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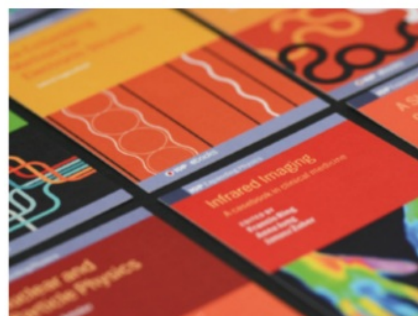
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Analysis of quantity and quality the implementation of high school chemical practicum in Semarang city

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Abstract. This study aims to analyze the quantity and quality of chemical practicum implementation in SMA / MA (Senior High School). The research method is a case study, percentage descriptive and direct observation in the school followed by cause interviews are rarely carried out or even why it is not implemented at all. The results of the study showed that the practicum of chemistry which should be done starting for class X, XI and XII had 25 practical subjects. There are schools that have determined the usual agenda from the beginning, so that they do not reach 25 practicum programs. The practicum program that has been chosen with consideration can be carried out, and even then only a part of it is implemented. As in SMA A, there have been 22 practicum programs analyzed, in fact only 8 were done, 3 were sometimes done and 11 were never done. Factors that do not implement the practicum are: 1. Less time in implementation, 2. The teacher's task is too much, 3. Chemicals and materials are expensive. The teacher wants: tools and materials provided neatly. Laboratory staff and technician / laboratory staff should be available, so as to assist teachers in guiding students. The results of this study will be very useful for the long term in overcoming problems not optimal implementation of high school chemistry labs. The practicum program that can always be done, the quality must also be analyzed.

1. Introduction

The implementation of the 2013 curriculum in Indonesia has been carefully prepared, and always improved. Chemical practicum instructions have been included in the chemistry textbook for students, even examples of learning implementation plans or videos are also available. Interviews with students who have practiced field experience in chemistry education during 2013 to 2018, said that there were not more than 50% of the available practicum courses. The experience of high school (8 people) that were undergoing peer teaching in preparation for practiced field experience stated that while sitting in grade 10 only did one trial, there was two trials in grade 11 and there was only one experiment in grade 12. The experience of students who have undergone practiced field experience from year to year on average is as mentioned above. Students state that they remember the number of times practiced during grade 10, 11 and 12 (just quantity). There are students who remember any practice, but some only remember a small portion of what is practiced. Recognition of those who are remembered, it only occurred at this time, that the purpose of the implementation of the practicum at that time was not understood, only listening to the practical instructions carried out. Recognition, the story of the students shows that it is very important to conduct research on the quantity and quality of the implementation of chemical practicum in senior high school today.

Problems that arise related to the inability of practicum in accordance with core competencies, must be followed up immediately. Students can use it as a real problem that can bring up ideas to solve



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it and be appointed as a final thesis. Each student is sufficient to solve the problem of a title of the practicum program which is very important, but the teacher in the school has never implemented it.

Practical subjects that should be implemented, but not implemented are the responsibility of the teacher. Chemistry teachers should try in such a way as to replace the practicum program with other activities, for example to save materials and tools, then do demonstrations in class. The main principle is curriculum development and all subjects must contribute to students' attitudes, skills and knowledge [1]. Practical activities in chemistry learning are very important and indeed a necessity. Creative teachers, in anticipation of the lack of time for preparation, also anticipate the lack of tools and materials, innovative learning models are used so that competency outcomes remain fulfilled. Project-based learning model, and problem-based learning are real examples of good learning models and need to be considered. The learning model that has been chosen must be carried out seriously, so that the original goal can be achieved. Steps for problem-based learning, including: (1) Detecting, recognizing, and understanding; (2) Predict (3) Consider; (4) spark ideas and (5) be able to detail in detail, in solving problems, maybe in it must make tables, graphs, images, models and or expressions [2,3].

