

# The Development of Chemo- entrepreneurship Oriented Practicum Guided for 10 th Grade in Senior High School

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# *The Development of Chemo-entrepreneurship Oriented Practicum Guided for 10<sup>th</sup> Grade in Senior High School*

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**Abstract** - One way to cultivate self-reliance, active, creative and innovative in chemistry learning can be done through contextual learning oriented chemo-entrepreneurship. In general, practicum guides used have not been recorded and have not been contextual so that chemistry lab activities are not always applied in the classroom. This study aims to produce a chemo-entrepreneurship oriented practicum guided which is valid, practical and effective. This research is a development research with Plomp development model. Data collection was collected by interview method, observation, questionnaire and documentation. The data of the research were analyzed descriptively quantitative using Kappa Cohen. The result of the analysis on the validity is 0.89 with very high criterion. Practicality has been tested by teachers and students respectively are 0.75 and 0.76 with high criteria. Based on data analysis, chemo-entrepreneurship oriented practicum guided that has been developed is categorized as valid and practical to be used as learning resource of students while increasing interest of entrepreneur of 10<sup>th</sup> grade in senior high school.

**Keywords** – Development; Practicum Guided; Chemo-entrepreneurship.

## I. INTRODUCTION

Chemistry is the study of matter and its changes. The study of chemistry includes the properties of substances including the structure of matter, the change of substances (chemical reactions), the energy involved, the laws, the principles and theories [1]. Chemistry is one of experimental science; it cannot be learned only through reading, writing or listening. Learning chemistry is not just mastering the collection of knowledge in the form of facts, concepts, principles only, but also a process. One of the most important processes in chemistry learning is practicum. Practicum has become a method that can provide direct experience to students as a proof of concept or find concept. Students can practice directly in accordance with the concept they are learning by trial and error, so that students can prove the concepts of chemistry. A practicum guide is necessary because of the purpose of chemistry learning so that students have the skills in conducting laboratory

activities to understand the chemical concepts as well as fostering interest and scientific attitudes [2]. However, Sunyono [3] says, "Chemical learning has many scientific concepts that are still considered difficult to teach to students. Most teachers have been teaching science concepts in verbal ways, practice questions, but lab work is rarely done." In addition, the facts obtained from observations and interviews conducted by the author of chemistry teachers and students SMAN 1 Payakumbuh, SMAN 1 Guguak and SMA Islam Raudhatul Jannah Payakumbuh that has been obtained information that the activities of chemical labs are still rarely done in schools and still do not have a guide chemical lab in the form of print or file. The chemistry lab guide used is usually copied from the practicum section already in the book or LKS from the publisher. Then the practicum guide used has not led to the conceptual application and produced a useful product. The chemistry teachers added that they do not have a chemistry lab guide that is in line with the 2013 revision curriculum 2016 and

hopes for a development of a contextual chemistry guide because virtually every industrial product is a chemical product.

Development of an innovative chemistry lab guide needs attention, as the provision of qualified laboratory guides should be in accordance with the Indonesian national curriculum. Chemical practicum activities are expected to foster the students' self-sustaining spirit of entrepreneurship through a practicum guide that has been designed.

This has been relevant to Permendikbud No. 17 of 2016 which has made it clear that chemistry teachers can master *prakarya* and entrepreneurial subjects in the national curriculum 2013. Entrepreneurship subjects are the compulsory subjects that all students must follow in the national curriculum of 2013. Thus, practicum chemistry based entrepreneurship for students in self-development as well as chemistry teacher to teach chemistry and *prakarya* subjects is very need to be developed. One approach to chemistry learning that is able to develop and enhance student entrepreneur interest is chemo-entrepreneurship-oriented contextual approach.

Chemo-entrepreneurship or the CEP approach is a contextual approach to chemistry learning. This approach links the material being studied with a real object. In addition to obtaining learning materials, learners also have the opportunity to obtain information processing a material into a useful product, economic value and foster entrepreneurial spirit. Through the CEP approach, students are expected to be more creative, so they can apply the knowledge they have learned in their daily lives [4]. The purpose of this approach is to motivate students to have entrepreneurial spirit. With this approach, it is expected that chemistry learning will be more fun and provide opportunities for students to optimize their potential, able to work, active, creative and innovative.

Based on the problem, the problem formulation in this research is "How is the development of chemo-entrepreneurship oriented chemistry practical and practical guide that can increase entrepreneurship interest of 10<sup>th</sup> grade high school semester student?" The purpose of this research is to develop a practical chemo-entrepreneurship oriented chemistry practicum guide that can increase entrepreneurship interest of 10<sup>th</sup> grade students on even semester.

## II. METHOD

Research and development (R & D) has been applied in this study. According to Sugiyono [5] "development

research is a research used to produce a particular product and test the effectiveness of the product". The Plomp model has been adapted for chemo-entrepreneurship oriented chemistry guide. This model consists of 3 stages: the preliminary research phase, the development or prototyping phase, and the assessment phase [6].

