

Preliminary Study: Profile of Management of Practicum Activities Science at Middle School Level To Improve Higher Level Thinking Skills, Science Process Skills, and Scientific Attitudes

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Received: August 19, 2023

Revised: October 5, 2023

Accepted: October 25, 2023

Published: October 31, 2023

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DOI: [10.29303/jppipa.v9i10.6295](https://doi.org/10.29303/jppipa.v9i10.6295)

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Abstract: This study aims to conduct a preliminary study related to the management of science practicum activities at the junior high school level throughout Mataram City. This preliminary study is to obtain an overview of the management of science practicum activities which includes practicum activity planning, implementation of practicum activities and practicum activity assessment. This study uses a qualitative approach with a case study type of research. The research sample consisted of science teachers and students of grades VIII and IX in 3 schools outside the urban areas of Mataram City. The sampling technique uses purposive sampling. Data collection methods used are observation, documentation and questionnaires and interviews. The results showed that the management profile of science practicum activities carried out in order to improve higher-order thinking skills, science process skills and scientific attitudes had reached 69.21 or in the Enough category. For science practicum planning it has reached 54.58 or in the less category. For the implementation of science practicums it has reached 73.43 or in the good category and for the assessment of science practicum activities it has reached 79.38 or in the good category. The results of this study recommend that science teachers apply various models of more effective science practicum implementation in order to achieve science learning outcomes through science practicum activities.

Keywords: Management; Science learning; Science practicum.

Introduction

Science learning given to students aims to be able to carry out practice-oriented activities, holistic development, technology integration, social responsibility, self-management, dealing with uncertainty, innovation and creativity and pedagogy (Law, 2022). In the context of learning science, it is actually not much different from the concept of learning in other subjects, only the emphasis must be in accordance with the nature of science itself, that learning science must occur in a scientific process, producing scientific products by conducting experiments/experiments and forming a scientific attitude (Ardiansyah et al., 2022). Science learning in the future will be very effective if it fulfills the essential

components in the learning process, namely discursive, adaptive, interactive and reflective (Budiman, 2021). One form of science learning is through science practicum activities (Endah & Febri, 2023).

In general, the science concepts obtained by students originate from observations regarding the facts and phenomena observed and are followed by scientific processes in the form of investigative activities or practicum. Facts related to the environment around students' daily lives become an attraction for students to carry out investigations and can improve student skills (Yusuf, 2022). Science practicum activities are very supportive of the achievement of the science process, so it needs to be applied in learning in order to develop students' abilities such as process skills namely observing, interpreting, asking questions,

How to Cite:

Ardiansyah, B., Ramdani, A., Hakim, A., Makhrus, M., & Yustiqvar, M. (2023). Preliminary Study: Profile of Management of Practicum Activities Science at Middle School Level in City Mataram to Improve Higher Level Thinking Skills, Science Process Skills and Scientific Attitudes. *Jurnal Penelitian Pendidikan IPA*, 9(10), 9067-9073. <https://doi.org/10.29303/jppipa.v9i10.6295>

hypothesizing, planning experiments, applying concepts, and communicating. One way to realize the existence of a science process in learning is by having a science process skills approach (Rosdiani & Erlin, 2022).

So far the management of science practicum activities in several educational units in urban areas has been very good but in rural areas it is still in the sufficient category (Nulngafan & Khoiri, 2020). The implementation of the assessment of science practicum activities on the aspects of skills and attitudes is still constrained because the assessment is not in accordance with the assessment rules (Alfajari et al., 2020). In several schools in Yogyakarta, the implementation of science practicums is still experiencing problems in the utilization of their laboratories, due to the shift in the function of the laboratory, namely the laboratory being used as a classroom, a place for meetings, a place for extracurricular activities or a warehouse. In addition to the room, time availability is also an obstacle, the distribution of schedules that are not right, or the time together with holidays, practicum activities will automatically shift (Romadhoni & Saifuddin, 2021). Even in some schools, school science laboratory activities cannot be categorized as good. This is caused by the unavailability of a list of tools and materials for each practicum implementation, semester program for laboratory activities, activity journals and laboratory activity schedules (Manlea, 2017). In terms of the management process of science practicum activities at a higher level, they are already in the good category (Rosilawati, 2012).

To fulfill the expected goals of the implementation of science practicum, management is needed which includes planning, implementation and assessment. For planning, it includes the completeness of documents that must be owned by the manager of science practicum activities, including: Science laboratory rules; user schedule for practicum activities; list of practicum tools/materials; and a list of laboratory usernames (Elseria, 2016). Another form of practicum activities so that it can run according to the desired goals, requires adequate laboratory facilities and a relevant teaching material, including in the form of a simple practicum manual (Sinaga et al., 2018).

