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The Development of Natural Science Practicum Guidance Based on Guided Inquiry Integrated Scientific Skill Process

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ABSTRACT
The study was aimed to find out the result of the analysis of the natural science practicum guidance in the school, to know the feasibility of natural science practicum guidance which is developed, find out whether the natural science practicum guidance have been based on guided inquiry and can improve scientific skills, and to know the difference of learning outcomes of learners between those who were taught with the result of development natural science practicum guidance with science practicum guidance in school. The instruments are using multiple choice test to see the students' achievement and assessment sheet to measure the scientific process science. The result of the analysis of the natural science practicum guidance in the school are 3.1. The propriety level of natural science practicum guidance based on guided inquiry and can improve scientific skills process is 3.69. The difference of learning outcomes of learners between those who were taught with the result of development natural science practicum guidance with science practicum guidance in school shown in the percentage of student's average gain (students' achievement) in experiment class I that taught using natural science practicum guidance is 88%, while for experiment class II, the average gain (students' achievement) is 69%. So, we concluded that students' achievement which taught by natural science practicum guidance is higher than students' achievement in experiment class II.

Keywords: *guided inquiry, natural science practicum guidance, scientific skill process, students, achievement*

1. INTRODUCTION

Education is a worldwide accepted currency. (Nelson Mandela) According to the Law on National Education System (Education Law Number: 20 of 2003) "Education is a conscious and deliberate effort to create an atmosphere of learning and the learning process so that learners are actively developing the potential for him to have the spiritual power of religion, self-control, personality, intelligence, noble character, and skills needed him, society, nation and country ".

Learning science in the curriculum of 2013 was developed as an integrative science subjects and not as a discipline. Learning science is a learning process that emphasizes the nature symptoms and relation between these symptoms, so that in the process of learning science does not only emphasizes cognitive aspect, but also encompasses attitudes, processes, products and applications must be done thoroughly.

Learning science requires a skill in linking between concepts and quarrying evidence. Science is largely built on the basis of want to know, not only about objects to be researched, but also a role as Researchers and personal transformation process during investigation.

Science is a learning process activity include observation, made hypotheses, plan and implement experimentation, evaluation of measurement data, and so, while learning science products is the result of the process in the form of facts, concepts, principles, theories, laws, etc., so as to master of Natural Science (IPA) is not quite simply obtained by learning from book or just listen to the explanation of downloading others, however, required a learning activity that involve an activity of the process to produce a certain product.

In doing experiment, obviously experimental guidance is needed. Experimental guidance acts in developing students' attitude and scientific performance. The appropriate and related model with students' scientific attitude is inquiry strategy. The importance of experimental guidance is: experimental guidance can be supporting learning sources when do the experiment, it can increase students' interest in experiment, and

students know how to do the experiment and they know the system how to make experiment report.

The will to make an ideal learning teaching activity in the classroom and require a big amount of material which the students must accomplish, the teachers sometimes get difficulties in arranging qualified experiment. Based on some done experiments, there is constraint in implementing experiment in school, include non-provided chemical laboratories module which can cause students cannot do the experiment maximally, the teachers also don't have guidance in scoring students' scientific skill and attitude, besides material and expensive equipment for chemistry laboratories also become a problem in school chemistry laboratories implementation.

Researches related to laboratories utilization effectivity had been done by many researchers before. Erdogan and friends said that laboratories utilization significantly increase students' interest and understanding in chemistry learning, but there are also some problems, which are: the lack of experimental guidance which specially designed to develop students' experimental skill. Besides, surrounding environment utilization in doing experiment is not maximal yet.

Based on observations and interviews the eighth-grade science teacher at a junior high school in Medan, obtained information that in the process learning in the classroom has been equipped with Science book in which there are experimental guidance. However, the contents of the lab manual limited to certain materials. Case occurred because the background of a science teacher at the school is different disciplines e.g. biology, chemistry or physics, so that the good integrated science practical guide to grip teachers and for students is limited. According Wulandari et al., integrated study gives students a solid foundation for science studies further education that will show an interest in offering lesson core (biology, chemistry, and physics).

Based on the problems above, the writer is interested to conduct a research titled "The Development of Natural Science Practicum Guidance Based on Guided Inquiry Integrated Scientific Skill Process".

