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Administration of High Schol Chemistry Laboratory to Facilitate the Implementation of Practicum

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***Abstract*—This study aims to determine the administration of chemical laboratories in high school the SMA Teladan Cinta Damai Medan. Data collection techniques were interviews with school principals, vice principals, head of laboratories, chemistry study teachers and direct observation into the chemistry laboratory. Based on the results of laboratory administration analysis in high school the SMA Teladan Cinta Damai Medan, there is no complete data on laboratory room data, item cards, list of items, list of proposals and requests for tools, tool cards, tool lists, material cards, list of materials, labor data, laboratory activities agenda . Tables and chairs made of plywood and wood absorb residual chemicals from the practicum, causing itching in some students practicing. Fire extinguishers are available, but not regularly checked. The first aid kit is available but there is no periodic check on the first aid kit so that a partial vacuum occurs.**

Keywords: administration, laboratory equipment, chemicals

I. INTRODUCTION

The characteristics of science education are characterized by the processes experienced by students in the laboratory to gain knowledge. Important factors in science education are learning science (gaining conceptual and theoretical knowledge), learning about science and doing science (engaging in and developing expertise in scientific inquiry and problem solving).

In essence, science education is an activity to develop students' creativity and scientific thinking abilities. Science education must be taught through scientific processes so that students can actualize their potential abilities so that facilities and infrastructure are needed to develop science process skills, namely laboratories and their equipment. In science education, a laboratory is a place for teaching and learning with activities that involve the interaction of equipment and materials to gain direct understanding and experience in learning the secrets of nature. Working in a laboratory is a large part of a science program and enhances student curiosity, appreciating student creativity [1].

In the 2013 curriculum the learning process uses a scientific approach (scientific), through scientific approaches students are able to understand and apply their knowledge. Practicum is one approach to scientific learning [2]. Practicum can visualize abstract things become real so students understand the concept [3]. The laboratory creates science education goals including increasing students' understanding of science concepts, their application in scientific skills, problem solving, scientific thinking [4]. With a laboratory, understanding how science and scientists can work, giving interest and motivation to students in learning science [5].

Recording activities are administrative processes that enable the acquisition of laboratory inventory data. Laboratory inventory is useful for getting information quickly and precisely about the state of the laboratory, planning and development if there are additional tools can be determined priorities and prevent duplication, prevent loss or misuse of tools and materials, foster laboratory activities better and orderly. For this reason, an understanding of laboratory management is very important to be owned by parties related to the laboratory, both directly and indirectly.

Good laboratory management is an important component of laboratories for practicum implementation [. Safety supervision in practicum activities to ensure consistent maintenance of high professional standards and expect laboratory staff to be held accountable in practice in a safe laboratory. The head of the laboratory is specifically tasked with supervising research that involves chemical hazards and helps strengthen laboratory safety and brings more tighter supervision [6]. All aspects of laboratory work must be monitored with the aim of achieving the highest quality of performance. This implies that a quality assurance program must be established, including internal quality control, participation in external quality assessments and a series of monitoring schemes specifically designed to other aspects of laboratory work, including materials used .

Improper management and inappropriate use of chemicals can pose a threat to human well-being. Poor record keeping and poor inventory management and no proper steps for disposing of expired chemicals. This shortage can endanger the environment, laboratory safety. Chemical containers are not labeled or have faded labels and incompatible chemicals are stored together thereby increasing the risk of accidents in the laboratory [7].

Laboratory classification consists of primary, secondary and specialist with laboratory functions for diagnosis, management, screening, education and research and development . The high school laboratory is categorized as type I, namely the laboratory that organizes education and

training with equipment of category I dam II and the materials managed are general [8].

In general, laboratories in senior high schools are in good and complete categories [9]. In carrying out the practicum in addition to complete tools and materials, laboratory administration is very necessary. Laboratory administration can facilitate the implementation of practicum, so this study analyzes the administration of chemical laboratories in High School SMA Teladan Cinta Damai Medan.

II. Research Methods

This research is a descriptive qualitative research. The subjects in this study were the principal, deputy headmaster, head of the laboratory as well as science laboratory of SMA Teladan Cinta Damai Medan.

III. Results And Discussion

Laboratory administration is a process of recording or inventorying laboratory facilities and activities so that all laboratory facilities and activities can be systematically organized. Based on the results of observations that have been made at the chemistry laboratory of SMA Teladan Cinta Damai Medan, the results of observations and preparation of laboratory administration. The Science Laboratory in SMA Teladan Cinta Damai Medan consists of two rooms, a biology laboratory and a chemical/physics laboratory. In the SMA Teladan Cinta Damai Medan chemistry laboratory is still simple so what is discussed in format A, B1, B2, B4, C1, C2, D1, D2, E, F.

