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Preface

Recent studies clearly indicate that the quality and quantity of the global biological diversity (biodiversity) as the main component of the planet's life are really endangered. Diverse strategies, aspects and technologies are essential to save the earth. The experts convinced that the role of science, technology and cultural approach to society is very important in saving the biodiversity for our future generations. Therefore, education and an effort to encourage a communication of young people among nations in the world are also viewed as an important part in conserving the global resources.

By bringing together scientists, NGOs, teacher and students exploring minds in one forum will foster interdisciplinary discussion, and advance our avenue of the ways to contrive a global recommendation to save the biodiversity. Therefore, Global Resource Conservations Consortium, Department of Biology, Brawijaya University holds an International Conference on Global Resource Conservation (ICGRC) 2015.

The best articles from this conference have been arranged in this book. Moreover, this book will provide a good reference and knowledge which is useful for experts, professionals and whoever else work on conservation from a range of disciplines to contribute for drawing up global mission in saving earth's biodiversity.

We would like to gratefully acknowledge the effort of all professional colleagues, editors, friends and agencies that have directly and indirectly contribution towards this book has been published.

Malang, August 26th 2015

Rodiyati Azrianingsih,Ph.D
Chief Editor
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Teacher's Competencies on the Management of Science Laboratory Public Secondary School Pekanbaru Academic Year 2014/2015

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Abstract

This research was conducted in order to determine the teacher's competencies on management of science laboratory based on Permendiknas no. 26/2008 in Pekanbaru City for academic year 2014/2015. Subjects in this study are science teachers who manage science laboratories of secondary schools in Pekanbaru City. The numbers of subjects are 29 people from Public Secondary School in Pekanbaru City. Collecting data in this study was conducted by questionnaire, interview, and observation (The data analyzed descriptively and the unit measurement on analysis technique that used in this study is percentage.) From the research, its known that personal competence categorized as very competent with percentage of 91.01%. Social competence is 89.90% categorized as very competent. Competence of administration is 86.74%. Then the professional competence 86.64% categorized as very competent. Competence managerial categorized as very competent (86%). It can be concluded that level of competence in management of the science lab teachers at Pekanbaru's Public Secondary Schools for Academic Year 2014/2015 are very competent.

Keywords: Management of science laboratory; public secondary school; teacher competencies

1. Introduction

Education is the process of changing attitudes in order to mature human being through teaching and training. It can be defined as a process with certain methods so that people acquire the knowledge, understanding, and how to behave in accordance with requirements [1]. According to Law Number 20 of 2003, education define as conscious and deliberate effort to create an atmosphere of learning process for learners who actively developing their potentials to have the spiritual strength, self-control, personality, intelligence, noble character, and skills needed him, society, nation and state.

Its required varies factors including teacher support curriculum facilities and infrastructure to achieve the education goals. The educational facilities are sources of learning for the school community, especially teachers and students. Based on Government Regulation No. 19 of 2005 on Education National Standards section 42 verse 1, which stated that each educational unit shall have the means, which include furniture, appliance education, instructional media, books and other learning resources, consumables and other supplies needed to support the learning process regularly and continiously.

At the secondary school (SMP) level, science classes have the time allocation approximately 5 hours a week. There are expectation of time distribution in science class for student to learn both in classroom and laboratory. Science education emphasizes providing direct experience to develop the competencies that students are able to explore and understand the life around scientifically. Science education is directed to "find out" and "doing". The existence of science laboratories in secondary schools is a necessity in modern science education. The process of science can not be learned as simply just by listening, not even by watching a demonstration.) The process of science has to be learned by doing. To construct the knowledge that students can not only passively accept, but also have to "act" on things that are face and concern. Science lab provides a lot of opportunities for students to "act" on things that studied and observed. [6]

The existence of science laboratories in secondary schools is a necessity in today's education. IPA/Science is containing three major aspects; product, process, and attitude. Product of this term has been arranged systematically as concept, principle, and theory in science. The process in this term related to observation and experiment. In this part the laboratory takes very important role and train the skills of students in the field. According to [21], laboratory management will work more effectively if the board of Management who serves as director and advisor supports the organizational structure of the laboratory, they are seniors who have competence in its laboratory activities. Success in lab management requires good management that includes planning, operational, control, and sustainability. The success here, relies heavily on managers and their staff in the laboratory, such as researcher staff, analyst, technicians and operators, and the amount of funds available [7] Results of survey conducted in 29 secondary schools in the city of Pekanbaru in September to October of 2014, shows that laboratory manager at SMP Pekanbaru are teachers of science, provision of tools and materials has not detailed the needs, there is still science laboratory with not complete facilities and laboratory infrastructure, there are teachers as a laboratory manager who never attended training about management science laboratory, and less effective of laboratory utilization. In order to make laboratory function in accordance with the intent procured the laboratory need to be used and managed as well as possible. Without being used and managed, along with the procurement of laboratory equipment and materials required will only be a waste[6]. Based on the problems pointed out above, the objective of this study was to

observe the teacher's competencies on management of science lab in SMP Pekanbaru City based on Permendiknas No. 26/2008.

