Proceeding of Integrative Science Education Seminar Vol. 4, 2024, pp. 357 - 362

Available online at

PISCES

Proceeding of Integrative Science Education Seminar

Journal homepage : https://prosiding.iainponorogo.ac.id/index.php/pisces

Article

Efforts to Optimize Laboratory Work Safety in One of The Junior High Schools in Ngawi Regency

Sri Wahyuni[1*], Salsa Bela Yulieta Puja Kusuma[2]

[1,2]Institut Agama Islam Negeri Ponorogo, Indonesia

**Corresponding Address: wahyuniis2021@gmail.com*

Article Info

4th AVES
Annual Virtual Conference of Education and Science 2024

Keywords:

Job safety;
Junior high school;
Laboratory.

ABSTRACT

Laboratory safety and security management is the responsibility of managers and users, so it is necessary to understand the knowledge of laboratory safety and security that is carried out periodically so that awareness of hazard risks can be optimized. This study aims to determine: the implementation of occupational safety in the laboratory, occupational safety standards in the laboratory, the completeness of facilities and infrastructure that support occupational safety in the junior high school science laboratory. This study uses a qualitative descriptive approach method, namely by digging data from the object being studied. Primary data collection was obtained through interviews and observations. Meanwhile, secondary data was obtained through documentation. The results of observation of the implementation of occupational safety in the laboratory show that the efforts made are in the form of prevention efforts from the implementation system, design and layout of the laboratory as well as efforts to handle accidents and optimize through evaluation. Based on data analysis on efforts to optimize the implementation of laboratory work safety at one of the Ngawi Regency Junior High Schools, it does not meet government work safety standards, but improvements have been made so that they can meet these standards.

© 2024 Sri Wahyuni[1]*, Salsa Bela Yulieta Puja Kusuma[2]

INTRODUCTION

According to PERMENPAN No. 3 of 2010, a laboratory is an academic support unit in an educational institution that can be in the form of a closed or open room, permanent or temporary, and is managed systematically to carry out testing, calibration and production activities on a limited scale, using equipment and materials based on certain scientific methods aimed at the implementation of education, research, as well as community service (Oktariani et al., 2022). The laboratory in its role as a place to try, see and evaluate the scientific theories studied as an effort to increase students' knowledge about science learning so that more in-depth and meaningful knowledge is obtained, making the laboratory the heart of science learning activities (Rahmantiyoko et al., 2019). Learning carried out in the laboratory in the form of practicum requires caution and can be at risk of causing an accident so efforts are needed to implement work safety in the laboratory.

Copyright © 2024 Sri Wahyuni, et al, p-ISSN 2808-5337 e-ISSN 2808-5345

Occupational safety and health (K3) is the basis and introduction to occupational safety and health (Rejeki, 2016). Knowledge about occupational safety in the laboratory is important to know in order to strive for optimal safety in learning activities in the laboratory. Occupational safety is an absolute thing because of the risks that can be posed by activities in the laboratory such as experiments, practicums and so on. Occupational safety can include aspects of laboratory design and layout as well as aspects of occupational safety in individual laboratory users (Hall, 2014). The completeness of infrastructure facilities that support occupational safety needs to be studied in an effort to optimize occupational safety in the laboratory. Because of the urgency of occupational safety, it is necessary to study the completeness of laboratory occupational safety supporting equipment, a study on the planning system and implementation of laboratory occupational safety, a study on the evaluation of shortcomings in the implementation of occupational safety in laboratories that have been carried out (Syakbania & Wahyuningsih, 2017) The research on laboratory occupational safety that we conducted is relevant to the research conducted previously by Adhitya Chandra Permana in "Understanding and Awareness of Occupational Safety in Science Laboratories for Junior High School Students" (Chandra Permana, 2022), Agus Rahmantiyoko in "Laboratory Occupational Safety and Security" (Rahmantiyoko et al., 2019), Dwi Cahyaningrum in "Occupational Safety and Health Programs in Educational Laboratories" and so on who researches and discusses similar topics, namely conducting research in order to optimize occupational safety in the laboratory, minimize the occurrence of occupational safety and control potential hazards and accidents that may occur through the preparation and implementation of occupational safety programs in educational laboratories (Sangi & Tanauma, 2018).

The formulation of the problem is presented to explain the objectives contained in the research and does not deviate from the objectives that have been described previously. Therefore, the formulation of this problem is "How is the implementation of laboratory work safety in one of the junior high schools in Ngawi Regency?", "What are the standards for laboratory work safety in one of the junior high schools in Ngawi Regency?", "How is the completeness of the facilities and infrastructure to support work safety in the laboratory in one of the junior high schools in Ngawi Regency?"

