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Graduate performance of science education department in implementing conservation-based science teaching

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Abstract. This study aims to measure the performance of graduates in implementing conservation-based science teaching. The study employed a qualitative method by collecting the self-assessment data from alumni and the performance assessment from the headmasters of schools where the graduates are currently teaching. There are nine indicators of conservation insight examined in this study. The study concluded that the 78 alumni, who have become teachers when the study was conducted, perform well in implementing conservative science lessons.

1. Introduction

The graduate performance of science education department at Universitas Negeri Semarang illustrates the suitability of the needs with the competencies of each graduate. Referring to the learning outcomes, graduates have performance indicators in implementing the learning that includes: (1) being able to prepare the implementation plan of learning that has conservation insight; (2) developing teaching materials that integrate local wisdom; (3) integrating science with local wisdom; (4) developing learning media from simple materials; (5) developing learning aids from simple materials; (6) developing student worksheets; (7) developing the practicum worksheet; (8) developing an evaluation tool in accordance with high-order thinking skills or higher order thinking skills; (9) minimizing paper use during learning; and (10) forming new conservation cadres. Performance indicators that have been assigned to each graduate, it is necessary to take measurements to determine strategies and policies in educating prospective science teachers which are appropriate to user needs.

The ability of graduates in implementing conservative science teaching is a form of accountability to the community because conservation has become the basis of the curriculum. Conservation as an insight into science learning is internalized into learning tools, processes, and evaluations. The seven main pillars of conservation are internalized into learning including biodiversity conservation, green architecture and internal transportation systems, waste management, paper policy, clean energy, conservation, ethics, art and culture, and conservation cadre [6,26,16]. The results done by Ridlo and Irsadi[15] is in accordance with the conservation insights that can be started from the simple things that happen in the learning process.

This research has been conducted since the graduates as the subjects of the study were still active attending college. An analysis of the seven conservation pillars at the time the subjects were still active attending course showed that 92% of students have excellent knowledge of conservation, while 4.6% have good knowledge, and only 3.4% of students have less knowledge about conservation. Narimawati



[14] argued that the level of knowledge of an active student is not always the same as that of alumni in the workplace. Therefore, this study attempts to investigate the graduate performance of science education department in implementing conservation-based science teaching.

The performance of graduates in implementing conservation-based learning is important to analyze the quality of the education in the department, to analyze the achievement of graduate competency, to determine the policy in education, and to know the level of graduate competence to stakeholder needs. Although the study program has graduated 284 students since 2013 until 2017, it has never attempted to examine the performance of the graduates. Investigation on the performance of graduates is urgent for immediate measurement. This study was focused on the performance of graduates in implementing conservation-based learning.

Based on the background of the study, the research problems are formulated as follows: (1) How is the performance of the graduates of Science Education Department, UniversitasNegeri Semarang, in implementing conservation-based science teaching?; (2) How is the conservation-based science teaching performed by the graduates?; and (3) How do the graduate users (headmasters) respond to the alumni's performance in implementing the lesson?. Particularly, graduates have characteristics that differ themselves from those of other universities because of the differences in the curriculum during the education process. The curriculum used is the competency-based and conservation-based curriculum. Conservation became the characteristic of Science Education graduates of UniversitasNegeri Semarang. The main objective of the study was to analyze the performance of graduates in implementing conservation-based science teaching.

The performance of a teacher is a combination of three factors consisting of knowledge, experience, and responsibility. In accordance with the results of a research by [21], the performance of a teacher can be optimal if he has a deep knowledge, airtime, and personality on him. The teacher's knowledge is related to the mastery and depth of knowledge. The experience relates to the amount of time or duration of work and to the substance being worked on. Furthermore, personality is related to the conditions within a person in facing his work. Teachers' performance in Indonesia is measured using performance instruments that are generally performed by the principal or supervisor. Winarsih and Mulyani [25] argued that the ability of science teachers in schools can be known from the planning stage to developing learning tools in the form of effective learning to present teaching materials.

The performance of science teachers in schools is inseparable from the level of discipline in preparing and implementing learning tasks. Readiness in preparing lessons is started by composing learning tools, preparing tools and materials as well as learning resources. The result of the study by Ummi [23] showed that discipline of science teachers' performance showed average value of 79,52% that represents good criterion. Teachers' readiness in carrying out learning contributes less to the success of teaching compared to the discipline in time of carrying out the task. Performance of teacher is not limited to discipline in terms of time, but rather discipline in preparing lessons that are appropriate to the characteristics of science teaching [20].