Implementation of science practicum is expected to improve students' skills. Student skills include basic skills, essential skills and generic skills (Maknun, 2012). The implementation in laboratory management can be seen from the orderly use of the laboratory, the use of the laboratory for practicum, as well as the practicum implementation process (Nahdiyaturrrahmah et al., 2020). The basic skills that can be fulfilled from science practicum activities include: observing, interpreting data, predicting, hypothesizing, communicating, planning experiments, applying concepts, and asking questions Suryaningsih, (2017) and Desmiawati et al.,

(2023). In addition to being able to improve students' skills, of course science practicum activities can improve students' understanding and learning outcomes starting from the basic education level (Nisa, 2017). At the higher education level, students' cognitive and psychomotor abilities can be improved through practicum activities (Murti et al., 2014).

Every science practicum process will run well if its implementation is aligned with the understanding of the concepts being studied. Based on an analysis of science material taught at the junior high school level, several science practicums were carried out for learning outcomes, namely students were able to classify living things and objects based on observed characteristics, identify the properties and characteristics of substances, distinguish physical and chemical changes and separate simple mixtures, among others : classification of living things such as carrying out complete plant herbariums, leaf herbariums which are fruit plants, vegetable plants, tuber plants, ornamental plants and medicinal plants. In addition, there are concepts of physical and chemical changes such as material changes with symptoms of color changes, changes in temperature, formation of precipitates and odors. For material concepts, practicum can be carried out related to the identification of chemical ingredients and others are (Alarifin et al., 2016) needed such as the Contextual Middle School Science practicum module (Subamia et al., 2015) learning tools such as lesson plans and teaching materials (Yahya et al., 2020), science practicum instructions based on the guided inquiry model (Indriyana et al., 2019), science practicum instructions based on POE learning (Maulida et al., 2018) and (Dewi et al., 2018) forms of natural science practicum instructions other (Margunayasa & Riastini, 2014; Firjatillah et al., 2020; Maslihak et al., 2022).

Activities in the management of science practicum are carrying out the assessment of science practicum activities. Assessment of science learning outcomes through practicum activities can be in the form of higher-order thinking skills, assessment of science process skills and assessment of attitudes such as scientific attitudes. Based on the foregoing, a preliminary study was carried out to describe the practicum activity management profile Science at SMP level throughout Mataram City to Improve Higher Level Thinking Skills, Science Process Skills and Scientific Attitude

Method

The approach used in this study is a qualitative approach. The type of research used is case study research. According to (Creswell, 2020) case study research (case study) is research on a "unified system." Through this type of case study research, researchers

will collect data on the management of science practicums which include practicum planning, practicum implementation, and practicum assessment. From this data, the meaning of the management profile of science practicum at the junior high school level will be obtained. Data collection was carried out by means of documentation studies, observations, interviews and questionnaires. Sources of data in this study were science teachers and representatives of 1 (one) class VIII and IX students who came from schools in outside urban areas as many as 3 schools, namely Mataram 11 Public Middle School, Mataram 17 Public Middle School, and Mataram 21 Middle School.

To measure the level of achievement of science practicum management using the Formula 1.

$$P = \frac{S}{N} \times 100 \% \quad (1)$$

Information :

P = Percent figure

S = Total Score obtained

N = Total Highest Score (Sugiyono, 2016)

The percentage results are converted into categories with the meaning of percentages referring to Table 1.

Table 1. Assessment criteria

Percentage Intervals	Criteria
85% - 100%	Very good
70% - 84.99%	Good
55% - 69.99%	Enough
40% - 54.99%	Low
< 39.99%	Very low

(Sugiyono, 2016)

Result and Discussion

Based on the results of documentation studies, observations, interviews and questionnaires, some data related to the planning of science practicums, the implementation of natural science practicums and the assessment of natural science practicums are obtained as follows.

Science Practicum Planning

Processed results of achievement data Indicators from planning a science practicum include: documents prepared by the teacher (A.1) and various science learning activities carried out through practicum (A.2). The results of the study show the following data achievements.

Table 2. Achievements of science practicum planning

School name	Planning Achievement		
	A1	A2	Average
SMPN 11 Mataram	83.33	46.67	65.00
SMPN 17 Mataram	50.00	60.00	55.00
SMPN 21 Mataram	50.00	37.50	43.75
Overall average	61.11	48.06	54.58

Based on Table 2, it can be interpreted that the achievement of science practicum planning in 3 schools varied with an average achievement of 54.58 or in the less category. for the achievement of science practicum planning at SMPN 11 Mataram, it achieved a score of 65 (enough category). The completeness of the documents prepared by the teacher for practicum activities is in the Good category. What has not been done is the list of practicum activity names for 1 semester/year. For the name of the new activity carried out several activity titles, namely 7 practicum titles.