Fig. 1. Incorrect tool storage

Format A (laboratory room data). Laboratory area: 120 m2 with a capacity of 40 people, which should have a laboratory area of 150 m2. Chemistry and physics laboratories have not been separated. Chemistry and physics laboratories should be separate because generally physics laboratory equipment must be in a dry place and most physics tools are made of iron. While chemicals are generally solid and liquid substances and chemical practicum generally uses liquid substances both in cleaning tools and materials used so that it is corrosive to tools made of iron.

Format B1 (item card) with the name of the item, brand, size, factory, item code, date, state of entry, exit, inventory. The use of the B1 format does not yet exist so that goods enter or exit even inventory goods can not be known.

Format B2 (list of items) concerning the code number, item name, specifications (brand, size, factory), number of good and damaged goods. This format does not yet exist so the chemistry teacher must check the number of items needed for the practicum to be carried out and check the condition of the goods in good condition or damaged.

Format B3 (list of goods receipts and expenditures). This format does not exist so the number of items received and exited cannot be known.

Format B4 (list of proposals and requests for goods). The list of proposals and requests for goods is not made in B4 format but only typed in the name of the goods and then submitted to the foundation for the purchase of practical tools.

Format C1 (tool card) shows the tool name, brand, size, manufacturer and tool code. This laboratory has not used the tool card format so that students who practicum have difficulty in retrieving tools that will be used in practicum implementation.

Format C2 (list of tools) listed the name of the device, size, specifications, components, number of tools, whether the equipment is good or damaged. Exemplary high school chemistry laboratories have equipment records but they do not follow the C2 format and practicum tools are not all recorded. Teachers also have to check the tools if practicing.

Fig. 2. Poor chemical storage

Format D1 (material card) contains the card number, substance class, parent number and the specimen contains the name of the substance, chemical formula, relative atomic mass, purity, concentration, specific gravity, shape, color, plant, substance code. From the results of observations of the use of the D1 format some substances have specific specifications, especially substances with high concentrations, but some other substances only consist of the name of the substance, concentration while the expiry is not listed. Some solid substances have no label at all so they cannot be used for practical work.

Format D2 (list of ingredients) contains the parent number, code number, material name, chemical formula, technical form, and the amount of material whether it is in good condition or damaged. This laboratory does not use a list of ingredients so the chemistry teacher must check the substances that will be used in the practicum. Some of the liquid substances have been contaminated by other substances due to the carelessness of practicum students. The head of the laboratory does not check the chemicals to see expired substances and does not check the substances in the laboratory periodically.

Format E (employment data) consists of name, position, circumstances (number, staffing class, education). The head of the Natural Sciences laboratory at SMA Teladan Cinta Damai consists of one person who is from a biological education.

Format F: Agenda of laboratory activities consisting of the date of entering the laboratory, the day of the teacher, the name of the teacher, class, hours, the title of the practicum, supplies of equipment and materials. The practicum schedule has already been held, which is once every two weeks, but for physics practicum, biology laboratories are often carried out because chemical laboratories are used. If the laboratory is used in the field of chemistry studies, physics practicums are carried out in biology laboratories so that physics tools are raised to biology laboratories. This can damage the physics practicum tool because the tool is transferred to a biology laboratory and then the practicum must be returned to the chemistry/physics laboratory.

A. Organizational Structure

At SMA Teladan Cina Damai, the laboratory organizational structure consists of the chairman of the foundation as the owner of the foundation, the principal as the person in charge, the head of the chemical laboratory as the laboratory mana.

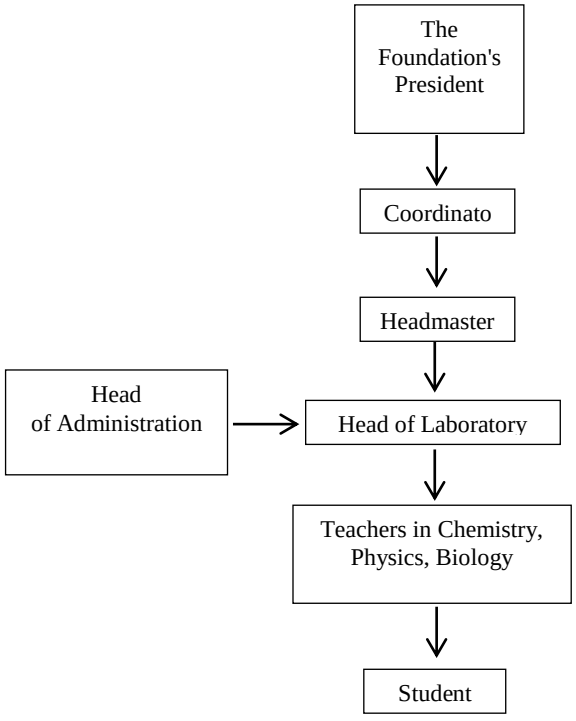

Fig. 3. Organizational structure of chemical laboratories in SMA Teladan Cinta Damai Medan

B. Facilities and Infrastructure

Public facilities available at the SMA Swasta Teladan Cinta Damai laboratory are practicum tables, instructor desks, sinks, chairs, water installations, tool storage cabinets, substance storage cabinets, blackboards, electrical installations, televisions, fans. The table and chairs practicum and instructor are made of wood and plywood so that when practicum if liquid spills on the table immediately absorb before cleaning. This condition is uncomfortable for students who practice because there are students who feel itching or irritation on the skin when they finish practicum. One of the chemical properties is irritation or can cause itching on the skin.

