills in science; the ability to communicate (Rezba, dkk., 1999). Communication can be done in oral or written form. Scientific report is one example of the written communication form (Day, 1983).The ability to write a scientific report is useful for students to develop scientific thinking, to improve the ability to organize facts clearly and systematically, and to recognize literature activities.

Based on the conducted observations in class VIII G MTs Negeri 2 Bandung, some facts were obtained, those were 1) the learning process has not been reached satisfactory result since the average value of Final Examination in Semester 1 was still under KKM (minimum completeness criteria: 65), 2) the students tended to be passive and did not have the courage to ask during learning activities, 3) the ability of the students in writing research-based scientific reports was limited; the students tended only to fill the data table and answer the question that was given on the worksheet, and 4) teachers more likely taught the subject to achieve the cognitive learning outcomes only, i.e mastering the science concepts.

Students will appear enthusiastically and actively engaged in learning if teachers do a real science show or a demonstration in science learning. However, the demonstration method is not addressed specifically to develop students' science process skills, especially the ability to write a scientific report. The need of teachers to implement practical methods or demonstration is constrained by the availability of experiment tools and props which do not match for the number of students. In addition, teachers were worried if the laboratory activity or demonstration is often done, then it will take more time than teaching plan so that the whole learning materials cannot be completely delivered during the specific given time in class. To solve the problem, some teachers have made various efforts which include giving students assignment at the end of each lesson to read the learning materials for the next meeting. Besides that, during session, teachers sought to bring practical tool to attract students' attention. However, these efforts have not yet developed the students to perceive natural science subject as a process.

Teachers do realize the importance of teaching natural science based on the development of process skill and the ability to write scientific reports but find it difficult to discover the right method or technique so that students can achieve those skill and ability. Based on this problem, an analysis and reflection towards the process of the current science learning method has been done. From the discussion, it can be seen that the tendency of teachers to use the written test instruments that only measure the cognitive learning influence the way of teachers in delivering lessons. The dominant lecture method also resulted in weak ability of students to solve problems using thinking skills. Learning materials are accepted as the only one true concept so the opportunity to develop their thinking skills is hampered. This is evident from

the attitude of students who tend to be passive in the class. Besides that, students have not been given ample opportunity to express the results of their study in another way since written test is the only measuring tool. Teachers are not accustomed to use self-developed worksheets that fit the needs of students, they tend to use worksheets that already exist in the form of a book. Practical experiment is still rarely done so that students are not habituated to write scientific reports. Students are only used to write down the answers to the scientific report by filling out and complete the answers to questions in the worksheet book. The writing of reports of the experimental results does not use the authentic assessment formats. As a result, the teacher does not know the student's real ability in making scientific reports. Assessment results have not been used as a basis for providing feedback to students directly to improve the performance of students in the learning process.

Given the demands of student learning outcomes that should be appropriate to the characteristics of the natural science subject, which includes the dimensions of products, processes and attitudes, hence in order to achieve these objectives, students should be facilitated by another different strategy than usually given by teachers. Student learning outcomes is not only measured by the test results, but also showed by the skills achieved and the products of the learning process. Students also need to get feedback regarding their work from the teachers during the learning process so that they can improve their performance in learning. Therefore, an action is necessary to make students able to increase their ability through practical experiment in the laboratory in order to produce a product in the form of a scientific report.

The selected action of teacher so that students could produce a product in the form of a scientific report is to use authentic assessment strategies with feedback. based on the experimental results adapted from Nicol & Draper (2008). Authentic assessment with feedback is an assessment of the tasks / students' performance by providing feedback when the learning process is in progress which aims to improve student learning outcomes. The tasks or performances done are related to science process skills, which include: observing or inspecting, asking questions or building hypotheses, planning research, conducting experiment, interpreting or analyzing the data, making conclusion, and communicating with others. By giving feedback when students perform the tasks, it is expected that the students will be encouraged to achieve good product and high level of performance that is to use written communication in the form of a scientific report.