The achievement of the science practicum planning at SMPN 17 Mataram reached a score of 55 (enough category). The completeness of the documents prepared by the teacher for practicum activities is in the low category. The management of practicum activities at SMPN 17 Mataram already has a practicum implementation procedure, a list of names for science practicum tools, and a list of practicum tool users. The school does not yet have a user schedule, a list of practicum activities for one semester or year and does not have a list of chemical names available in the laboratory. Related to science practicum activities that have been carried out during the last 2 years, there were 9 practicum activities.

The achievement of the science practicum planning at SMPN 21 Mataram reached a score of 43.75 (low category). For the completeness of the documents prepared by the teacher for science practicum activities, it only has rules for practicum implementation, laboratory user schedules and a list of names of science practicum tools, besides that they are not available. Regarding science practicum activities carried out in the last two years, there were 6 practicum activities.

Implementation of Science Practicum

Indicators of the implementation of the science practicum include: the availability of practicum reference documents (B1), the cognitive skills provided during the science practicum (B2), the skills observed by the teacher (B3) and the ability to scientific attitude (B4). The results of the study show the following data achievements.

Table 3. Achievements in the implementation of science practicum

School name	Implementation Achievements			
	B1	B2	B3	Average
SMPN 11 Mataram	62.50	100.00	100.00	87.50
SMPN 17 Mataram	62.50	100	71.43	77.98
SMPN 21 Mataram	57.14	66.67	42.86	55.56
Overall average	60.71	88.89	71.43	73.68

Based on Table 3, it can be interpreted that the achievements of the implementation of science practicums in 3 schools varied with an average achievement of 73.43 or in the Good category. for the

achievement of the implementation of the science practicum at SMPN 11 Mataram 87.50 (very good). Documents that become a reference in the process of teacher practicum activities include teaching modules (RPP), Practicum Instruction Books (LKPD), Teacher Books, Student Books. All forms of practicum activities to improve cognitive abilities have been carried out such as knowing the names of tools and materials, understanding the practicum title being carried out, implementing the work steps for each practicum stage, analyzing the results of observations, concluding practicum results and designing practicum activities. Various activities carried out to improve (psychomotor) skills such as observing, identifying objects, asking and answering questions, presenting, transferring solutions from one test tube to another and taking reagents with a dropper pipette have often been carried out.

The achievement of the implementation of the science practicum at SMPN 17 Mataram reached a score of 77.98 (Good). Documents that are used as a reference in the process of teacher practicum activities include teaching modules (RPP), Practicum Manuals (LKPD), Teacher's Books, Student Books and Material on the Internet. All forms of practicum activities to improve cognitive abilities have been carried out as happened at

SMPN 11 Mataram. Various activities carried out to improve skills (psychomotor) such as observing, identifying objects, asking and answering questions, presenting have often been carried out. Things that have not been implemented, such as transferring the solution from one test tube to another test tube and taking the reagent with a dropper pipette.

The achievement of practicum implementation at SMPN 21 Mataram reached a value of 55.56 (enough). The availability of reference documents in the process of teacher practicum activities is almost the same as that available at SMPN 17 Mataram. SMPN 21 Mataram has not utilized the source of reference documents from the internet. For the form of practicum activities to improve cognitive abilities, 4 activities have been carried out and 3 activities have been carried out to improve skills or psychomotor abilities.

Science Practicum Assessment

Indicators of practicum assessment include: type of assessment (C1), aspects of knowledge assessment that have been carried out (C2), aspects of skills assessment (C3) and aspects of attitude assessment that have been carried out (C4). The results of the study show the following data achievements.

Table 4. Achievements of Science Practicum Assessment

School name	Assessment Achievement				
	C1	C2	C.3	C4	Average
SMPN 11 Mataram	100	83.33	81.25	100.00	91.15
SMPN 17 Mataram	100	66.67	43.75	60.00	67.60
SMPN 21 Mataram	100	33.33	43.75	100.00	69.27
Overall average	100	61.11	56.25	86.67	79.38

Based on Table 4, it can be interpreted that the results of the science practicum assessment in 3 schools varied with an average achievement of 79.38 or in the good category.