The study of science teacher education has focused on some aspects of teacher preparation or professional development. According to Lederman and Lederman [7], encouraging a change for teacher performance in improving science through practices with self-awareness is capable of developing the quality of graduate. The results of research showed that the performance of teachers is an important part of a study program in mapping the quality of graduates in schools [5]. Teachers must be able to follow the development of learning trends. McFadden and Roehrig [12] argued that teachers do not only teach the concept of science but also adjust their teaching to curriculum development. They are also required to integrate Science, Technology, Engineering, and Mathematics (STEM). Teacher's habits in maintaining a learning approach that is believed to be effective must become the topic of study on the improvement of future science teachers' performance. This is because the domains of science processes emphasize the use of some process skills to learn how scientists think and work [2]. An empirical study by Huang and Asghar [3] investigated the perspective of science teachers in Taiwan. This study suggested the requirement of transferring traditional approaches to science teaching by engaging students for actively participating in learning process.

Science Education department at UniversitasNegeri Semarang applies competency-based and conservation-based curriculum. There are four types of conservation characters that can be developed during the learning process, namely; moral conservation, cultural conservation, environmental conservation, and humanist conservation [9]. Alumni are expected to teach science professionally and apply conservation insight in learning. Findings revealed that learning by integrating conservation can provide hands-on experience to students so that they actively make discoveries [10,22]. Conservation in learning is integrated into teaching materials. McFadden and Roehrig [12] suggested that teaching materials internalizing conservation can help students understand environmental issues and concerns.

2. Research method

This research employed qualitative approach. The samples in this research were alumni of science education department of UniversitasNegeri Semarang as informants who learned competence-based and conservation curriculum. The number of respondents in the study was 78 people who have worked as teachers in junior high school and madrasah tsanawiyah. The total number of alumni was 284 people. Those who have become teachers at the time the research was done were 78 people. The methods of collecting data employed self-performance sheets and working performance filled by the principals of each alumnus. The research was conducted with various actions such as meeting directly with respondents, and using email and personal social media to communicate with alumni and principals. The subjects have lived in various regions in Indonesia including Central Java, West Java, Jakarta, Sumatra, and Kalimantan.

This research is to measure the ability of alumni in implementing conservation-based learning. To find out the ability of the alumni, the research used unstructured direct questions and observations on graduates in implementing science teaching in schools. Researchers have observed various classes and laboratories using 9 indicators of teacher's ability to carry out learning in accordance with conservation insights. Then, the researcher carried out deep analysis through direct questions to informants. The data obtained were in the form of description of teaching and learning activities and interviews with informants. Researchers believe that the data were not really saturated but must be terminated due to time constraints. Data were analyzed using a qualitative approach which refers to Sugiyono [19]. The collected data was then reduced, translated and analyzed for subsequent narrative content.

3. Result and discussion

Investigation of the graduate performance started from a self-assessment conducted by 78 alumni who become the target of this research. The results of self-assessment can be seen in table below.

Table 1. Self-assessment of the graduate performance of science education department in implementing science-conscious science lessons.

| Aspect of Competence | Answer | | | |
|--|---------------|----------|------------|---------|
| | Very Good (4) | Good (3) | Medium (2) | Bad (1) |
| Being able to develop a conservation-based learning plan | 67 | 11 | - | - |
| Developing teaching materials that integrate local wisdom | 44 | 14 | 22 | - |
| Integrating science teaching with local wisdom | 62 | 16 | - | - |
| Developing learning media from simple materials | 54 | 24 | - | - |
| Developing learning aids from simple materials | 45 | 33 | - | - |
| Developing a student worksheet | 70 | 8 | - | - |
| Develop a practicum worksheet | 78 | - | - | - |
| Develop an evaluation tool that matches higher order thinking skills | 43 | 22 | 13 | - |
| Minimizing paper usage during learning | 44 | 23 | 11 | - |

| | | | | |
|---|---|----|----|---|
| Establishing new conservation cadres in schools | 8 | 56 | 14 | - |
|---|---|----|----|---|

Self-assessment was conducted on 78 alumni. 67 people have integrated conservation in the plan of teaching implementation. Each alumnus has also integrated the teaching materials with local wisdom. In the aspect of minimizing the use of paper during the learning, there were still 11 alumni who have not applied this principle well. In the aspect of forming new conservation cadres for students, there were still 14 people who have not yet done well. Self-assessment has a high subjectivity; therefore, this study carried out data collection of graduate performance by the principals where the alumni are currently working as teachers. There were 24 school principals assessed the performance of alumni. The results of graduate performance can be seen in table 2.

