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The Influence of Integrated Science Practical Guidance Based on Guided Inquiry on Achievement of Junior High School Grade VII

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***Abstract*— this research aims to develop integrated science practical guidance by integrating a guided inquiry learning model. This type of research is a combination of development and experimental research, which was modified from the Borg and Gall development model with stages of analysis, development, validation, revision and trial. Practical guiding products from the next development were tested on student of class VII of the second semester Junior High School (SMP) Al-Azhar Medan. Sample of this research including 60 students that was divided into two classes as experiment class-1 and experiment class-2. Validation is carried out by the validation to determine the feasibility of the practical guide the results of development are in accordance with the National Education Standards Board (BSNP). The instrument used is a modified feasibility study questionnaire based on National Education Standards Board (BSNP), and cognitive tests instrument. The results of the study showed that the integrated science practical guidance based on guided inquiry of the development results has been feasible and in accordance with BSNP. The results of the trial showed that the integrated science practical guidance based on guided inquiry of the development results could improve student learning outcomes.**

***Keywords*— *practical guidance, integrated science, guided inquiry*.**

I. INTRODUCTION

The study of integrated science presented as an inseparable unity, meaning that students do not study chemical, physics and biology separately, but are summarized in a single whole [1]. The most effective integrated science learning is done through practical effective [2]. The practical goal is train the students scientific skills involve the thinking skill [3]. In addition to developing and applying science process skills, it can arouse interest in learning and provide evidence for the truth of the theory to be more meaningful to cognitive structures [4].

From the survey in some junior high school in Medan, it show that generally the practical guidance to integrated science books are not available yet and the result of the survey shows that the application of integrated science still using practical guidance arranged by the teacher. From the analysis of science students' practical guidance sheet which arranged by the teacher still have many weakness and deficiency and shows that the science student's practical guidance not compatible to National Education Standards Board (BSNP). The effect of using guidance practical guidance seen from the students' learning result which have not fill the minimum completion criteria.

One way to maximize the student learning outcomes is with good learning resource. The meaningful learning not only created in teaching learning in the class, but also by practical [5]. After student learning a concept, they can proof the truth of the concept by practical [6]. Practicum activities are less effective without a strategy to help students to more easily understand the material being studied. The strategy proper to produce learning practicum is guided inquiry. Practicum in the laboratory with inquiry strategies can improve students ability to design, experiment analyze data obtained [7]. Guided inquiry learning can also improve students' academic attitudes and achievements [8]. In accordance with the results of the study [9], state that learning with guided inquiry significantly affects the improvement of academic achievement. This show that inquiry be separated in the learning of integrated because it has three categories, which are related to the way students learn and the relationship with the curriculum [10].

II. LITERATURE REVIEW

A. Research and Development

Development research is a way to develop a product which effective to uses and not to test a theory [11]. Besides that, the development research is a process which use to develop and to validate education product. Develop research steps consist of learning research findings related to developing product, develop the product based on research findings, testing scope in arrangement where it used in the end revise to improve [12].

B. Integrated Science Practicum Guidance

The practical guide is defined as a teaching material that contains guidelines in conducting practicum activities in a laboratory with the aim of creating optimal practicum activities in a learning process. Practicum activities are carried out in order to support the achievement of learning objectives that cannot be achieved in learning or affect learning outcomes [13].

C. Integrated Inquiry Learning Model

Inquiry can be interpreted as the process of asking questions and finding out answers to the scientific questions he proposed [14]. Whereas according to Ergaul [15] inquiry learning involves students in a learning process that is scientifically like a scientist, solving problems with observation, collecting data carefully and accurately.

III. METHODOLOGY

This type of research includes and development modified from Borg and Gall, and experiments. The stages in the study of: (1) Analyze the practical guide for student worksheet made by teacher; (2) Development of practical guidebook by integrating guided inquiry leaning models; (3) Validation of the practical guided book results to expert validation based on standard content of the BSNP; (4) Revise the product based on the results of the validation in the previous stage; (5) Trial using the practical guided the results of development in the implementation of the practicum to junior high school students so as to improve student learning outcomes.

The instrument used for data collection in this study is the validation questionnaire for practical guidance questionnaire based on the standard content of the BSNP and learning outcomes test (gain score). Analysis of validation data obtained from expert validation and science teachers. This analysis uses a Likert scale. The quality of textbooks is obtained based on the respondent of respondents to the contents of the practical guide of the development results by asking the opinions of respondents based on the assessment criteria strongly agree (score 5) to disagree (score 1). The components assessed include: (1) Practical coverage; (2) Stimulating Curiosity; (3) Develop life skills; (4) design; (5) language.