Instruments that have been used in this study are questionnaires, interview lists, self-assessment instruments, and instrument validity. Questionnaires have been provided to teachers and students for needs-based analysis, interview lists are guidelines for interviewing teachers and students. The self-evaluation instrument is a checklists list to check the completeness of the developed prototype. Instruments of validity and practicality have been developed from the lattice of practicality and validity. Then, the expert has assessed the validity instrument developed. Meanwhile, a practical instrument consisted of a teacher response questionnaire and a student response questionnaire to a chemo-entrepreneurship oriented practice guide that has been developed.

Data were analyzed by descriptive statistical analysis to get the average number and percentage of validity and practicality. The validator assessment of each statement was analyzed using Kappa Cohen. Assessment of practicality sheets was obtained from teacher questionnaire response and student response questionnaire which was also analyzed by using Kappa Cohen.

## III. RESULT AND DISCUSSION

The development of chemo-entrepreneurship grade 10 chemistry orientation guides in the even semester at High School starts from:

### 1. Preliminary Research Phase

Preliminary research consists of needs-based analysis, curriculum analysis, student analysis and concept analysis. Needs analysis is done by giving questionnaires and interviews to teachers and 15 students. The result is 67% of teachers do not have guidance labs of chemicals that have been printed, 100% of teachers do not have a complete practical guide. Similarly, needs-based analysis of students. 67% do not have a practical guide yet, 93% of chemistry practicum did not occur in learning.

Curriculum analysis has been conducted based on KI (Core Competence) and KD (Basic Competency) which have been set in the SI (Content Stand) then elaborated into indicator and subject matter for practicum activity. Based on the analysis of students found that; students still difficult to understand chemistry because less interested, students have

not felt the benefits of learning chemistry and learning minimal practice. By chemo-entrepreneurship, students are expected to be motivated to learn chemistry because it can instantly feel the benefits, and increase the thinking level of students become more creative, independent and innovative. Analysis of Grade 10 semester class includes knowledge, skill and attitude competence.

**2. Development or Prototyping Phase**

Prototype I have designed a chemo-entrepreneurship grade 10 chemistry oriented guide on an even semester with the first part consisting of cover, introduction and table of contents. The content consists of a preliminary, chemical experiment and chemo-entrepreneurship experiment. After

the design and preparation process of the chemistry practicum is made, the next stage is self-evaluation.

Phase of development of prototype II has been validated by the expert on the practical guide which has been designed at prototype stage I. Chemo-entrepreneurship oriented chemistry guide is validated by 7 experts, namely 4 chemistry lecturers and 3 high school chemistry teachers. The validated aspect of the practicum guide consists of content validity, construct, language, and graphics. Each aspect has an item statement that will be validated by experts. The result of validation of the practicum guide in Table 1.

Table 1. Data from Validation of the Chemo-entrepreneurship Practicum Guided

Indicators	eligibility of content	feasibility of construction	linguistic component	graphics component s	average	Criteria
Electrolyte solution	0.95	0.8	0.98	0.87	0.90	Very high
Redox reaction	0.73	0.75	0.98	0.87	0.83	Very high
The basic law of chemistry	0.97	0.79	0.98	0.89	0.91	Very high
Stoichiometric	0.97	0.88	0.98	0.92	0.94	Very high
Average	<b>0.905</b>	<b>0.805</b>	<b>0.98</b>	<b>0.8875</b>	0.89	Very high
Criteria	Very high	Very high	Very high	Very high		<b>Feasible with correction</b>

**Validator Decision**

Validation of Chemo-entrepreneurship Practicum Guided

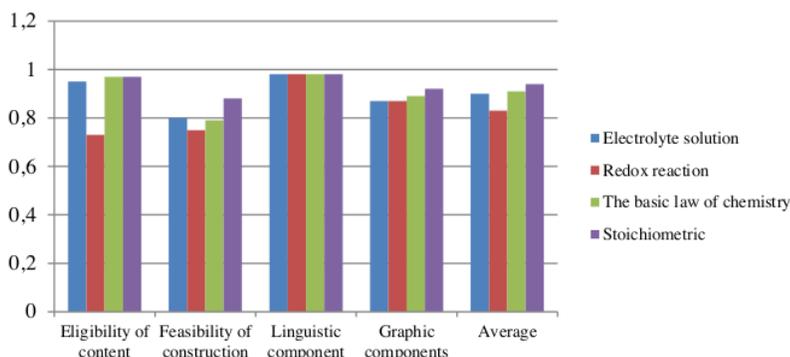


Figure 1. The results of Validation the Chemo-entrepreneurship Practicum Guided

The validator provides suggestions as revisions to the practicum guide that have been designed before providing validation values, here are suggestions and revisions of the

cover applicator, header, character and entrepreneur features, chemical applications, chemical properties and

hazards, drawings and content components of the practicum guided.

