The Workshop Program on Authentic Assessment for Science Teachers

N Y Rustaman\textsuperscript{1}, D Rusdiana\textsuperscript{2}, R Efendi\textsuperscript{2} and W Liliawati\textsuperscript{2}

\textsuperscript{1} Department of Biology Education, Universitas Pendidikan Indonesia, Jl. Dr. Setiabudhi No. 229, Bandung 40154, Indonesia
\textsuperscript{2} Department of Physics Education, Universitas Pendidikan Indonesia, Jl. Dr. Setiabudhi No. 229, Bandung 40154, Indonesia
Email: nuryanirustaman@upi.edu

Abstract. A study on implementing authentic assessment program through workshop was conducted to investigate the improvement of the competence of science teachers in designing performance assessment in real life situation at school level context. A number of junior high school science teachers and students as participants were involved in this study. Data was collected through questionnaire, observation sheets, and pre-and post-test during 4 day workshop. This workshop had facilitated them direct experience with seventh grade junior high school students during try out. Science teachers worked in group of four and communicated each other by think-pair share in cooperative learning approach. Research findings show that generally the science teachers' involvement and their competence in authentic assessment improved. Their knowledge about the nature of assessment in relation to the nature of science and its instruction was improved, but still have problem in integrating their design performance assessment to be implemented in their lesson plan. The \textsuperscript{7}th grade students enjoyed participating in the science activities, and performed well the scientific processes planned by group of science teachers. The response of science teachers towards the workshop was positive. They could design the task and rubrics for science activities, and revised them after the implementation towards the students. By participating in this workshop they have direct experience in designing and trying out their ability within their professional community in real situation towards their real students in junior high school.

1. Introduction

The Workshop program on authentic assessment was carried out as follow up of previous research results [1]. The science teachers had seriously supervised the prospective teachers in science teaching during teaching practice at Junior high schools [2]. Nevertheless they did not have enough ability in applying assessment during science instruction as they had less understanding about the nature of assessment compared to the prospective science teachers been supervised as a demand of the 2013 Curriculum in Indonesia [2]. It had been found too that most of science teachers had poor understanding about the nature of science and its component in order to be implemented in their science learning [3; 4]. Another research on prospective science teacher resulted in very limited ability in preparing rubrics [5]. Actually since the end of twentieth century there has been a tendency that standard for classroom assessment need to be improved [6]. Therefore it is very urgent to focus the study into the essential aspect of science epistemology [7], the characteristics of learning science [8] to improve the ability of science teachers regarding the theory and the practice of authentic assessment in science teaching as demanded by any curriculum [9].

In general training for science teachers on instruction in relation to assessment are very rare in Indonesia and many countries as well as in teacher education [10]. Mostly during science instruction, and in science teacher training/workshop, they are being explained how to conduct, but not being...
modelled or even never being direct experienced by the participants [11]. The workshop program on authentic assessment for science teachers gave theoretical aspect by observational learning model [12]. In this developmental study, the workshop program focused on interactive small group activities. They practice directly in small group of four using cooperative learning approach (think-pair share type). Later after practicing within their own groups how to implement their rubrics planned, they have the opportunity to try out their rubrics towards the junior high school students in order to be completed or revised [13].

By direct experience in planning and implementing their plans in groups, the junior high school science teachers can communicate each other, share ideas, and construct their capacity to enhance performance assessment before, during, and after science instructions [13]. In short they have authentic experience on the essence of the purpose of assessment, namely: assessment for learning, assessment of learning and assessment as learning [6]. The originality of the workshop program on authentic assessment is that: “having direct experience to generate the standard competence into indicators and/or learning objectives in science which includes the nature of science [7] and the nature of assessment in science instruction to empower them with performance assessment in real context with their students among their community [1][8][9][14].

2. Research methodology

2.1. Participants
A number of junior high school science teachers (n=30) as participants, divided into seven groups of 4-5, and 21 seventh grade students from one state junior high school at LPMP Bali Province in Denpasar. The science teacher participants were from nine “districts” in Bali. There were more science teachers with science background in biology major than in physic major, and it is relevant with the number of basic competences to be implemented in seventh grade.

2.2. Instrument and procedure
Data collected through pre-test and post-test results which were taken before and after the workshop. The instrument for the two tests was similar, consists of 20 test items with five statements (strongly agree, agree, neutral, disagree, and strongly disagree). The observation sheet was prepared to assess the quality of the tasks and rubrics planned by the groups of science teachers during the implementation of science activities. Documents from each group were collected after being presented and revised based on other groups’ comments or questions as input.

Two sessions presentation from the facilitators was delivered. First session was about nature of science, its instruction and assessment [13], the second session was about formulating indicator and learning objectives to be integrated into lesson plan. Discussion using think-pair-share type of cooperative learning approach was then implemented during the workshop. It was used in sharing experience to formulate the indicators and the learning objectives derived from the basic competence selected from 2013 curriculum for the 7th grade school science. And it was used too in planning tasks in worksheet activity and its rubrics within each group of science teachers.

After having been limited tried out within the group, each science teachers group prepared the equipment and local materials by themselves for the next day try out. During the implementation of their own task and rubrics, the members of each group chose and took role in the try out, such as one member act as the teacher who explains what to do, other members as an observer using their rubrics, as photographer using hand-phone cameras. The number of seventh grade students involved in the workshop trial out was distributed into seven groups of three and faced each group activity for about one up to two sessions of 40 minutes.

The research team members observed the try out session using observation rubrics prepared before and took photographs of each group of students as documentation during the try out. The interactive direct experience of students and the science teachers in groups was then followed up by interactive communication between the science teachers and the students, as well as between the students and the
research team, and between the team and the group of science teachers through separated reflection activities which resulted in input for revisions.

2.3. Data analysis

The task in science activities prepared and revised by each group of science teachers were checked and interpreted. The documents obtained from seven groups of science teachers were then analysed each effectiveness using the rubrics. Each group of science teachers’ finding using their own rubric was checked and interpreted thoroughly. Later it was scored based on the rubric prepared by the team. The pre-test and post test results were scored individually.

3. Results and discussion

Research findings show that there was improvement science teachers understanding about the authentic assessment in its relationship with science instructions. The plans of each group of science teachers were recorded in Table 1.

| Group | Topics of YHS Science Activity | Lesson Plan | Alternative Assessment | Observation about Task | Rubrics | SP Skills | Product |
|-------|---------------------------------|-------------|------------------------|------------------------|---------|-----------|---------|
| 1     | Classification: Identifying objects | No LS | Not clear | Complete | Obs, com | complete |
| 2     | Classification of Living things: Classifying Plants | No LS, complete Worksheet+Obs sheet | Complete | Obs, cla, in-complete |
| 3**  | Chemistry & Physical Changes: separation of mixed materials | No LS using lab equipment | Simple | Obs. complete |
| 4     | Organization of Life: identifying Cell | Complete | Clear | Complete | Obs, com, incomplete |
| 5     | Temperature and its change: Using suitable thermometer | No LS, Worksheet & Observation sheet | Need explanation | Obs, select, measure, complete |
| 6**  | Interaction of biotic & abiotic factors: | Complete | Not clear | Need explanation | Obs, com, int, incomplete |
| 7     | Measuring using specific equipment | No LS, complete Worksheet+Obs sheet | Complex | Obs, com, measure, complete |

Notes: YHS= Junior High School; Obs= observing; **) using sight only during observation com= communicating; cla= classifying; int=interpretation, conclusion

Based on the information in Table 1, it can be stated that most of the group cannot complete the lesson plans. They just can plan worksheet for science activities and its rubrics. Science process skills mostly are observation, but it still not completes observation, because two of the group still using sight only. Group 2 and Group 7 have worked hard to prepare complete worksheet, observation sheet and its rubrics. Unfortunately they did not have enough time to prepare their lesson plans. They spent most of the time to complete and revise the rubrics.
Table 2. Results of task & try-out rubric for each group.

| Group | Clear Descriptor of Science Activity for Students | Observation Result using Rubric* | Achievement on Concept | SP Skills | Scoring guide in Rubrics |
|-------|-----------------------------------------------|---------------------------------|------------------------|-----------|-------------------------|
| 1     | Clear, limited number of materials to be observed | 100% relevant; between 2-3   | Moderate               | Good      | General and complete    |
| 2     | Clear, supported by materials observed by the students | 80% relevant, mostly 3, but time allocation | Good                   | Good      | Specific and complete   |
| 3     | Separation of mixture                           | 80% relevant, between 2-3     | good                  | Too simple | Not complete            |
| 4     | Identifying Cell                                | 100% relevant; between 2-3   | Moderate               | Obs., draw. | Complete                |
| 5     | Using suitable thermometer                      | 80% relevant; mostly 3, but target | Good                 | Limited   | Not complete            |
| 6     | Not clear, especially taking notes about characteristics of living things in nature | 40% relevant; only 2-3 for time allocation | Moderate, not focus | Limited   | Not specific, no example to fill in |
| 7     | Clear, too many objects to measure              | 100% relevant; mostly 3, but time allocation | Good                  | Good      | very complicated, need interpretation |

*designed by the research team

The quality of worksheet and observation sheet developed and achieved by each group of science teachers can be seen in Table 2. In Table 2, the results of using holistic and analytical rubrics are stated as “observation result using rubric”. Meanwhile achievement on science concept and scientific skills are also stated qualitatively, as well as the characteristic of scoring guide in rubrics prepared by each group of science teachers. The scoring guide in rubrics was categorized as complete/incomplete; too general, not specific or specific; very complicated.

Data in Table 2 shows that based on “Observation Result using Rubric*” more than 80% the science teacher participants within their group were able to prepare tasks and rubrics properly (except group 6), and the range of score applied to their rubrics were mostly between 2-3 (from 3 scale). It means that the science teacher participants had understanding and ability to plan activity based performance assessment in the form of tasks and rubrics. They began to realize the relationship between assessment and instruction, which means they have understood the purpose of assessment for learning [6].

Working in group among science teachers can remind them that in order to develop performance assessment in real world (authentic assessment) they can develop their professional development in their learning community such as in MGMP [14]. By doing observation upon the science activities conducted by the student, they learn collaboratively and actively [14]. They can realize that there was a tendency that assessment in science education has moved from what is easy to assess towards what is highly value and transferable knowledge/skills [15].

They have direct experience and exploration in preparing task and rubrics for science activity performance assessment. By giving opportunity to their student to have learning experience, and at the same time they learn how to use the rubric. This experience helps them to understand the meaning of assessment for learning. The evidence collected during the authentic assessment workshop supported inferences concerning the attainment of learning objectives [8]. Assessment in this sense act as formative assessment which is used to inform teaching and to influence learning [16].
From the expression of the student during science activity and Forum group discussion (FGD), it was found that they were exciting doing science activities, as it derives them to the concept to master [8]. Further it was found too, that some of the seventh grade students are very creative in using science equipment and very critical in making inference of what they observe through the microscope. So active science need active assessment procedure [8]. it is relevant with the statement that “… authentic assessment creates assessment procedures that are closely modelled on real world tasks and require the same conceptual, physical, and social abilities as the real world task [8]. Further it was stated too that the process of active assessment development consists of five stages: empirical description, definition of aims, tool development, rubric development, and assessment piloting.

The findings that the rubrics were qualitatively assessed, and were not all complete due to the vague (not clear) of the task can be understood, as the assessor should comprehend and practice again- and again in applying alternative assessment [17]. For the first experience, using holistic rubrics is good enough, later they can develop and practice the analytic ones. Assessing scientific skills, especially in measuring objects using specific equipment will need precision and accuracy [9][18][19].

4. Conclusion

Based on the results and research finding as stated in the discussion, and refers to the research objective, it can be concluded as follows. The workshop program on authentic assessment for science teachers is effective to enhance science teacher knowledge and skills in delivering science learning with scientific approach. as well as to implement their task and rubric on science activity plans during the workshop through direct experience. They can improve their experience how to implement scientific approach in learning science, by directing the small group of students to conduct science activities and assessing their performance (skills and product such as worksheet fill-in report) and come to conclusion expected. Furthermore the workshop program is effective in enhancing science teacher ability in planning task and rubrics through direct experience and reflective activity. They work within the group that challenge their mind to comprehend new skills embedded with science knowledge which has epistemology meaning through social interaction and construction.

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