Chemical learning is not the optimal result, if not accompanied by practical activities. Practical skills, laboratory skills including science process skills, through practical activities students conduct a scientific investigation [4]. Students can obtain knowledge through practical activities [5]. The following are the benefits of practical activities in the laboratory [6]. Expected development of abilities and skills includes three groups, namely cognitive abilities including using problem solving thinking methods, practical skills related to the environment and skills used in other aspects including communication skills.

In practicum there is a scientific method which includes several stages namely starting from problems, formulating problems, submitting hypotheses, designing research strategies, compiling research instruments, collecting data, analyzing data, and drawing conclusions [7]. In carrying out scientific methods students are bound by several processes such as observing, comparing, and hypothesizing [8]. Practicum implementation must be accompanied by student worksheets for practical purposes that can help students understand the material. Through the worksheet, students can express the ideas they have obtained from their observations in the laboratory.

Early research is very important, the results can be used to be considered in making a chemistry lesson curriculum. The research conducted was a case study with the aim of knowing: 1) knowing what percentage of the practicum program was carried out; 2) knowing what percentage of the practicum program is sometimes done sometimes not; 3) knowing what percentage of the practicum program has never been implemented; 4) knowing the causes of the implementation of the practicum agenda; 5) knowing the wishes of the teacher in the implementation of the chemical lab so that the benefits. 6) knowing the wishes of students in the implementation of chemical labs so that benefits.

The benefits of the research carried out are training prospective chemistry students to raise awareness of problems in the field regarding problems in chemistry education, caring for the environment and curiosity of students, must be trained and familiarized including integrating conservation characters in each lecture. The implementation of lectures with various models, approaches, methods and strategies for prospective teachers The contribution of research to the development of science and technology, is as a step to create a new policy in solving problems related to the implementation of practicums that have been prepared.

The discovery of practicum what needs to be revised in the instructions, or replace with natural materials around us, the use of simple tools is an example and opportunity in institutional development. High school who experience obstacles can be interviewed or given a questionnaire that reveals the obstacles and or reasons why the lab is not implemented. Teachers, students, principals and others are very potential as data sources.

2. Methods

This research is a case study, which requires qualitative or quantitative data. In detail the methods to be used include several stages, are: (1) analysis of the number of practicum programs provided; (2) analysis of the number of practicum programs provided and carried out; (3) analysis of the number of

practicum programs provided, but not implemented; (4) analysis of the factors causing the implementation of the practicum agenda; (5) analysis of Teacher's wishes in the implementation of chemical labs so that benefits; (6) analysis of the wishes of students in the implementation of chemical labs so that benefits.

This research was conducted in three senior high schools in the Semarang City Central Java Indonesia. This study measures the quantity and quality of chemistry practicum in high school. The research model used is blended research or mixed research, in this case applied quantitative and qualitative research. The study begins with the initial observation of the availability of chemical books compiled according to curriculum. The advice from chemistry teachers about books to be analysed. Starting from three books, studied and can be grouped in each class and each semester, what chemistry learning material in each book and practicum program is expected to be carried out in each of these materials. The study continued with observations in senior high school capture the titles of chemical practicum, which were prepared to be carried out, both in grade 10, 11 and 12.

Analysis of information, based on the subject matter that must be practiced, is related to the conditions in the field and will be assisted by students who are implementing practiced field experience in various senior high schools in various regions. Interpretation and conclusion of research conclusions based on the results of information analysis and discussion with the research team, so that conclusions can be drawn. Data analysis in this study was conducted simultaneously between quantitative and qualitative data. The rationale of this data analysis design is the lack of one type of data supplemented by another type of data. Quantitative data provides a way to generalize research results, while qualitative data provides information about contexts and settings. Qualitative analysis is carried out on the results of open observations (field notes) and interviews with teachers, students and students about the implementation of chemical labs so far.

3. Results and Discussion

Chemistry teachers from eight senior high schools was interviewed and indicated that the number of practicum programs to be carried out, it was confirmed, had been adjusted to the conditions, tools and materials available several years ago. The teacher just needs to continue teaching chemistry and carry out the practicum program that have been confirmed earlier that there are available materials and practical tools. The eyes of the chemistry lab program that had been confirmed earlier, it turned out that only a few were carried out. The results of the analysis in school A about practicum implementation can be seen in Table 1.