The data obtained through the validation questionnaire of the practical guide based on the content standard of the BSNP, analyzed descriptively qualitative. The formula used to determine the percentage descriptive value as follows [16]:

$$P = f / N \times 100\%$$

Information:
P = percentage of validation
F = Number of data collection
N = Maximum score

TABLE 1. Percentage Criteria Validation

Average	Variable Criteria
81%-100%	Very valid and does not need revision
61%-80%	Valid and does not need revision
41%-60%	Fairly valid and does not need to be revised
21%-40%	Less valid, some need revision
0%-20%	Invalid and must be totally revised

The piloted guided inquiry based innovative practical guide was conducted in Junior High School (SMP) Al-Azhar Medan grade VII, where there were two class groups that received different treatment. The experiment class -1 uses a guided inquiry based practical book and experiment-2 uses a practical guide book circulating in school. The research design can be seen in Table 2

TABLE 2. Design Study

Group Sample	Pretest	Treatment	Posttest
Class Experiment-1	T_1	X	T_2
Class Experiment-2	T_1	Y	T_2

Description
T_1 = Initial test of experimental class-1 and experimental class-2 (pretest)
T_2 = Final test of experimental class-1 and experimental class-2 (posttest)
X = Learning with guide inquiry based practical guides
Y = Learning with practical guide book student worksheets that are in school

Procedures of the research used at the trial stage, can be seen as the chart in Figure 1

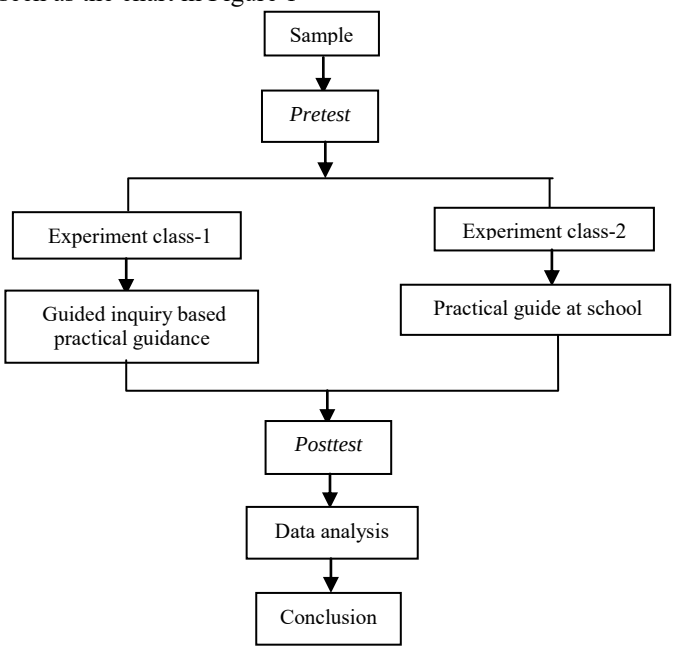

Fig.1. Research Procedure

Analysis of the test results of the trial was conducted using pretest and posttest data, then from the data obtained was used to determine the improvement of learning outcomes. Criteria for improving learning outcomes (gain) [17] can be seen Table 3

TABLE 3 Criteria gain

Limitation (%)	Variable Criteria
g ≥ 70	High
30 g ≤ 70	Medium
g ≤ 30	Low

IV. RESULTS AND DISCUSSION

The study begins by conducting an analysis to find out how the product criteria will be development and the things that support the product development process. The development of the practical guide was carried out by integrating the guided inquiry model in each material, adding the component of the practical guide book that was developed including: (1) Laboratory discipline; (2) Work safety in the integrated science laboratory; (3) Techniques to work in the science laboratory; (4) Science laboratory equipment; (5) Symbols of chemicals in laboratory; (6) Experiments developed; (7) Bibliography; (8) Glossary. After developing the practical guide first standardized using expert assessments (lecturers and science teachers). Revise were made based on the suggestion and comments of the lecturers and teachers validation.

