

Need Analysis for Basic Chemistry Practice Modules Based on Local Wisdom

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Abstract—One of the most important components needed in the implementation of the practicum is the practicum module so that a proper practicum module is needed to direct the practicum becomes effectively and efficiently. This study aims to analyze the student's needs on local-wisdom-based-chemistry practicum modules as the initial stage of the module development process. The research is a quantitative descriptive study referring to the stage of analysis in ADDIE development model. The research subjects were 48 students who had taken basic chemistry courses in the Chemistry Education Study Program, Universitas Samudra. The data were obtained through filling out the initial observation sheet and questionnaire on the student's needs for the expected practicum module. The results of initial observations indicate that the existing practicum module has not met the needs of 20.8% of students in understanding the practicum material, because the material explanation is incomplete according to 56.3% of students. The results of the needs analysis showed 77.1% of students need additional practicum modules to support learning in the practicum. Meanwhile, 93.8% of students stated that a practicum modules based on local wisdom are needed in basic chemistry practicum.

Keywords—local wisdom, practicum, etho-chemistry

I. INTRODUCTION

Teaching materials are systematically arranged learning resources that contain concepts, facts, both written and unwritten, to assist students in understanding and in applying learning the content [1]. Learning could be done effectively if the teaching materials support the learning activities. For example, the teaching materials in the form of learning module could help students comprehensibly master the subject [2]. On the other side, modules are printed handouts in the form of packages relating to learning materials. By using the module,

students can individually complete their study materials as well as control and recognize their learning identity. In practicum implementation, the practicum module is one of the most important components needed in practicum. A proper practicum module can effectively and efficiently direct the practicum to achieve the objectives of implementing the practicum.

Teaching material module development is a process by which a teacher organizes the developed teaching material to ease the delivery and to build students' understanding of the material. ADDIE model is one of the general learning design models, emerged in the 1990s developed by Reiser and Mollenda. ADDIE model functions as a guide in building effective, dynamic training program tools and infrastructure that support the training performance itself. ADDIE development model has systematic stages so that it fits the characteristics of media development, especially the practicum module [3]. It has 5 stages of development, namely: (1) analysis, (2) design, (3) development, (4) implementation, and (5) evaluation [4]. The stage begins with a needs analysis in order to gather information related to products needed by potential users. Needs analysis is used as a foundation in developing teaching materials [5].

Science learning in Indonesia could not ignore culture contribution nor local wisdom [6]. Indonesia has around 300 ethnic groups with differences in values, beliefs, and practices which are explored in a limited way in the context of chemistry education [7]. Modules can be used as teaching materials that can connect knowledge of science with the local wisdom [8]. This study aims to analyze the student needs on local-wisdom-based-chemistry practicum modules that will be developed.

II. METHODS

The research is a quantitative descriptive study referring to the stage of *analysis* in ADDIE development model. The research was conducted in August 2020, with research subjects that were students having taken basic chemistry courses in the Chemistry Education Study Program of the Faculty of Teacher Training and Education, Universitas Samudra. Samples were taken using purposive sampling technique with a total sample of 48 students.

The data were obtained through filling out the initial observation sheet and questionnaire on the student's needs for the expected practicum module. Initial observation aimed to determine the weaknesses of the practicum module being used by students in basic chemistry lab work. Meanwhile, the needs questionnaire aimed to determine the expected follow-up efforts in the module to be developed. The data obtained in this study were qualitative and quantitative data. Data were analyzed descriptively by systematically compiling data, categorizing data, reducing data, presenting, and drawing conclusions.

III. RESULTS AND DISCUSSION

The student needs of the local-wisdom-based-chemistry practicum module were analyzed from the data obtained from the observation sheets and need questionnaires. The observation was initially filled by research subjects before filling out the need's questionnaire.

A. Initial Observation

The observation obtained data regarding the condition of the module being used by students for basic chemistry practice. The practicum module used contains several topics or materials being practiced, namely: acidimetry-alkalimetry, oxidation reduction reactions, acid-base indicators, filtration and crystallization, diffusion and chromatography, chemical reactions, electrolysis, electroplating, periodic table, reactions of alkali metals and alkaline earth metals, and qualitative analysis of organic compounds. Figure 1 presents the results of observations about the materials in the practicum module perceived to be difficult by the students. Referring to Figure 1, the "qualitative analysis of organic compounds" is the most difficult material to understand by 39.6% of students. Another material that is also difficult to understand is acidimetry-alkalimetry (31.3% of students). Based on these findings, the development of the practicum module will be directed at the preparation of content that makes it easier for students to understand the material for qualitative analysis of organic compounds and acidimetry-alkalimetry. Students find it easier to understand the material if the contents of the material are related directly to the student's daily life [9].

The observation results show that the practicum module has not met the needs of 20.8% of students in understanding the practicum material due to various factors as shown in Figure 2. What causes 56.3% of students to have difficulty in understanding practicum material is the incomplete material in

the practicum module. Other factors with a significant percentage were the lack of images (37.5%), abstractness of material (18.8%) and less attractive modules (12.5%).

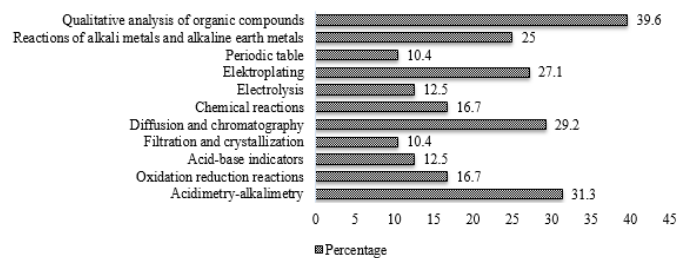


Fig. 1. The difficulty level of the material in the practicum module.

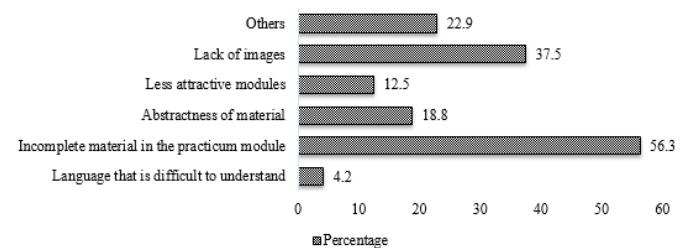


Fig. 2. The factors causing student difficulties in understanding the material in the practicum module.

The criteria of the module expected by students can be seen in Figure 3. It shows that 81.3% of students expect the practicum module which provides detailed explanation of the material. In addition, the practicum module is expected to use a more understandable language (62.5% of students), more applicable and related to everyday life (58.3%), provide visualization for abstract content (16.7%), and local-wisdom-based (12.5%). Language comprehension ability correlates strongly with student achievement on chemistry courses [10]. Students' appropriation of chemistry language was deeply related to how they incorporated scientific culture into their everyday culture [11].

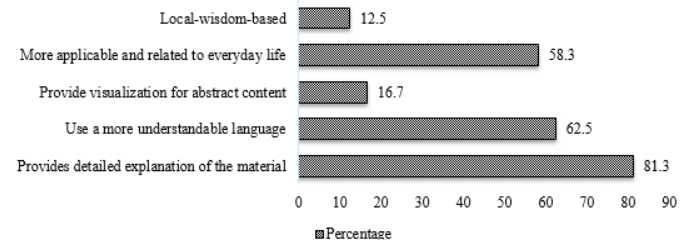


Fig. 3. Criteria for the expected practicum module.

B. Needs Analysis

Figure 4 shows the results of the questionnaire survey. Referring to the figure, 79.2% of students stated that basic chemistry practicum is a practicum with material that is difficult to understand. Meanwhile, 35.4% of students stated that the practicum modules used were not sufficient to understand practicum. As many as 77.1% of students need

additional practicum modules to support learning in the practicum.

As a follow-up to the results of initial observations, a practicum module was developed based on local wisdom or ethnosience. Several studies have shown that the use of science modules based on local wisdom were effective to improve students' scientific literacy, science process skill and scientific attitude [7-8]. In addition, the integrated ethnosience module is effectively used to improve learning outcomes [12]. As many as 87.5% of students stated that they had never used a practicum module based on local wisdom. However, 93.8% of students agree that practicum modules based on local wisdom are needed in basic chemistry practicum.

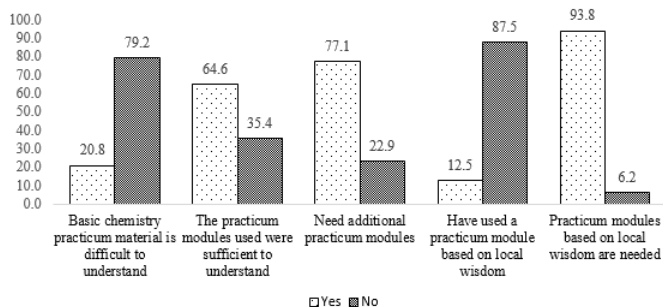


Fig. 4. The results of need analysis questionnaire.

The results of the questionnaire analysis show some additional content expected in the module is shown in Figure 5. The material that is applicable in daily life is the most expected module additional content (72.9% of students). Students have difficulties in relating the chemistry phenomena they learned and the life around them [13]. In addition, the module is also expected to contain additional content in the form of images (68.8%), visualization of abstract material (18.8%), and others (31.3%).

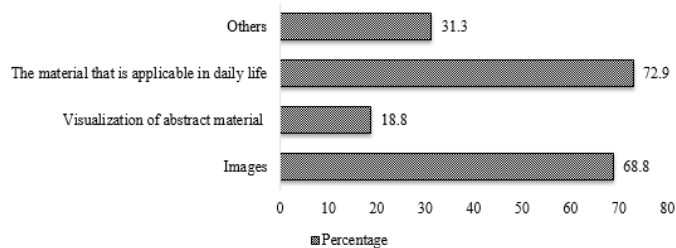


Fig. 5. Additional content that is expected to be contained in the module.

Figure 6 presents the level of student interest in using the basic chemistry practicum module based on local wisdom that 47.9% of the students filled "very interested", 16.7% "interested", 27.1% "quite interested", 2.1% "not interested", and 6.3% "uninterested". Meanwhile, the majority of subjects stated that qualitative analysis material for organic compounds was suitable for developing practicum modules based on local wisdom. This finding is in line with other research which shows that students are interested and motivated using chemistry teaching aids based local wisdom as a media for

learning chemistry [13]. Ethnosience raises local wisdom as an object of meaningful science learning. Incorporating ethnochemistry practices in teaching chemistry was found to have positive effect on enhancing students' motivation and attitude towards chemistry [14-15].

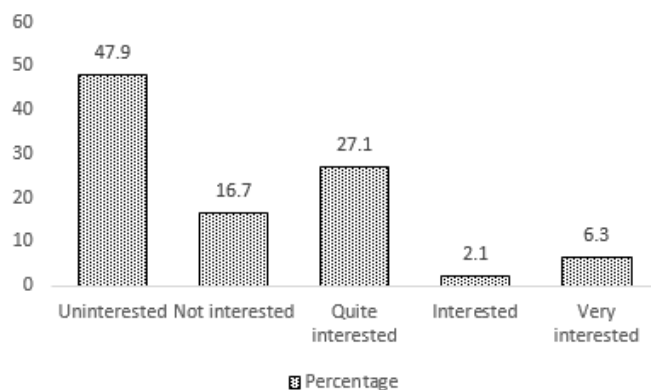


Fig. 6. Student interest in practicum modules based on local wisdom.

IV. CONCLUSION

Initial observation shows that the existing practicum modules did not meet the needs of all students in understanding practicum material. The main criteria for the practicum module that students want is that the content in the module is able to provide detailed material explanations. The results of the needs questionnaire analysis showed that most students needed additional practicum modules to support learning in practicum. Students stated that a local wisdom-based practicum module is needed in basic chemistry practicum. The explanation regarding the application of the material in daily life is the additional content that is expected to be included in the module. In general, students need and are very interested in using practicum modules based on local wisdom.

ACKNOWLEDGMENT

This research funded by Ministry of Research and Technology, National Research and Innovation Agency of the Republic of Indonesia.

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