Therefore, by implementing authentic assessment strategies with feedback through collaborative classroom action research, students' skills in writing scientific reports in science learning is expected to improve.

The objectives of this classroom action research were to describe the application of authentic assessment with feedback in learning science that can improve the ability of students of class VIII G MTs Negeri 2 Bandung in writing a scientific report and to analyze the ability increase of students in VIII G MTs Negeri 2 Bandung to write scientific reports through the application of authentic assessment with feedback in learning science

METHODS

Research procedures on each cycle consisted of three stages, namely: 1) Planning ,(2) Action, and 3) Reflection. The three phases can be described, visually, in a spiral shape as shown in Figure 1. Each stage was conducted through participatory collaborative study by a research team consisting of two lecturers and two teachers. One member of the research team was the class teacher of the subject of the research, which then acted as a teacher who implemented the action in each cycle. Other team members acted as the observers.

In the first cycle or the planning phase, the activities conducted by the researchers were to develop an action plan, learning devices, (lesson plan and students' worksheet) and instruments to collect data. At the action stage, the teachers implemented the already planned action that was to conduct the lesson. This action phase was carried out within four meetings. At the first and the third meetings, the students did experiment about Newton's laws and wrote scientific reports based on the experiments conducted in groups. At the second and fourth meetings, the students wrote scientific reports individually based on the temporary scientific reports that had been given some feedbacks by teachers. When the learning activities took place, three observers noted the implementation of the planned action by the teacher and the student learning activities. Video recording was also done to document the learning process took place. The reflection on the learning pro-

cess was done after each completed lesson to review the implementation of the actions taken and the learning activities of students. At the end of the first cycle, the reflection of the learning was focused to plan for the next action. At the reflection time, the research team analyzed the data findings and determined the tendency of the teacher's behavior that appeared from the observation notes and video records.

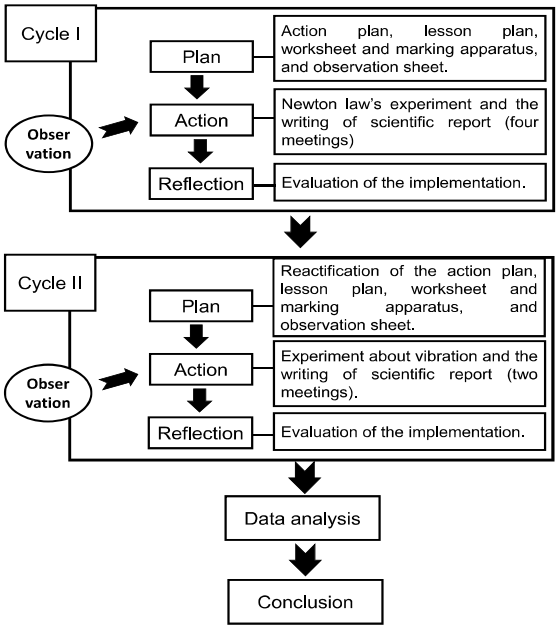


Figure 1. Procedure of research.

Based the results of the reflection from the first cycle, the plan for the second cycle was then arranged accordingly. In the second cycle, the study was conducted in two meetings. At the first meeting, a group of students did experiments about vibration and then subsequently wrote the temporary scientific reports. At the second meeting, the students wrote a scientific report individually based on the previous provisional report. Just like the first cycle, an observation was made and video recorded during the learning activities. All the data that have been collected were then processed and analyzed to obtain conclusions. The procedure for classroom action research can be seen in Figure 1.

The data were collected using research instrument in the form of the action observation sheets and the assessment rubric of the students' scientific reports.