For the achievement of science practicum planning at SMPN 11 Mataram, it achieved a score of 91.15 (very good). All types of assessments have been carried out. For the assessment of new knowledge leads to 5 aspects (knowing, understanding, applying, analyzing and evaluating). For aspects of the assessment of new skills lead to 7 forms of observing skills, recording each observation, determining what is measured, using tools and materials, knowing the reasons why and how to use tools/materials, explaining experimental results, connecting several observations, suggesting what might happen on conditions that have not been observed, ask questions, read graphs, and discuss the results of activities to determine the tools used. Things that have not been implemented such as determining variables and compiling reports.

The attitude assessment that has been carried out includes assessing curiosity, accepting other people's opinions, being honest in reporting results,

responsibility, mutual respect and cooperation. The achievement of the implementation of the science practicum at SMPN 17 Mataram reached a score of 67.60 (enough). All types of assessments have been carried out. For the assessment of new knowledge leads to 4 aspects (knowing, understanding, applying and analyzing).

For the new skills assessment aspect it leads to 7 forms of observing skills, recording every observation, determining what is being measured, using tools and materials, knowing the reasons why and how to use tools/materials, and explaining the results of the experiment. Things that have not been done such as connecting several observations, suggesting what might happen in conditions that have not been observed, asking questions, determining the tools used, determining variables, drawing empirical data from experimental results, compiling reports, reading graphs, and discussing activity results. The attitude assessment that has been carried out includes assessing the attitude of curiosity, accepting other people's opinions, being honest in reporting results. Other attitudes have not been done.

The achievement of the implementation of the science practicum at SMPN 21 Mataram reached a score of 69.27 (enough). All types of assessments have been carried out. For the assessment of new knowledge leads to 2 aspects (knowing and understanding). For aspects of the assessment of new skills, it leads to 7 forms of observing skills, recording each observation, determining the tools/materials used, using tools and materials, compiling reports, explaining the results of experiments and discussing the results of activities. Most of the things that have not been implemented are the same as what happened at SMPN 17 Mataram.

The attitude assessment that has been carried out includes assessing the attitude of curiosity, accepting other people's opinions, being honest in reporting results, responsibility and mutual respect. As a whole, it shows that the management of science practicum activities for SMP throughout the city of Mataram has been carried out well. Some indicators that fall into the less category need attention from the school.

The results of interviews with science teachers at SMPN 11 Mataram, currently the role of the science laboratory is functioning as a class. All practicum equipment is placed in the tool cabinet at the back and side of the room. For chemicals, the quantity and type are very limited. For SMPN 17 Mataram, currently the role of the science laboratory is used as a storage room for all work equipment, drum bands, and practicum tools. During the observation at the school, it appeared that the role of the laboratory was used as a storage room for all school facilities, this was because the school was carrying out a renovation for library facilities, and several classes. In the practicum tool room, they are arranged in a makeshift manner and stored in chemical tool cardboard boxes. For SMPN 21 Mataram, currently the role of the science laboratory is used as a multi-purpose room. Occasionally it functions as a classroom, sometimes as a meeting room for activities and even during observation it is used as a national assessment exam room. Tools and chemicals are kept neatly in the storage room for tools and materials. The three schools explained the same thing regarding the practical implementation techniques by bringing tools and chemicals into the classroom to carry out science practicums.

The role of the science laboratory needs to be returned to its origins. The management of SMP Science practicum activities needs to be improved. Apart from preparing and properly organizing the laboratory, what is more important is making science practicum activities simpler and more interesting and even producing products. To meet these objectives, it is necessary to develop a science practicum model that is more in line with the facilities and infrastructure and management of the science practicum as described in the previous discussion.

Conclusion

Based on the discussion of preliminary research studies related to the management of junior high school science practicum activities, it can be concluded that the management of junior high school natural science practicum activities in the city of Mataram is quite good. The school is quite good at planning, implementing and evaluating science practicums in junior high schools.

Acknowledgements

On this occasion, allow us to thank the promoter and co-promoter for their guidance and direction on this research. All the extended family of SMPN 11, 17 and 21 Mataram who have contributed allow me to provide supporting data from this research. The author would like to thank the Directorate General of Higher Education, Research and Technology through the Directorate of Research, Technology and Community Service (DRTPM) for funding this research. The authors also thank the school for facilitating this research.

Author Contributions

Bakhtiar Ardiansyah and Agus Ramdani, preparation of the original text, results, discussion, methodology, Aliefman Hakim and Muh. Makhrus conclusions; did analysis, M. Yustiqvar proofreading, reviewing and editing.

Funding

SMPN 11, 17 and 21 Mataram funded this research.

Conflicts of Interest

We have no conflict of interest.

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