METHODS

The research was conducted on May 17, 2023 at one of the junior high schools in Ngawi Regency. The research was conducted using a qualitative research approach method. Qualitative research is the process of extracting as much data as possible from the object being studied to understand events and phenomena regarding all things, objects and research subjects with descriptive methods in the form of words and language that are natural with various scientific methods. The object of the research was the science laboratory in one of the junior high schools in Ngawi Regency, while the observation subjects from the interviews conducted with the laboratory coordinators were Mrs. Erwin and Mrs. Wulan as science teachers. The techniques used to obtain data are interviews, observations, surveys, documentation and comparative literature. The data collection instrument uses a checklist of completeness of occupational safety standards and a list of interview questions regarding infrastructure, standards, and efforts to implement the implementation of occupational safety in the laboratory. Data analysis according to Miles and Huberman.

RESULTS AND DISCUSSION

The laboratory as a place for research, investigation, experiment, practicum, proof of theory and other educational processes. The laboratory allows accidents to occur so that efforts are needed to achieve work safety in the laboratory. Every school or educational institution

must have its own system or rules in striving for this work safety.(Adnyani et al., 2019). Likewise, one of the junior high schools in Ngawi Regency has its own system in efforts to implement work safety in the laboratory.

Preventive Efforts to Implement Work Safety in the Laboratory

Laboratory users are encouraged to wear personal protective equipment, students and teachers when conducting dangerous practicums are required to wear gloves and masks. However, the implementation of practicums in this junior high school has not used complete personal protective equipment.The interview results showed that students' understanding of the importance of using PPE was still lacking. Mrs. Wulan, one of the science teachers stated that *"Many students tend to underestimate the use of gloves, even though we often work with chemicals that can damage the skin."* This is in line with research conducted by (cahyaningrum, 2019) which shows that low knowledge of the properties of chemicals can cause work accidents. In addition, based on the results of observations, it was found that the availability of PPE in the laboratory is still limited.

Before the implementation of the practicum, socialization is carried out regarding work safety in the laboratory which includes the activities to be carried out, things that may or may not be done, objects/tools/materials that require caution or special treatment and the properties of the tools/materials used in the practicum. In implementing the practicum activities, the teacher always reminds and guides students regarding work safety, regarding caution in carrying out practicums, the characteristics of tools and materials, and things that need to be considered and are risky. Knowledge regarding the characteristics of tools/materials is very important to be able to form a careful attitude in students and students can also recognize them well so that they can preventwork accidents. This is in accordance with the research results of Cahyaningrum et al., namely that the lack of knowledge about the physical and chemical properties of materials used in chemical laboratories can affect occupational safety and health in the laboratory (Cahyaningrum et al., 2019).

The design and layout of the laboratory in one of the junior high schools in Ngawi Regency has 5-10% ventilation, a distance between students of 3.2 m^2, a preparation room for each student of 0.5 m^2, a table height of 80 cm for the experiment table and a height of 90 cm for the preparation table, a two-leaf door, an emergency door, a square-shaped room with a total area of 103 m^2, the main room is larger than the storage room and preparation room, the demonstration table is as high as the practitioner's table, has its own electrical system, an adequate lighting system, close to irrigation, the floor of the room is flat and not slippery, has a waste channel and the laboratory is not built near a water source. Regulation of the Minister of Education no. 24/2007, 28.06.2007, the area of the research laboratory is 2.4 m^2 per student, including storage and production space of 18 m^2. The width of the laboratory space is at least 5 m, sufficient lighting for reading books and observing test subjects. Must have clean water and electricity and equipment such as tables, chairs, cabinets, sinks, etc.This makes the science lab of one of the junior high schools in Ngawi Regency, some of its components are not yet in accordance with the standards. The results of an interview with one of the science teachers stated that *"although efforts have been made to improve work safety, there are still several obstacles, such as lack of student awareness, limited facilities, and difficulty in supervision are the main factors. To overcome this, a more interesting and interactive approach is needed, such as the use of educational videos. In addition, it is important to actively involve students in efforts to improve work safety, for example by forming a safety working group."*