Validation Results of the Practical Guide

Based on the results of validation of the feasibility study of practical guidance based on guided inquiry by expert validation and integrated science teacher, the results of the analysis were obtained in practical coverage (90.68%), stimulating curiosity (90.9%), develop life skills (87.07%), design (89.9%), language (87.58%) with an average score obtained 89.22% with criteria very valid which means that the practical guide is feasible and does not need to be revised. The results of the feasibility test can be seen in Figure 2.

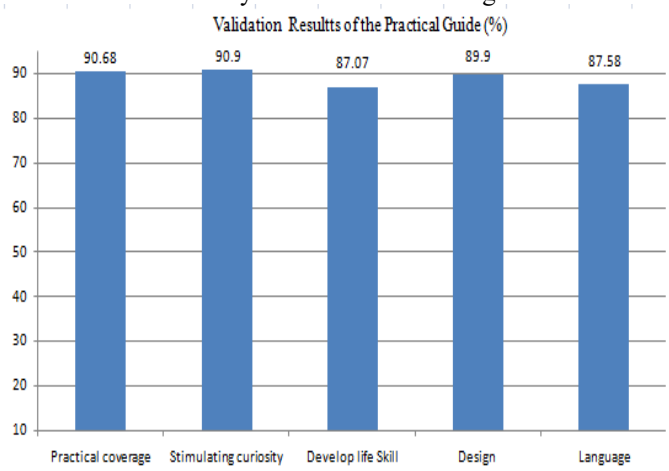

Fig.2 Chart Validation results

Trial Results of the Practice Results Development Guide

The average value of pretest in experiment-1 is 35 and experiment-2 obtains an average value 36.83. Whereas for the posttest in experiment-1 obtained the average value of 81.82 and experiment-2 obtained an average value of 72.67. Based on the results of the pretest and posttest it can be seen the level of understanding of student by calculating their normalized gain (N-gain). The acquisition of normalized gain values in successive experiment-1 and experiment-2 is 71.9% (in the high category) and 56.5% (with the medium category). The results of learning improvement can be seen in Figure 3.

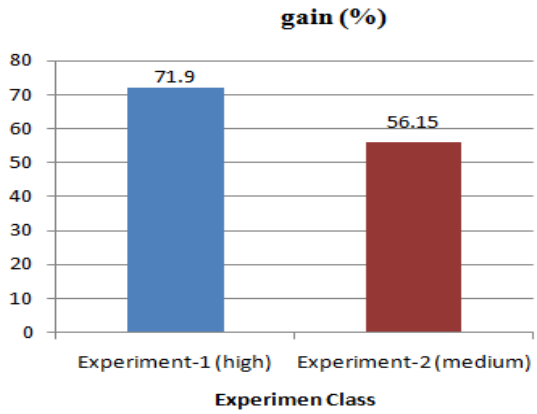

Fig.3. Chart Gain Results

Discussion of Results

Research has succeeded in developing integrated science practical guidance based on guided inquiry. The results of the practical guide assessment that has been developed based on the standard content of the BSNP obtained an average score of 89.22% with very valid criteria and no need for revision. This means that the practical guide that has been developed is very suitable for use. Even though the results of the assessment were obtained, it was necessary to make improvements based on suggestions for improvement from several validation. Some suggestions for improvement are: (1) The objectives must be more specific and more operational; (2) Some images are too small and unclear; (3) In theory is no reference. From the results of the assessment obtained, the shortcomings that still exist in the practical guide that has been developed can be refined for the perfection of the practical guide that has been developed so that the practical guide is ready to be piloted to students.

Percentage increase in cognitive learning outcomes of students in experiment class-1 (classes that use practical guidance based on guided inquiry) of 71.9%. While the percentage increases in students' cognitive learning outcomes of students in the experiment class-2 (the class that uses the practical guide of the school student worksheet) is 56.15%. These results prove that the integrated science practical guidance based on guided inquiry effectively improve the learning outcomes of junior high school grade VII. From the results of the improvement of students' experiment class-1 learning (using practical guides of development results) shower an increase in student learning achievement with high category as much as 56.66%. While the experiment class-2 (using the practical guide for student worksheet), improvement of student learning outcomes with a high category is 10%. From the results of this data indicate that

integrated science practical guidance based on guide inquiry of the development results can improve student learning outcomes.

V. CONCLUSION

Based on the results of the analysis and discussion, it can be concluded that the integrated science practical guidance based on guide inquiry has met the standard criteria of the content of the National Education Standards Board (BSNP) use in the learning process and the practical guide is effective in improving student learning outcomes.

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