Fig. 4. Practical tables and chairs made of plywood and wood

There are 2 sinks and in good condition, and water is always smooth in the implementation of the practicum. Water is very useful in practical work because water can be used to wash laboratory equipment used.

In the chemistry/physics laboratory there are 2 cabinets, one for chemistry and another for physics. Tool storage cabinets and chemicals are one. This cabinet consists of 3 shelves where the first shelf is for high concentrated substances, the second shelf is for solids and low concentrations of liquid while the third shelf is a storage area and some is placed together with a physics practicum. The tool cabinet and chemicals should be separate to avoid accidents and damage to tools and materials in the laboratory. This laboratory does not yet have its own sewerage system. Chemical laboratories should have sewerage channels to avoid water, air and soil pollution.

1) Laboratory safety

The chemistry laboratory is rather specific because it uses a lot of chemicals with a variety of hazardous properties for students and teachers in the school environment so work safety is required [10]. The potential for hazardous and unsafe chemicals needed by laboratory safety equipment, namely: Eye Protection / Face Patch. Eye protection provides the best protection against chemical splashes, steam, dust and mist. Contact lenses should not be worn during lab work using chemicals (even if wearing glasses). In the event of an accident, chemicals can be behind the contact lens and cause serious damage before the lens can be removed. Eye protection can absorb ultraviolet when working with ultraviolet light. Face shields must be worn on welding, soldering, machining, fire, explosion. Face shields can protect against impact, dust, particles and splashes on the face, eyes and throat.

Based on the results of interviews from chemistry teachers, students who carry out practicum have not used eye or face protection. Based on information from the chemistry teacher, that students have been exposed to vinegar splashes and then taken to a specialist eye doctor for further treatment. Events like this should not have happened, if the blindfold and face were used practicum students.

2) Eye wash equipmen /faucet

Eyes that are exposed to chemical liquids, dust and flying granules, first aid must be washed immediately with eye wash equipment. If the body needs a lot of water (if exposed to chemicals so it needs to be watered), then the laboratory must have an eye wash faucet. This laboratory does not yet have eye wash equipment and faucets. Students who experience chemical splashes in the eyes are washed in the faucet. This is inefficient because the water in the tap is not necessarily clean.

3) Fire extinguishers/fire blankets

The research laboratory is equipped with a variety of emergency equipment which is very valuable in the event of accidental fire or explosion involving dangerous reagents. Equipment that must be available in the laboratory in the event of an emergency is a fire extinguisher. There are four main types of fire extinguishers: A, B, C and D. Class A fire extinguishers use water to extinguish paper and wood-based fires. Class B fire extinguishers use compressed, non-combustible gases such as carbon dioxide to extinguish fires involving combustible material. Class C fire extinguishers shoot highly flammable, non-conductive powder to extinguish electric fires and class D fire extinguishers are used for fires involving combustible metals such as magnesium and sodium. Fire blankets are also used to put out fires. Fire extinguishers in the laboratory must be checked periodically. Periodically check the date of the fire extinguisher to ensure that the extinguisher is full and the extinguisher is working properly.

4) First aid box for accidents (first aid)

First aid must be available in the chemical laboratory for use during accidents and emergencies. First aid kit is equipped with a solution of bethadine, alcohol, cotton, sodium bicarbonate solution, adhesive tape, bandages, and scissors. Check and refill the first aids kit box regularly so that it will be useful in an emergency. In general, this first aids kit is most useful for minor injuries such as a cut finger Results of observations at the chemistry laboratory and interviews with the head of the laboratory that the first aid kit was available but the examination of the first aid kit was not periodic so that a partial vacuum occurred.

5) Safety warning signs

This sign is necessary to avoid accidents and must be obeyed by everyone who carries out activities in the laboratory. In this laboratory safety warning signs already exist.

IV. CONCLUSION

Based on observations at SMA Teladan Cinta Damai Medan it was concluded that the administration of the chemical laboratory does not yet have complete data on laboratory room data, item cards, item lists, tool proposals and requests, tool cards, tool lists, material cards, material lists, labor data , agenda of laboratory activities. Tables and chairs made of plywood and wood absorb residual chemicals from the practicum, causing itching in some students practicing. Chemistry and physics laboratories have not been separated so that the physics tools made of iron undergo corrosion.

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