There are fire extinguishers, CCTV surveillance systems, laboratory rules boards, and sinks near the laboratory exit. The use of APAR in this case is in line with the results of Cahyaningrum's research thatThe fire extinguisher that must be available in the laboratory is the dry chemical powder type, because of the potential dangers of electricity and flammable chemicals. PLP must understand and be able to use fire extinguishers to control the potential

dangers of fire in the laboratory. Therefore, it is necessary to conduct training and simulation of the use of light fire extinguishers (Cahyaningrum, 2020). This junior high school laboratory does not yet have lockers for students' belongings, but during the practicum, students' belongings are placed in the classroom to make them safer. The laboratory also does not yet have a fire alarm, does not yet have a special acid cabinet and blower for storing concentrated liquids (both base and acid), even though the acid cabinet is quite important in the laboratory. This is in line with research conducted by(Nor Litasari et al., 2014) Fume cupboards are useful for storing highly acidic and gas-containing materials. In this case, the right solution is to equip them with lots of windows and ventilation so that air can be minimized.(Nor Litasari et al., 2014).The storage of hazardous raw materials is placed on a special shelf in the preparation room with a certain classification system, but in the storage of hazardous materials/compounds, neither a fume cupboard nor a blower is used. The storage of certain sharp tools that can endanger students is placed on a special shelf in the preparation room with a certain classification system. This is not in line with the results of Isnainy's research conducted in the chemistry laboratory of Senior High Schools (SMU) which resulted in the fact that in carrying out inventory and storage of chemicals, they should be grouped into solid materials, liquid materials, strong acids and others. Inventory activities should be accompanied by data on each chemical stock and its control card (Isnainy et al., 2014).

Accident Handling Efforts

Accidents may occur in laboratory practicums, accidents can occur due to students' lack of caution in using tools and materials when doing practicums. If an accident occurs, it will be handled in the UKS because the first aid facilities and equipment are in the UKS and are not available in the laboratory. It would be better if there was still a first aid box available in the laboratory because it would minimize the time for handling accidents, if it takes too long, more serious things will happen and become a serious accident.(Cahyaningrum, 2020). While the accident is quite serious and cannot be handled by the UKS, it will be referred to the local health center. The school has made an official agreement with the MoU with the local health facility. The school also has a local health facility number and important numbers to deal with any work accidents in the laboratory. Cooperation between the school and health institutions is something that deserves more attention. Therefore, the government provides health services in the form of health centers, one of the goals of which is to provide cooperation to educational institutions in order to realize effective student safety.

The results of the interview with Mrs. Wulan as a science teacher, stated that *"accident handling in the laboratory still needs to be improved. Limited first aid facilities, lack of clear procedures, and lack of training are the main obstacles. To overcome this, it is necessary to provide a complete first aid box in each laboratory, prepare clear and easy-to-understand accident handling procedures, and conduct regular training for teachers and students. In addition, it is important to build good communication between all parties so that accident handling can be carried out quickly and accurately."*

Accidents that result in damaged goods, then the goods and tools will be stored separately to avoid accidents and as evidence of data collection later. The damaged tools/goods cannot be repaired independently because the school does not have special tools to repair damaged tools/goods independently. According to the SOP for the maintenance of laboratory goods, in order to minimize the occurrence of work accidents, laboratory goods must be arranged according to their characteristics. For example, goods made of glass are grouped with glass and must be on top of other goods. In the process of maintaining goods, periodic checks must be carried out at least once a month. This aims to maintain the quality of the goods and to find out which goods are at risk of damage or have been damaged. Meanwhile, damaged goods can be placed in a different place to be stored and exchanged for new goods.

Improvement Efforts Through Evaluation

Evaluation needs to be done to improve the implementation of occupational safety in the laboratory in the future. Evaluation is done after the implementation of the practicum if there is still time by the teacher giving questions or input to students related to the practicum that has been carried out.

The results of the interview with Mrs. Wulan as a science teacher, showed that *"The evaluation process still needs to be improved. Time constraints, lack of student involvement, and difficulty in measuring effectiveness are some of the obstacles. To overcome this, sufficient time needs to be allocated to conduct evaluations after each practicum. Students need to be actively involved in the evaluation process through various means, such as filling out questionnaires or participating in group discussions. In addition, clear indicators need to be developed to measure the effectiveness of the efforts that have been made. Input from students and evaluation results need to be followed up consistently to ensure continuous improvement"*. This is in line with Idrus' opinion which states that evaluation activities are a process carried out systematically in an effort to determine the value of something based on certain criteria through assessment activities. By holding evaluation activities, it can help in knowing the achievements of success that have been achieved in practical activities (M, 2019).

Every time a laboratory practicum is conducted, it will be recorded in a journal. The importance of journaling is because a journal is an archive of the practicum and can be used as a benchmark for practicum practitioners to better carry out practicums in the future. The principal also continuously supervises and reviews the laboratory, and plans improvements to deficiencies in the laboratory. So even though the laboratory does not yet comply with government safety standards, improvements are still being made to meet government regulatory standards. The improvement plan includes facilities and infrastructure, regulations and so on. One way to optimize the implementation of work safety in the laboratory is to create a separate program and always remind students about work safety in the laboratory.