1. Action observation sheet was the guide to collect data on the activities of students and teachers' actions. The action observation sheet contained the detailed outline action steps, consisting of a) the steps of learning and b) the authentic act of assessment by teachers. The observers were asked to provide their result of observations regarding the learning in every step with a checklist (yes or no) and, then, required to provide a detailed description of the observed facts, both the teacher's action and the students' activity.
2. Assessment rubric was used to evaluate the scientific reports of students. The assessment of the scientific reports covered seven aspects, those were: 1) the report outlook, 2) the report format, 3) the flow diagram of the experiment 4) data observations, 5) analysis and discussion, 6) conclusions and 7) references. The third, fourth and fifth aspects, each consisted of two sub-aspects. Overall, there were ten assessment criterias listed in the assessment rubric. The assessment rubric used three levels of achievement: good (3), enough (2) and bad (1).

The research data consisted of qualitative and quantitative data. The qualitative data were obtained from the action observation sheet, the field notes and the video recording of the learning activities. The quantitative data were obtained from the assessment of scientific reports using the assessment rubric.

The analysis of the qualitative data was done by describing the data from the observation and the video recording. Each action step of the teacher in the lesson was connected with the students' responses that appeared. The analysis was also carried out by discussing it with the research team to reflect on going learning activities. The discussion regarding the recorded observations was directly made on the reflection session since the results of the discussion will be used as the the reference for improving the next action.

The quantitative data analysis of the scientific report prepared by the students was conducted by calculating the percentage of students that fit into some specific categories which was divided into poor, moderate and good based on the total score of each component of the assessment on the scientific reports.

To get the quantitative mark of the ability to write scientific report of each student, the student scientific report was assessed based on the rubric that has been set. There were ten aspects assigned by scores ranging from 1 to 3. The conversion of the score into the mark of the scale of 100, was done as follows:

$$\text{Mark} = \frac{\text{Achieved score}}{\text{Total score}} \times 100$$

The maximum score of the scientific reports was 3 x 10 (the number of scientific report aspects) = 30, while the minimum score of scientific reports was 1 x 10 (the number of scientific report aspects) = 10. Based on the assessment rubric, the assessment criterias of the scientific report were categorized as shown in Table 1.

Table 1. Assessment criteria for scientific reports.

Criteria	Total score	Mark
Maximum	10 x 3 = 30	100
Minimum	10 x 1 = 10	33,3
Good catagory	24- 30	$\geq$ 80,0
Fair catagory	17 - 23	56,7 s.d. 76,7
Poor catagory	10 - 16	33,3 s.d. 53,3

The criteria for categorization were taken by dividing each range of marks by three from the overall mark. One third of the lower mark was in the range from 10 to 16 and had a maximum mark of 53.3 (see Table 1). Therefore, the categorization of the quality of the scientific reports was suitable with the scale set for the category of achievement for the scientific report which ranged from 1 to 3.

The analysis of the quantitative data was compared to the expected target of ability to determine the level of achievement of the action. The analysis of the qualitative and quantitative data was then interpreted and linked between them to obtain some conclusions.

The success indicator for this classroom action research was at least 80% of the students have the ability to write scientific reports which was marked as “good” (with a minimum score of 80). Thus, the classroom action research was considered successful if at least 80% of the students have the ability to write a scientific report with the achievement of good in the set category, the minimum score of 80.

RESULTS AND DISCUSSION

The students’ ability in making the scientific report based on data analysis of the first cycle is described in Table 2.

Based on Table 2, it can be seen that the number of students that reaches the ability of making the scientific report with good category increases on the second report; that is from 0% into 14% of total student. However, the result of action has not been achieved the expected target: a minimum of 80 % of total student have the ability of making the scientific report with good category.

Table 2. Percentage of total students based on ability category.

Category of ability	% Number of student (N=35)	
	Scientific report 1	Scientific report 2
Good	0	14
Fair	80	83
Poor	20	3

Table 3 shows percentage detail of the total student based on the category of ability attainment for each component in the first and second scientific reports. Based on the Table 3, it can be stated that some components of scientific reports that cannot be arranged properly by students are work procedure (3a and 3b), observation data (4a and 4b), analysis and discussion (5a and 5b), and bibliography (7). In general, there was an increase of writing ability from the first report to the second one, except to ability component of making the observation data.