The study was aimed to find out the result of the analysis of the natural science practicum guidance in the school, to know the feasibility of natural science practicum guidance which is developed, find out whether the natural science practicum guidance have been based on guided inquiry and can improve scientific skills, and To know the difference of learning outcomes of learners between those who were taught with the result of development natural science practicum guidance with science practicum guidance in school.

2. RESEARCH METHODOLOGY

The research method in this study includes: Location and Time Research, Population and Sample Research, Research Methods, Research Procedures, Data Collection Techniques and Data Analysis Techniques.
This research procedure is a modification of the development model by Borg and Gall (1983) and modified into 5 stages:

1. Analysis: Determination of analyzing practicum guidance, analyzing practicum guidance, and result of analysis
2. Development: Inovating practicum guidance based on guided inquiry integrated scientific skill and making research instrument.
3. Validation: Validation of practicum guidance & question instrument to expert validator, they are 3 Chemistry Lecturer in UNIMED and validation of practicum guidance to Science teacher who teaching in JHS
4. Revision: Product revision based on validation result of practicum guidance at the step before
5. Evaluation: Doing treatment test by using the innovation of practicum guidance based guided inquiry in practicum

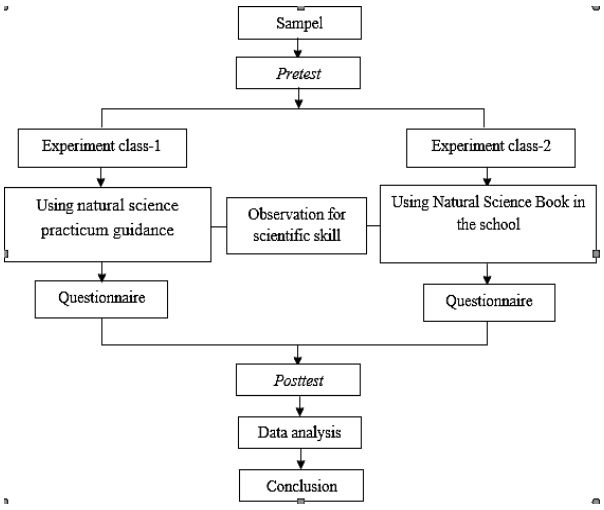

Figure 1. Procedure of Guided Inquiry in Natural Science Lesson

The instrument data collection used in this research is a questionnaire containing the feasibility / validation standard based on BSNP, test instrument containing the problem to know the improvement of learners' learning result, observation sheet of learner and psychomotor character, scientific skill assessment sheet.

3. DATA ANALYSIS, RESULTS, AND DISCUSSION

The results of laboratory analysis of additive and addictive substance based BNSP guide that has been modified according to practical guidance includes the feasibility of content, appropriateness of language, Kelay a right presentation, graphic feasibility shows that the average: publisher A and publisher B is 3.1 and 3.2 that means it's decent enough to be used. However,

the practical guide book in the school is not based on science process skills, so for the development, the practical guidance added the science process skills. One of the VIII SMP class materials is selected, namely addictive substances and additives for odd semester.

Table 1. Practicum guidance analysis results

No	Publisher	Component	Score	Average
1	A	Content Feasibility Language Feasibility Presentation Feasibility Feasibility of Graphics	3.2 3 3 3.23	3.1
2	B	Content Feasibility Language Feasibility Presentation Feasibility Feasibility of Graphics	3.23 3.32 3 3.20	3.2

Based on the results of the validation of the feasibility test of the science process skills-based practical guide by 3 lecturers, it was found that the practical guide was feasible and did not need to be revised. For content eligibility, the average value obtained for 3.7, for language eligibility obtained for 3.7, for the feasibility of presentation, an average of 3.65 and for the feasibility of graphics obtained by an average of 3.7.

Table 2. The components in the practicum guide book that are developed are compared with the practicum guide publisher (a) and publisher (b)

Component	Innovative Practicum Guide	Publisher Guide A	Publisher Guide B
1. Instructions General Guidance	✓	✓	✓
2. Code of Practice Practicum	✓	✓	✓
3. Work safety	✓	✓	✓
4. Laboratory equipment	✓	-	-
5. Danger symbol in the laboratory	✓	-	-
6. Waste handling procedure *	✓	-	-
7. Curriculum Analysis	✓	✓	✓
8. