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Analysis of Chemistry Practical Guidebook Class 12th of Odd Semester Based on the 2013 Curriculum

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Abstract: *The System 2013 Curriculum requires students to take an active role in the learning process at school and learn independently. So that the need for a learning media that can help students in understanding the learning of chemistry. Chemistry is a natural science that is a product and concept so that the learning can be done through practicum activities. Practical activities required by a tool as a guide in scientific work called a practical guidebook. The research design used is the Research and Development (R & D) model of ADDIE (analysis, design, development, implementation, and evaluation). This research is only done in the early stages of the analysis practical guidebook. The results obtained are an early overview of an existing practicum guidebook for further development into an innovative chemistry guidebook product based on the 2013 curriculum.*

Keywords: *practical guide, chemistry of learning, medialearning, 2013curriculum*

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I. Introduction

Currently the enactment of the 2013Curriculum which is a learning model with a scientific approach with five learning steps: observing, asking, reasoning, trying, and communicating. One of the lessons that applied the five steps of learning is chemistry. Chemistry is an experimental science, can not be learned only through reading, writing or listening alone. Studying chemistry not only mastered the collection of knowledge in the form of facts, concepts, principles but also a process of discovery and mastery of procedures or scientific methods. Therefore, in studying chemistry there are two important things that must be considered, namely chemistry as a product of scientific findings in the form of facts, concepts, principles, laws, theories, and chemistry as a process of scientific work [1]. Scientific work in science has the goal of skill, development, and understanding of science and an understanding of the scientific inquiry process [2].

In line with the above opinion Tezcam and Bligin [3] state the parable of learning chemistry, that a person who learns drawing, but without the use of paint and canvas or someone who tries to learn to ride, but without using a bicycle is the same as someone who studies chemistry without practicum. This means that the most effective chemistry learning can be done through practicum activities. Students' practice can improve factual and procedural knowledge and facilitate understanding of chemistry learning [4-5]. The use of laboratory learning strategies creates and enhances student motivation, interest, and achievement [6], critical thinking to develop cognitive and skill abilities [7].

The use of chemistry laboratories in learning will provide hands-on experience to develop competencies to be able to explore and understand the natural surroundings scientifically and will provide experience to be able to propose and test hypotheses through experimenting, designing and assembling experimental instruments, collecting, processing, and interpreting data, and communicates the experimental results both verbally and in writing. The statement is supported by Can [8] which states that in laboratory work, students are encouraged to participate in scientific activities ranging from learning through experience and discovery, asking questions, suggesting solutions, making predictions, organizing data to explaining by example. So that required the provision of tools and materials lab and good laboratory management, for the implementation of learning chemistry can run optimally [9]. Practical activity is a learning activity that can be done in class or in thelaboratory [10].

The use of practicum method will be effective if supported by the availability of tools and chemicals in the laboratory as well as the skills of teachers in the implementation of the lab. But in reality, learning practicum in many schools have obstacles in the implementation. Another alternative according to Tatli and Ayas [11] can use virtual laboratories to overcome obstacles in the implementation of lab work in school.

Other obstacles explained by Tuysuz [12] include the unavailability of a chemistry practicum guide that can lead students when practicum, teachers also have no guidance in assessing process skills and scientific

attitudes. Costly chemicals and chemicals are also an obstacle to the implementation of school chemistry labs. According to Lubis *et al*[13]. The implementation of practicum activities requires a practical guide, where a practical guide is used to facilitate the finding of practicum steps. In addition, the practicum guide should also be able to develop the scientific learning ability and process skills of the learners.

Chemical practicum guides that have been used in school as well as guides of chemistry laboratories developed in postgraduate programs, The State University of Medan still have some obstacles in their use, such as practical guides are still difficult to understand by students and do not provide simple materials and tools that can be an alternative for schools has no laboratory.Based on the background mentioned above, the purpose of this research is to analyze the practical guide used in the school and the guide of chemistry practicum developed in the graduate program of the state university. Thus, from the guidance analysis, it can obtain an overview of existing guides to be developed into innovative chemistry lab guide products.

II. Literature

Research and Development

Research and development is an attempt to develop an effective product for school use and not to test the theory [14]. Research and development in the world of education is a relatively new type of research better known as R & D (Research and Development). Strategy in R & D is intended to develop a new product to improve the existing product, which can be accounted for. The product can be learning media, learning model, computer program, training, guidance, evaluation tool and so on. Research and development is a process used to develop and validate educational products [15].

Analysis of Practical Guidebook Chemistry

The analysis is an activity that contains a number of activities such as parsing, differentiating, choosing something to be classified and regrouped according to certain criteria then searched for and interpreted meaning [16]. The analysis was conducted based on the questionnaire of feasibility level of the modified chemistry guide from the National Education Standards Agency/Badan Standar Nasional Pendidikan (BSNP) questionnaire which consisted of the feasibility of content, the feasibility of language, the feasibility of presentation and feasibility of graphic.

III. Research And Methodology

The analysis of chemistry practical guidebook of the class 12thodd semester based on Curriculum 2013 using research design used is Research and Development (R & D) model of ADDIE (analysis, design, development, implementation, and evaluation). This research is only done in the early stages of the book lab study guide.

The types of data obtained in this guidebook analysis are qualitative and quantitative data. Qualitative data are comments, suggestions or criticisms of the practicum guidebooks analyzed. While the quantitative data in the form of numbers obtained based on the validation sheet of the study guidebook using the Likert scale (4,3,2,1). The data collection instrument used in this research is a validation sheet of practicalguidebook A, B, and C based on standard BSNP. The data analysis technique used to analyze the validation result data of practical guidebook is the average calculation technique. According to Arikunto [17], the range of validation criteria to the complete calculation results can be observed in Table 1.

Table 1. Criteria for validation practical guidebook

No	Average	Variable of criteria
1	3,26 – 4,00	very valid and can be used
2	2,51 – 3,25	valid and can be used
3	1,76 – 2,50	less valid and revision
4	1,00 – 1,75	not avalid and totalrevision

IV. Result

Before conducting innovativepractical guidebook. Researchers conducted an analysis of the guidebooks circulating in schools and that have been developed in previous research conducted in the Master of Chemistry Education, Postgraduate Program, State University of Medan. The laboratory guides in the analysis consist of four parts of the feasibility of content, the feasibility oflanguage, the feasibility of presentation and feasibility of graphic. Based on the validation results it is found that the practical guidebook A, B, and C can be said to be very valid and can be used. Validation results on the practical guidebooks A, B, and C can be seen in Figure 1.

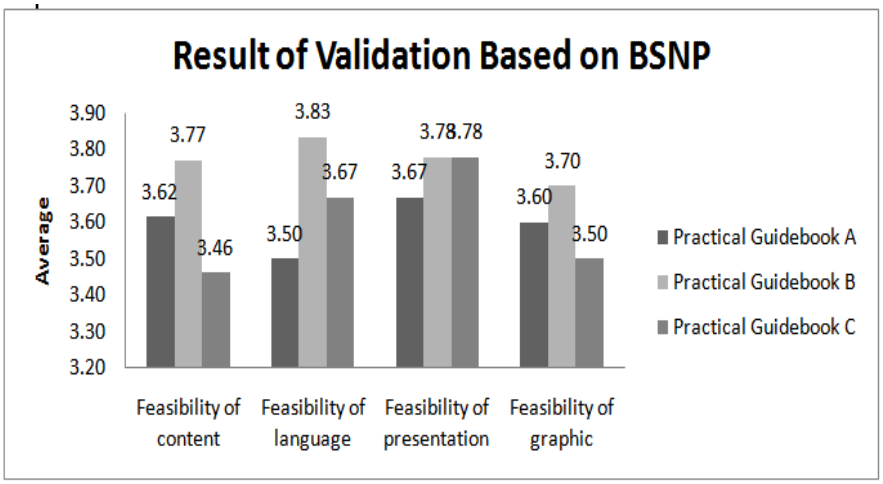

Figure 1. Result of Validation Based on BSNP

The results of the analysis of the content feasibility state that the study guide book that has been analyzed has been valid and can be used. But there are still some that must be on the content feasibility of which is the depth of the material needs to be re-adjusted with teaching materials, sub-material conformity in the practical guide with the concept and the addition of learning objectives in each practical activity. Validation of content feasibility can be seen in figure 2.

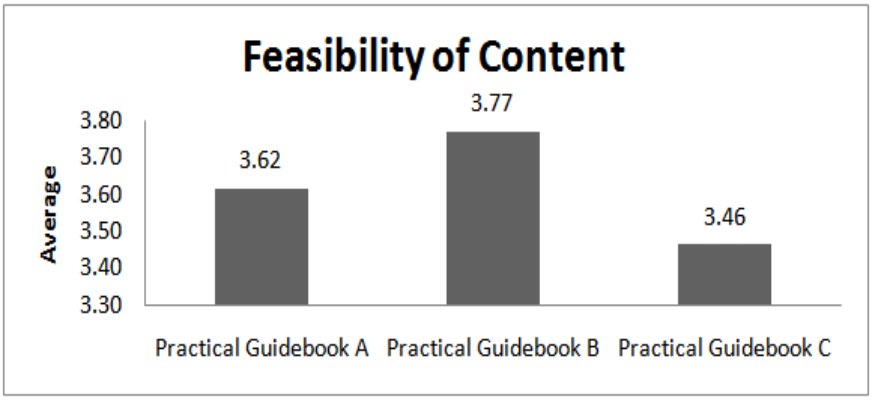

Figure 2. Result of Validation Feasibility of Content Practical Guidebook A, B, and C

The results of the analysis of the language feasibility stated that the practicum guidebook analyzed was valid and usable. However, by adjusting the sentence that accompanies an image or illustration to make it look more clear. Validation of language eligibility can be seen in figure 3.

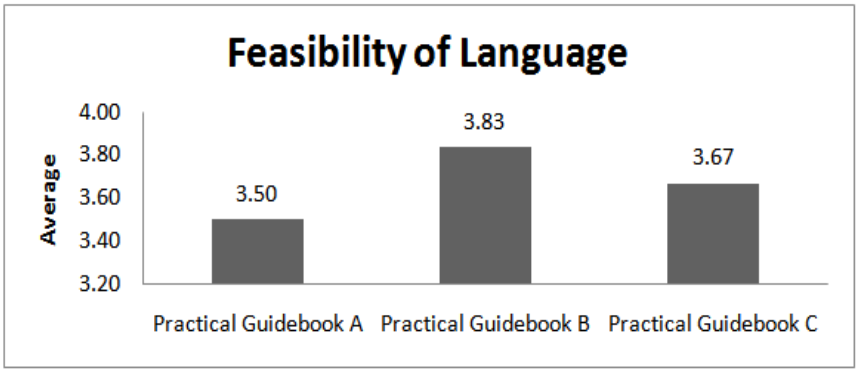

Figure 3. Result of Validation Feasibility of Language Practical Guidebook A, B, and C

The results of the analysis on the feasibility of the presentation stated that the study guide book that was analyzed was valid and could be used. However, by improving the cover design and the overall design of the practicum guide to attracting students' interest. Validation of presentation feasibility can be seen in figure 4.

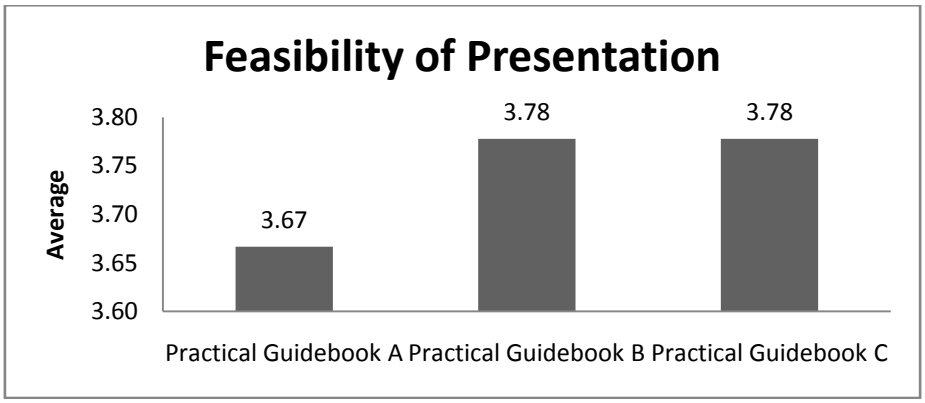

Figure 4. Result of Validation Feasibility of Presentation Practical Guidebook A, B, and C