Based on the analysis, the students’ ability in making the scientific report was still not optimal on the above components, because:

a. The students wrote down the steps of practical work by copying directly from sentences in students’ worksheet (LKS) and did not use their own sentences in accordance with what they did.
b. The students only wrote down a part of the steps of practical work/procedure which they did and did not insert the complete pictures.
c. The students did not write down the observation data completely.
d. The result of data analysis and discussion written by students was less concerned with the relevant theories and contained no causation argument.
e. Almost all of students have not included the bibliography.

In the first cycle, the target of ability in making the scientific reports has not still been achieved. Nevertheless, the students have obtained experiences in making the scientific report in which they have never done in the previous lessons. The students’ weaknesses

Table 3. Percentage of total students based on the category of scientific report component.

Component of scientific report	% Number of student					
	Scientific report 1			Scientific report 2		
	Poor	Fair	Good	Poor	Fair	Good
1	0	9	91	0	3	97
2	0	9	91	0	0	100
3a	94	6	0	3	54	43
3b	94	6	0	9	54	37
4a	20	11	69	6	71	20
4b	20	11	69	6	74	17
5a	86	11	0	86	11	0
5b	86	11	0	91	6	0
6	3	43	54	17	83	0
7	100	0	0	94	0	6

Information:
1 = Report display
2 = Report format
3a, 3b = Work procedure
4a, 4b = Observation Data
5a, 5b = Analysis and Discussion
6 = Conclusion
7 = Bibliography

were caused more on implementation of practical work. They were less complete in carrying out the steps of experiment. Students were not careful in observing and writing down the observed data. The students did not completely answer the directive questions on the students' worksheet and have not been able to relate the functions of the directive questions which can help them relate the data analysis and discussion with the relevant theories. To answer the directive questions, they need to refer to source books or other references and relate them with the facts that they observed through experiment.

Teacher's effort to improve the action at the third meeting gave the change for students' performance in carrying out the experiment. They were more thorough to do the experiment and write down the data of experimental result. Even so, the students still deal with the same difficulty when they asked to make the scientific report. The matter becomes improvement material in the next cycle.

Based on the matter, in the next cycle, teachers have to give more intensive direction so that students can do the experiment well, write the gained data thoroughly and answer the directive questions. Teacher's guidance towards students is committed by giving example or demonstration, doing question and answer in order that the students are able to relate the experiment with learnt-important concepts as well as obtain the right example in carrying out the experiment. Teachers have to ensure that the scientific reports made by students already accord with assessment criteria.

The actions committed by teachers were to check out the students' work to each group and give feedback directly by improving their work to each scientific report component without having to wait them finishing the reports. Teachers also gave the written feedback, and students confirmed or were given the chance to ask teacher's suggestion. Afterwards, the students revised it. It was the final result which will be assessed. Thereby, the giving of feedback, whether it was made in written or oral way, depended on the teacher's assessment, when and how the students got the mistakes. The technique of giving the classical verbal feedback should really be considered by the teacher. The focus of students' attention has to be directed to teacher's explanation. This was to ensure that students truly understand what they need to improve.

In this part, the result of scientific report assessment compiled by students was described in the second cycle, both on the whole and to each component. It was then compared to the first cycle scientific report. Based on the analysis result of students' scientific report assessment, on the whole in the second cycle,

the number of students who achieved good category: have the score of scientific report over 77.7, were 83% of students. The attainment has exceeded the expected target that was, 80% of students reach the good category. In comparison with the result of scientific report assessment in the first cycle, it seemed that there was a rapid increase as seen in the Table 4.

Table 4. The Percentage comparison of the total students based on the category of ability attainment in making scientific reports in the first and second cycle.

Category of ability	% Number of student (N=35)	
	Scientific report 1	Scientific report 2
Good	14	83
Fair	83	17
Poor	3	0

Here is the graph which shows the percentage comparison of the total students that reach the good category for each component to the first and second cycle.