Islamic High School Raudhatul Jannah Payakumbuh with high ability, moderate, and low.

Phase Prototype III conducted individual evaluation (one to one evaluation). This stage is done to three students from

Table 2. Result of One To One Evaluation

No	Rated aspects	Results	Categories
1.	Ease of use	0.73	High
2.	Efficiency of learning time	1	Very High
3.	Benefits	0.65	High
	Average	0.73	High

Prototype IV has been done by testing the practicability of the developed module by evaluating small group to 10 students.

Table 3. Results Practical Analysis by Questionnaires of Student Responses in Small Group

No	Rated aspects	Results	Categories
1.	Ease of use	0.42	Moderate
2.	Efficiency of learning time	0.70	High
3.	Benefits	0.61	High
	Average	0.59	Moderate

### 3. Assessment Phase

Practicality for students can be seen from three aspects: ease of use, efficiency of learning time and benefits. The distribution of students' practicality analysis results can be seen in Table 4.

Table 4 Result of Practical Analysis of Response Questionnaire by Student Field Test

No	Rated aspects	Results	Categories
1.	Ease of use	0.90	Very high
2.	Efficiency of learning time	0.93	Very high
3.	Benefits	0.94	Very high
	Average	0.92	Very high

Table 4 showed that the average value of the overall practicability of each aspect is 0.92 which is at a very high level of practicality. Thus, it is concluded that the developed chemo-entrepreneurship practitioner guide is easy to use in chemistry learning, practical execution is more efficient and

very useful for students. Based on the results, overall practice of students, one to one evaluation, small group and field test, drawn graph in Figure 2.

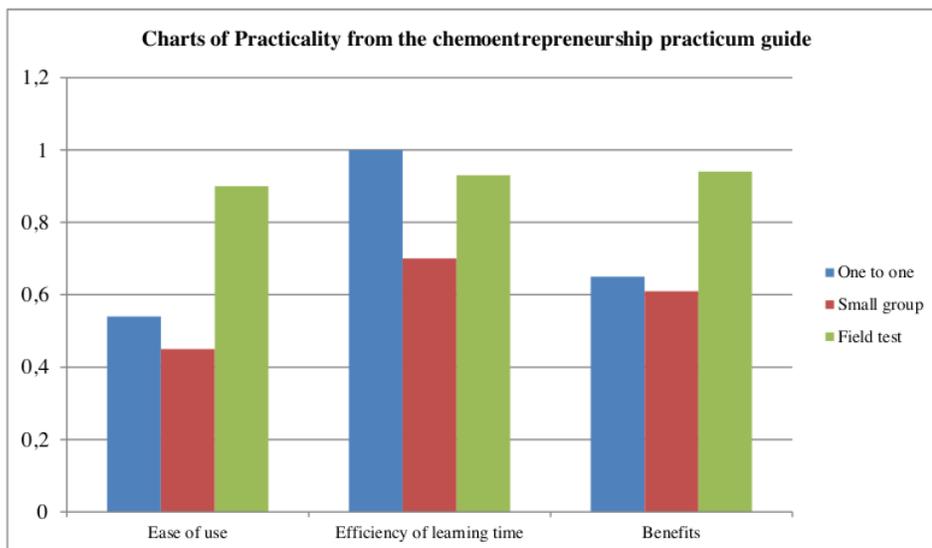


Figure 2. The results of Practicality from the Chemo-entrepreneurship Practicum Guided

Questionnaire teacher practicality contains aspects of ease of use, efficiency of learning time and benefits aspects.

The results of questionnaires data analysis of practicality can be seen in Table 5.

Table 5 Result of Practical Analysis of Response Questionnaire by Teacher

No	Rate aspects	Results	Categories
1.	Ease of use	0.88	High
2.	Efficiency of learning time	0.5	Very high
3	Benefits	0.90	High
	Average	0.76	High

The results of questionnaire responses by teacher responses in Table 5 have shown that the guided practicum of chemo-entrepreneurship has a high level of practicability, means that the chemo-entrepreneurship practicum guided is

practical and can be used by teachers in the chemistry learning process.

#### IV. CONCLUSION

This research is a development research that produces chemo-entrepreneurship practicum guided for 10<sup>th</sup> grade in the even semester at high school.

1. The validity of developed is consist of content, constructs, language, and graphics aspects with a value of 0.89 categorized as very high validity.
2. Practicality value obtained from questionnaires filled by students in one to one evaluation is 0.73 categorized as high practicality. Practicality value obtained from questionnaires filled by students' in

a small group evaluation is 0.5 categorized as moderate practice. Then the practicality value obtained from the questionnaire filled by students in the field test is 0.92 categorized as very high practicality, while the practicality value obtained from three school chemistry teachers is 0.76, 85 as high practicality.

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