CONCLUSION

Implementation of laboratory work safety inone of the junior high schools in Ngawi Regencyis quite good, but does not meet the standards and is not complete according to the government's laboratory safety recommendations such as the use of incomplete PPE, lack of safety equipment such as fume hoods and blowers, and lack of clear procedures are some of the main obstacles. Nevertheless, the school has shown a commitment to improving work safety by conducting socialization and providing some safety equipment. To improve work safety more optimally, it is recommended to make several improvements, such as increasing student awareness through interesting educational programs, completing laboratory facilities, preparing clear and measurable procedures, and involving all parties in the periodic evaluation process.

REFERENCES

Adnyani, I. S., Md Seniari, N., Supriyatna, Natsir, A., Nababan, S., & Ratnasari, D. (2019). KESELAMATAN DAN KESEHATAN KERJA (K3) LABORATORIUM SISWA SMPN 7 MATARAM. *Prosiding PEPADU*, *1*(1), 170–174.

Cahyaningrum, D. (2020). Program Keselamatan dan Kesehatan Kerja Di Laboratorium Pendidikan. *Jurnal Pengelolaan Laboratorium Pendidikan*, *2*(1), 35–40. https://doi.org/10.14710/jplp.2.1.35-40

Cahyaningrum, D., Tegar Muktiana Sari, H., & Iswandari, D. (2019). Faktor-Faktor yang Berhubungan dengan Kejadian Kecelakaan Kerja di Laboratorium Pendidikan. *Jurnal Pengelolaan Laboratorium Pendidikan*, *1*(2), 41–47. https://doi.org/10.14710/jplp.1.2.41-47

Chandra Permana, A. (2022). Pemahaman dan Kesadaran Keselamatan Kerja Laboratorium IPA Siswa SMP. *Jurnal Pendidikan Modern*, *7*(3), 87–96. https://doi.org/10.37471/jpm.v7i3.461

Hall, G. and. (2014). *Buku Ajar Fisiologi Kedokteran.*

Isnainy, H., Hasyim, H., & Sitorus, R. J. (2014). Implementation of Occupational Safety and Health At Laboratory Chemistry of Matemathics and Natural Sciences Faculty of Sriwijaya University 2009. *Jurnal Ilmu Kesehatan Masyarakat*, *5*(01), 19–24.

L, I. (2019). EVALUASI DALAM PROSES PEMBELAJARAN Idrus L 1. *Evaluasi Dalam Proses Pembelajaran*, *9*(2), 920–935.

Nor Litasari, K., Setiati, N., & Herlina, L. (2014). Profil Pembelajaran Biologi Berbasis Laboratorium dan Implikasinya terhadap Hasil Belajar Siswa di SMA Negeri Se-Kabupaten Semarang. *Unnes Journal of Biology Education*, *3*(2), 172–179. http://journal.unnes.ac.id/sju/index.php/ujbe

Oktariani, O., Febliza, A., Sari, Y., & Fauziah, N. (2022). Pengetahuan Keselamatan Kerja Mahasiswa Calon Guru di Laboratorium. *Edukatif : Jurnal Ilmu Pendidikan*, *4*(4), 5988–5994. https://doi.org/10.31004/edukatif.v4i4.2971

Rahmantiyoko, A., Sunarmi, S., Kurnia Rahmah, F., Sopet, & Slamet. (2019). Keselamatan dan Keamanan Kerja Laboratorium. *IPTEK Journal of Proceedings Series*, *4*, 36–38.

Rejeki, S. (2016). Kesehatan dan Keselamatann Kerja. In *Modul Bahan Ajar Cetak Farmasi* (Vol. 1, Issue 1). http://scioteca.caf.com/bitstream/handle/123456789/1091/RED2017-Eng8ene.pdf?sequence=12&isAllowed=y%0Ahttp://dx.doi.org/10.1016/j.regsciurbeco.2008.06.005%0Ahttps://www.researchgate.net/publication/305320484_SISTEM_PEMBETUNGAN_TERPUSAT_STRATEGI_MELESTARI

Sangi, M. S., & Tanauma, A. (2018). Keselamatan Dan Keamanan Laboratorium IPA. *Jurnal MIPA*, *7*(1), 20. https://doi.org/10.35799/jm.7.1.2018.18958

Syakbania, D. N., & Wahyuningsih, A. S. (2017). PROGRAM KESELAMATAN DAN KESEHATAN KERJA DI LABORATORIUM KIMIA. *HIGEA*, *1*(2), 49–57. https://doi.org/10.2174/9789815051186122010009