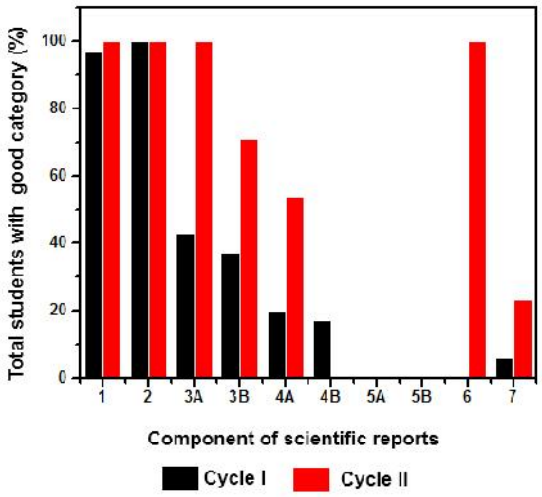


Figure 2. The percentage graph of the total students that reach the good category for each component of scientific report assessment in the first and second cycle.

Information:
1 = Report Display
2 = Report Format
3a, 3b = Work Procedure
4a, 4b = Observation Data
5a, 5b = Analysis and Discussion
6 = Conclusion
7 = Bibliography

Based on the graph in the Figure 2 above, the attainment of students' ability in writing the scientific report with the good category occurs in the component 1, 2, 3a, 3b, 4a, 6, and 7. It increases in the second cycle. However, component of 4b, a, and 5b has not reached the good category.

The comparison of ability attainment in writing the scientific report to each component with fair category in the first and second cycle can be seen in the graph shown in Figure 3.

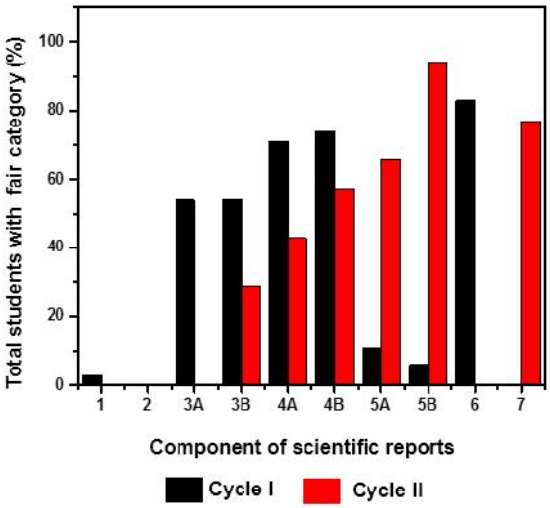


Figure 3. The percentage graph of the total students with attainment of fair category to each component of scientific assessment in the first and second cycle

Based on the graph above, the number of students who reaches the fair category to the component of 5a and 5b (analysis and discussion) increases in the second cycle. However, the component of 4b in the second cycle decreases. It means that more students fall in the poor category of ability of writing the observation data.

Even so, if it refers to the indicator of research success which minimally expects 80% of the total students to have the ability in making the scientific reports with good category, this research is stated to have attained the target of success indicator.

In the second cycle, the target of ability in making the scientific report has generally been achieved, that is, 80% of the total students have well reached the category of ability in writing the scientific reports. Thereby, the students have experienced an increased ability to make scientific reports. Provision of effective authentic assessment done by giving feedback, for each group and classical one, to each product

stage which is generated by students during the learning process. The assessment is committed in the way of checking out the students' work referred to rubric, followed by reflection, then informed to the students in the class, and followed up by the students' improvement individually.

Even so, there has not been found the students who reach the good category from the result of students' scientific report analysis, since the biggest percentage falls in the fair category. This certainly needs the further attention in order that the students can increase the ability in a better way in accordance with the expected target.

Based on the result of description in the first cycle, the students' ability in writing the scientific report has not yet reached the expected target at only 14% of the total number of students. It is contradictory to the indicator of research success which requires a minimum of 80% to gain the good category. It occurred because students were less thorough to do the observation and to make the data of observation result on the practical work. The students did not completely answer the directive questions on students' worksheet and have not been able to relate the function the directive questions which can help them relate the data analysis and discussion with the relevant theories. To answer the directive questions, they need to refer to source books or other references. As stated by Gallagher (2007), the learning activity on this research has been tried to embody the characteristic of natural sciences (IPA) learning as a process and to develop scientific work. The compiled students' worksheet has accommodated high level questions which directed students to do scientific work based on teacher's guidance.