2. Material and Methods

The research was conducted at public secondary schools in the city of Pekanbaru at Academic Year 2014/2015. The data collection of this research was started on September 2014 to March 2015. The number of respondent were 29 teachers from 29 secondary schools in the city of Pekanbaru. The method of this study was survey method. Procedure in this study determined as following steps:

a. Determination of the research subjects
   The research subjects are science teacher who manage the laboratory on each secondary school of Pekanbaru.
b. Determination of the variables and indicators of research as the basis of preparation of the research instruments
   The variables and indicators determination based on clause of Permendiknas No 26 in 2008.
c. Composing of research instruments, namely questionnaires or question sheets
   The competences of teacher on this research include personality, social competence, administrative aspects, managerial, and professional competences. For further information, can be seen in Table 1.

Table 1. Teacher competences based on Permendiknas No. 26 on 2008

No	Aspects	Indicators
1	Personality Competences	Presented as a person that mature, stable, and noble. Dedicated to jobs
2	Social Competences	Have a good teamwork on doing the job Capable to communicate well verbally and write.
3	Administration Competences	Planning on the school/madrasah's laboratory utilization Arrange the storage of materials, equipments, tools and spare parts laboratory of school / madrasah Inventory of research materials To Note the whole process of research
4	Managerial Competences	Planning the activities and development of school's /madrasah's laboratory To manage and supervised the laboratory activites Split the job desk to technicians and laborans of the school's/madrasah's laboratory Monitoring the facilities and infrastructure of school's / madrasah's laboratory
5	Professional Competences	Applying ideas, theories, and principles of laboratory activities of school / madrasah Utilizing the laboratory for education and research on school / Madrasah Preparing laboratory activities on school Maintaining the laboratory of school / madrasah Maintaining tools and materials in laboratory of school/ madrasah To manage materials and laboratory equipment of school / madrasah To serve lab activities

In this study, the research instrument was a questionnaire. The teacher competency items were prepared using the modified Likert scale. The data analysis technique used in this study is the percentage, with the formulation as follows:

$$p = \frac{f}{N} x\ 100\%$$

Description
p = teacher's competence percentage
f = frequency
N = number of questionnaire [18]

Then the calculation results are converted into table 2.

Table 2. Interval of Teacher Competency in Management Science Laboratory at Secondary Schools of Pekanbaru academic year 2014/2015 (Modified of [18])

Interval	Note
33% - 46%	Not Competent
47% - 59%	Less Competent
60% - 74%	Competent Enough
75% - 87%	Competent
88% -100%	Very Competent

3. Results and Discussion

The data in this study was obtained from the observation and questionnaire. Observations carried out on 29 research subjects as teachers who manage the science lab at SMPN Pekanbaru. The result of this study can be explained with Figure 1.

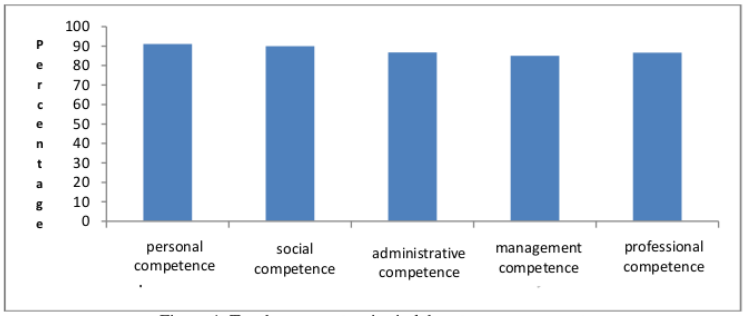

Figure 1. Teacher competencies in laboratory management

Based on the results of research on teacher competence in managing science laboratory can be seen that there are some competencies that need to be controlled by teachers in managing the laboratory. They are personal competence, social competence, administrative competence, managerial competence, and professional competence. In addition to these competencies, teacher qualifications will also determine the management of the laboratory. The results of observations and interviews that have been conducted on the subject of research show that in general teachers who manage the science laboratory are teacher who was graduated from undergraduate school (S1) of the biology education study program. To improve their academic qualifications, some teachers have been trained on the procurement of the laboratory. The total of 29 teachers, 65.52% have completed the training. Laboratory management is the process of utilization of laboratory resources effectively and efficiently. Laboratory governance must consider the sustainability of resource functions and management functions are good. The existence of science teachers is adequate in terms of academic qualifications, but the competence of the laboratory learning management still need to be improved.