The results of the analysis on the feasibility of graphic stated that the study guide book that has been analyzed has been valid and can be used. However, by improving the size of the book to comply with ISO standards. Validation of the feasibility of graphics can be seen in figure 5.

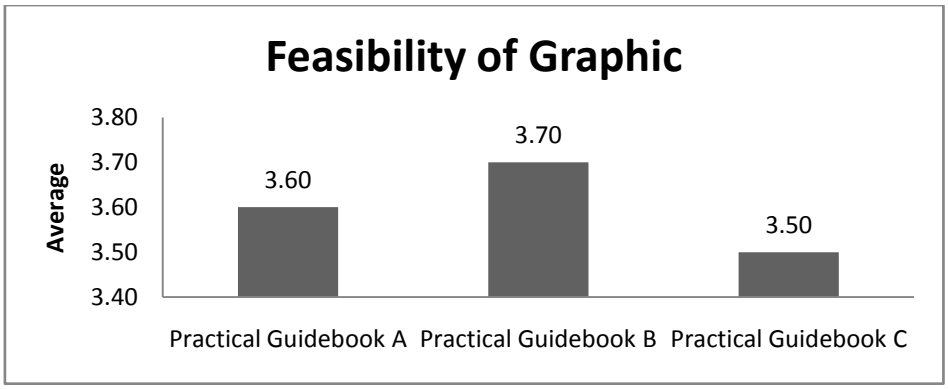

Figure 5. Result of Validation Feasibility of Graphic Practical Guidebook A, B, and C

After obtaining the results of book lab study guide then further can be done to the development of innovative guidebook in accordance with the 2013curriculum. The comparison of the components contained in the innovation guidebook chemistry guide according to the 2013curriculum with the guidebook analyzed can be seen in table 2.

Table 2. Development Plan for an Innovative Chemical Practicum Guide

No	Component	Guide practicum innovation	Guidebook A	Guidebook B	Guidebook C
1.	General practice manual	√	√	√	√
2.	Practicum Disciplinary Order	√	√	√	√
3.	Work safety	√	√	√	√
4.	Tools in the laboratory	√	√	√	√
5.	symbol of danger in the laboratory	√	√	√	√
6.	Waste handling procedures	√	-	√	√
7.	Curriculum Analysis	√	√	√	√
8.	Project-based learning model*	√	-	√	√
9.	Innovative practice activities*	√	-	√	√
10.	Attitude observation sheet*	√	-	-	-
11.	Practical skills assessment sheet*	√	-	-	-
12.	Practical report writing format	√	√	√	√
13.	The periodic system of elements*	√	-	-	-

Description: * = innovation contained in the practicum guide

The innovative laboratory guides contain several components including, laboratory basic rules, laboratory safety and safety guidelines, first aid in laboratory accidents, laboratory frequently, waste handling procedures and some commonly used tools in the laboratories, analysis curriculum, learning syntax, basic practicum theory, practicum activities, attitude assessment observation sheet, practical skills test sheet,

practicum report writing format, bibliography list, identification of practicum tools, identification of hazardous chemicals, chemical hazard scale and system level periodic elements.

V. Conclusion

Practical chemistry guidebooks class 12thodd semester analyzed consisted of four parts namely the feasibility ofcontent, the feasibility oflanguage, the feasibility of presentation and feasibility of graphic. Based on the above discussion, the book that has been analyzed has been feasible to be used but there are still some things that must be developed considering the guidebook that is analyzed still using the curriculum KTSP (Education Unit Level Curriculum) so that the need for development in accordance with the 2013 curriculum. The results obtained are preliminary picture of a manual laboratory guide has been there for further development into innovative chemicals lab guide product series according to the 2013 curriculum.

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