Teacher's actions direct students to do experiment and to make scientific report which is achieved by applying the authentic assessment with feedback as suggested by Nicol & Debra (2006) and Nicol & Draper (2008). Feedback in the first cycle tends to be given by teachers in written way on a piece of students' work report/result and classically it forms the common comments regarding the mistakes done by students. Such teacher's actions have not yet effective enough to improve students' performance, because not all students are able to understand teacher's comments given in written way or the ones given generally/classically. To improve the performance, the students need the feedback at once without having to wait for finishing their work. Based on Duncan's research (2007), the written feedback towards the final result is often difficult for students to catch on to the meaning. The teacher often writes down sentences with unclear words and lack of details to show the quality of students' commented work. It occurs because the teacher has to give the comments on some students' works in short time. As a result, the messages are not well conveyed. The result of research seems also to happen to the first cycle of this research. Teachers are not yet consistent and look hesitant to give the feedback to students' performance.

The weakness of giving the feedback in the first cycle can be improved in the second cycle after doing reflection and obtaining input from observer. This brings about the efficiency of teachers' guidance through giving feedback which can give the real impact on students' performance.

On the learning activity in the second cycle, the ability in making the scientific report increases; that is from 14% in the first cycle into 83% in the second cycle. Thereby, the target of the research which is minimally expected to reach 80% of the total students who have the ability in making the scientific report with the good category has been achieved.

It occurs because teachers' actions can motivate students to be more thorough in doing the observation and collecting the data of observation result. Students answer the directive questions on students' worksheet completely. The students have related the function of directive questions which can help them relate the data analysis and discussion with the relevant theories and have referred to source books or other references. In the second cycle, the teacher has given the more intensive direction so that the students can do the experiment well. The teacher has also supported the students to thoroughly write down the gained data and answer the directive questions. The guidance towards students was also committed by giving the example or demonstration and doing question and answer. The teacher has also ensured that the scientific reports made by students have accorded with the assessment criteria. In addition, the teacher checked out students' work to each group and directly gave the feedback to improve their work without having to wait for them to finish the reports. The feedback giving was committed classically and individually if based on teacher's assessment students got the mistakes.

From the result of this action research, the assessment is no longer viewed as a way to measure the learning result, but it becomes the integrated part in the learning process which can motivate students to achieve the expected objective (Taras, 2003).

Even so, there is still students' ability which has to be increased although the result of research has achieved the expected target, that is, the ability in writing down the observation data, analysis and discussion. In comparison with the first cycle, the task which has to be finished in the second cycle to the component is more complicated. The existence of the total capable students to the component of writing down the observation data is alleged to be caused by students who go through the difficulty to change the observation data into a graph through calculation and infer the pattern of the data tendency. Thereby, the students still need the guidance of how to change the table of calculation result into a graph. In general, the students' mistake in making the graph is that they do not attach the information completely for each coordinate (x and y) and do not use the precise scale and unit. The precise data presentation gives certainly effect to their ability in analyzing and discussing the result.

CONCLUSION

Based on the data analysis of the research result and discussion, it can be concluded that:

1. The application of authentic assessment with the feedback done by teachers in the learning of natural sciences which can increase students' ability in writing the scientific reports has been proved successful by giving the feedback to each product stage generated by students during the learning process, beginning in groups followed by feedback classically. The assessment is committed by checking out students' work which is referred to rubric and followed by reflection which is, then, informed to students in the class and followed up by students' improvement individually.
2. The application of authentic assessment with the feedback in the learning of science can increase the ability in writing scientific reports in the grade VIII G with the increase from 14% in the first cycle into 83% of the total students with good category in the second one.

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