Science laboratory is one of the laboratories in secondary schools and science laboratory has components that are quite complex because in laboratory occurs science learning process as a practicum or research that requires precision both in implementation and in terms of laboratory management. That requires professional managers because of in laboratories need skill. It is not enough by the head of the laboratory, auxiliary power is still needed as laboratory technicians who has at least has an adequate experience or in accordance with the provisions. This is due to the head of school laboratories are also a science teacher who has a solid teaching hours, so that the clock duty at the lab was not optimal. In line with the demands of the quality of education, the government today made the legislation governing the qualifications, competence, and teacher certification [7]. In Permendiknas number 19 Year 2007 on National Education Standards set about several things including national education standards and academic qualifications. National education standards are the minimum criteria regarding the educational system in the entire territory of the Unitary Republic of Indonesia (section 1, verse 1). Academic qualification is the education minimum level that must be met by an educator as evidenced by a diploma or certificate and the relevant expertise in accordance with regulations current legislation (section 28 verse 2). In this case the science teacher/biology become school laboratory personnel based on Permendiknas number 26 Year 2008 as the manager and chief of science laboratory through the teachers have the following qualifications: 1) bachelor degree as minimum education (S1), 2) have an experience at least 3 years as a manager of the laboratory, 3) have a certificate as head laboratory of school/madrasah published by college or another institution established by the government.

From questionnaire data were obtained from 5 competencies, the competence of personality has the highest percentage (91.01%). This competence becomes important because teachers who manage the laboratory must be able to behave, to act in accordance with religious norms, law, social, and national culture of Indonesia, present yourself as a person who is honest, noble, and as a role model for students and the public, featuring yourself as a person who is steady, stable, mature, wise and dignified, shows the work ethic, high responsibility, a sense of pride to be a teacher, and confidence. Respecting the teacher professional ethic code. As described by[24], showing as a mature person, steady and noble is an indicator of the aspect of personal competence. Personal competence is the personal attitude of teachers of Pancasila spirit that promotes the culture of Indonesia, who are willing to sacrifice for the preservation of the nation and country. Personal competence include personal capabilities that reflect the steady and stable personality, mature, wise, noble and dignified to be role models for students.

Teachers specialized in the laboratory management should be steady in carrying out the responsibility as head of the laboratory. One of the processes to mature and establish themselves is by training, workshops, seminars, and so on, which support teachers to deepen and broaden insights about the laboratory management. Some of these activities is a training vehicle and a variety of science with colleagues in different forums so that each teacher can hone their ability to deepen their knowledge in particular laboratory management. Education and training programs is very important. As it is known that education is an ongoing activity until the end of life. Thus, humans can learn and train theirself to become a better human being. The training includes more than just teaching the teachers and

how to use the media or equipment, such as quality control. Training also means making sure they acquire the development through the adequate knowledge and skills in improving the quality of work that they are responsible [2].

Social competence obtained an average (89.90 %) categorized as very competent. Based on answer reasons of questionnaire. the subject has been working with various parties effectively, working with colleagues and principals. The cooperation are discussion or meeting together to deliberate about the needs of the laboratory. Cooperation is also carried out over the mountain sides. The laboratory manager usually makes proposals for the demand for laboratory tools and materials, to repair the laboratory to the education department. The subjects also explained, cooperate in the task implement the urgently needed to help manage and maintain laboratories and sharing of knowledge and ideas about the practical good. This can avoid and minimize errors in performing the experiments so will facilitate the laboratory activities. Social competence is also related to the ability to communicate orally and in writing. This is consistent with the reason of subject, that communication between colleagues is always done to expedite the process of laboratory management and practicum process. According to the subject, to facilitate communication and resolve problems concerning the laboratory management, teacher utilizing the internet as a reference to find information and procedures on using of tools and materials. One of the factors that affect the cooperation in the management is communication. Someone who has a high performance level can communicate well. Either with superiors, subordinates or with peers. If everything is communicated with both the conditions encountered can be overcome with good. Communication becomes a means of implementing management processes, namely, as in the process of planning, organizing, leadership, and controlling. The communication can be defined as the process of transmission of information from one person to another.