The material studied was 22 kinds of practical subjects. There are 8 practicum programs that are always carried out, which means that 8 out of 22 materials of the practicum programs that are always carried out. The activity of the chemical lab program are sometimes carried out, namely 3 out of 22 practicum courses. The practicum program that was never done was 11 out of 22.

The eight practicum programs that must be done in senior high school A are already good, because there are certain high schools that do not reach eight times, the students carry out chemistry labs in the laboratory. Chemistry teachers should always check at least before the new school year, about materials, tools can still/ sufficient for future implementation with the number of students available. The chemistry practicum program is sometimes done in senior high school A, there are three out of 22 practicum courses, which include hydrocarbon material, colligative properties and macromolecules. Practicum implementation is not carried out, due to limited time, there is no laboratory that prepares tools and materials, teachers are not always able to prepare themselves. The practicum program that has never been done is 11 out of 22, which includes: The nature of chemistry, quantum numbers, the Periodic System of Elements, Redox, stoichiometry, titration, K_{sp} , chemical elements, alkanes and their derivatives.

The results of interviews and observations in the field, especially in senior high school A, B and C, can be concluded that, constraints about not being implemented, certain practicum agenda, need to be solved together. These obstacles can be solved in various ways, for example: poor of tools and materials can be replaced with demonstrations in class, providing laboratory or laboratory manager to assist in the implementation of the lab [9-11].

Table 1 Results of Quantitative Analysis of Chemistry Practicum in School A

Semester	Materials	Action			Explanation
		Often	Occasion.	Never	
1	The Nature of Chemistry			√	Because more emphasis on material, concepts, the nature of chemistry and only given examples in everyday life
	Quantum Number			√	Because the material is more of a theoretical concept
	Periodic System of Elements			√	Learning activities are only carried out using diagrams in explaining SPU material
	Chemical Bonding			√	Because it only emphasizes the concept of material related to chemical bonds
2	Electrolyte & Non Electrolyte Solutions	√			
	Redox			√	Because more emphasis on the concept
3	Stoichiometry			√	More inclined to practice related calculations
	Hydrocarbons		√		Related to the timing of implementation which is impossible to do sometimes collides with the school agenda so it is more about material explanation of the theory
	Thermo chemistry	√			
	Reaction rate	√			
4	Chemical equilibrium			√	Time and place limitations
	Acid-base	√			H ₂ O ₂ and Ice
	Hydrolysis	√			Limited time Because it emphasizes the concept of K _{sp}
	Buffer	√			
	Titration			√	
5	K _{sp}			√	
	Colloid	√			
	Colligative nature		√		Because it adapts to the school agenda regarding the time of practicum
	Electro-chemistry	√			
6	Chemical Elements			√	More emphasis on memorizing material
	Alkana and its derivatives			√	Tend to the material concepts of alkanes and their derivatives
	Macromolecules		√		Because it adapts to the school agenda regarding the time

According to the curriculum/syllabus, practicum activities should not be reduced, even better added [12-14]. The teacher recommends that the chemistry class for senior high school is not only four times meeting, preferably six times meeting. The expectation of students in the implementation of chemical labs so that benefits is as often as possible, but this desire is not balanced with student readiness. Ready in terms of lab equipment, but in the implementation they do not know the purpose of the practicum program. This can be proven by the treatment of those who only carry out orders in the practicum instructions.

4. Conclusion

As in senior high school A, there have been 22 practicum programs analyzed, in fact only 8 were done, three were sometimes done and 11 were never done. Factors that do not implement the practicum are: (1) less time in implementation; (2) the teacher's task is too much; and (3) chemicals and materials are expensive. The teacher hope that the tools and materials provided neatly. Laboratory staff and technician/ laboratory staff should be available, so as to assist teachers in guiding students. The results of this study will be very useful for the long term in overcoming problems not optimal implementation of senior high school chemistry labs. The practicum program that can always be done, the quality must also be analyzed.

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