Table 2. Assessment of graduate performance of science education department in implementing conservation-based science teaching by the principals

| Aspects of Assessment | Answer | | | |
|---|---------------|----------|------------|---------|
| | Very Good (4) | Good (3) | Medium (2) | Bad (1) |
| Being able to develop a conservation-based learning plan | 7 | 6 | 11 | - |
| Developing teaching materials that integrate local wisdom | 4 | 6 | 8 | 6 |
| Integrating science with local wisdom | 2 | 8 | 14 | - |
| Minimizing paper usage during learning | 7 | 5 | 12 | - |
| Establishing new conservation cadres in schools | 2 | 16 | 6 | - |

Before doing the assessment in this study, Principals got a brief explanation from the researcher about conservation in learning. The graduate performances were assessed by 24 principals from 24 different schools of where the alumni are currently teaching. The performance of alumni is mostly in the medium category of integrating conservation into the lesson plans, integrating materials with local wisdom and minimizing paper use during learning. This study also collected data about alumni's opinions on the suitability of conservation integration into learning in school. Opinions given by 78 alumni are presented in figure 1.

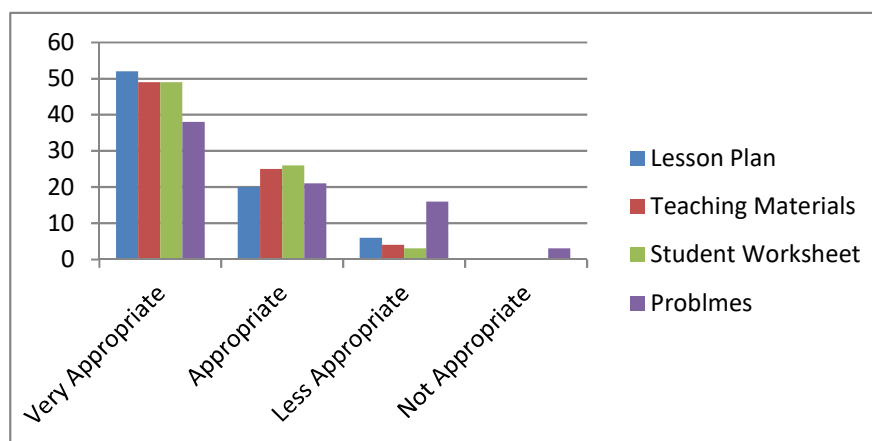


Figure 1. Alumni's opinion on conservation appropriateness which are integrated with teaching.

According to the alumni, conservation is the most appropriate to be internalized in the Learning Implementation Plan. However, the problems used to evaluate learning are less appropriate. The alumni

stated their perceptions of conservation when they were still attending the courses. They perceived conservation as a curriculum in Science Education Department in Universitas Negeri Semarang. Moreover, they stated that conservation is not appropriate for all subject. In other words, it is only appropriate for some particular subjects of science education. Teaching materials can be given across discipline (interdisciplinary) so that a particular approach cannot be imposed to be implemented in a certain teaching and learning process [17]. Prospective Science teachers need much time to master the skill in preparing teaching materials adjusted to the topic's characteristics with both modern and traditional approaches. The findings revealed that science teaching materials need to be integrated with traditional knowledge because it gives students a sense of representation about the materials being studied [13,11]. Conservation-based learning provides space for integrating the existing materials in the environment, both physical and socio-cultural societies.

The performance of graduates in implementing conservation-based science teaching was good. The samples of lesson plan created by the alumni have been analyzed. The analysis found some conservation indicators like providing examples of cultural and environmental conservation. Conservation policies cannot be separated from the life patterns of a traditional community [24]. The lesson plans have also used references containing information about conservation, and provided assignments linked to the protection of natural resources. Graduates have a commitment to the curriculum applied when they studied at college. Moreover, the lesson plans clearly mention the word 'conservation'.

Local wisdom in the form of community culture in interacting with the environment has become conservation principles integrated with teaching materials. Huang and Asghar's [3] argued that curriculum policy in science education required space to internalize the indigenous culture owned by the community. An appropriate form of policy is required in the curriculum to internalize local wisdom through teaching materials [11]. Based on the assessment of 14 headmasters, alumni still face obstacles especially in developing teaching materials by including conservation principles. The findings were conducted in depth by interviewing alumni in 14 schools who were judged to be poor performers. Knowledge of teaching materials, local wisdom, and how to develop it are sufficient, but their will to apply it is still very low.

4. Conclusion

Based on the results of the study, it can be concluded that: (1) the graduate performance of science education department Universitas Negeri Semarang in implementing science teaching is categorized into good performance; (2) conservation-based science teaching is developed by integrating conservation principles into lesson plans, teaching materials, and assignments; and (3) the assessment results on the graduate performance given by the headmasters are categorized into good performance.

Acknowledgements

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