Administrative competence is (86.74 %) categorized very competent. Observation results in the laboratory seen in general is still very simple only on takat settings, tools and materials laboratory stored in a safe closet and clean but less tidy. Subject give the reason that least an hour to tidy up the instrument in the laboratory. Another reason is the lack of cooperation and responsibilities among the science teachers to keep in the same place after borrowing tools or tool wear. Other subjects also argued, limited storage cabinet also affect storage. To ensure safety in the laboratory storing tools and materials, it must be in a safe and clean place to be easy to care and take. This is because there are tools and materials laboratories are dangerous if prepared in a storage cabinet. Storage manners must be considered such as alcohol is kept with the appliance physics and biology so if it spill will damage the condition of the other equipment. Then, in the storage room must be provided special storage and clean tool storage area, tidy, and easily retrieved. For the storage retrieval and restoration tools and substances must follow procedures that ensure the safety of the work of salvation.

Furthermore, placing or storing the tool can be based on such things, the safety/security of users and tool when the tool is taken from or returned to its place, the ease of finding and taking the necessary tools. The steps of structuring and storage equipment/materials as follows: Clean the space and storage of tools and materials, check the data and re-tool and materials exist, grouped tools and materials exist based on the state apparatus and materials, storage and management of tools and materials adapted to laboratory facilities, tools condition and materials [4]. This is consistent with the data obtained from interviews. Some of the respondents said that limited auxiliary staff to regulate the storage of tools and materials generate layout is not optimal tools and materials so that the laying of materials and tools are still there who do not fit into place.

Managerial competencies are in the category of very competent (85 %). To plan practical activities, laboratory manager make coordination with the science teacher who will use the laboratory. In accordance with the opinion of the subject, that coordination is intended to prevent conflicts in using of the laboratory. Observations show no evident Standard Operational Procedure (SOP) which is used in the laboratory activities. To manage activities in the laboratory, the subject has drawn up a schedule. But the schedule that has been arranged with a regular schedule is not controlled well. Therefore, the need to schedule completely in accordance with the class to be used. In addition, subjects attempt to monitor every execution boratorium activities by setting aside a little time to monitor teaching another class that was using the laboratory and the administration of books that must be filled before using the lab as well as to ensure that the conditions of the experiment runs smoothly.

The use of the laboratory must be scheduled with the best that can be used spread evenly by all classes which needed. Furthermore, to assist the head of the laboratory task scheduling can be handed over to a teacher or more. Teachers appointed to be involved also in the preparation of the general schedule. In terms of monitoring activities need to be undertaken to ensure activities run well. This opinion is supported by [3], in the scheduling has to consider the suitability of the time by activity (experiments or demonstrations) in accordance with and subject courses according to the school curriculum. The percentage of teacher professional competence in managing laboratory science is 86.64% categorized as very competent. The results of interviews on several subjects found they seek to increase their knowledge by doing simple research or study of innovation of any material different. One that always made is material food biotechnology, for example, to make salted fish, tapai soursop, dodol soursop, and et cetera. Some teachers never apply the results of studies such as innovation or scientific work. Most teachers find

difficulty to write the ideas in the form of scientific papers. Yet in terms of ideas, in fact many teachers who had a brilliant idea. Fundamental problem is that many teachers are not used to writing scientific papers [7].

To improve the professional competence, some teachers prepare practical guidance, tools and materials. This is in accordance with the data questionnaire on 60th items that 89.66 % always prepared a package of materials and a series of tools for the activities undertaken because the preparation easier for students to carry out practical activities. Furthermore, the item providing practical guidance on 91.95 %. The purpose of this preparation in order to facilitate students in carrying out practical activities. The preparation of practical guidance not only on practicum table but sometimes conveyed by teachers in front of the class or written on the board and look in to the worksheets that available [22]. As manager of the science laboratory, subjects usually identify damage after completion or before using the tool and the material and the subject is able to repair if minor damage happen. The treatment is the maintenance of the tools and materials that already exist in the laboratory based on the consideration of tools and materials knowledge and process or the resulting risks for the primary purpose of tools and materials remained good. Can be used at least depreciation value is not too dropped dramatically and the levels of power of the point is still good. Good storage is part of the treatment, because it involves aspects of the types and the nature of tools and materials, then the storage activities should receive special consideration.

4. Conclusion

Based on the research results, it can be concluded that the level of teacher competencies in the management of the science laboratory at SMPN Pekanbaru overall categorized as very competent with average 87.87%. Specially the highest percentage is the personal competence and the lowest is the managerial competence. This means that the teachers' competence in the management of science laboratories in the public SMP Pekanbaru already according to the standards established by Permendiknas. The sugestions that can be given as follows:

a. For schools, it is expected that schools provide adequate facilities and infrastructure and a sense of responsibility to work together for the development of science laboratories.
b. For the teacher, it is expected for every science teacher to understand the teacher's competence, especially in the management of the laboratory and improving knowledge of the laboratory with frequent training.
c. For further research are expected to researchers to choose the right time to carry out interviews and documentation.

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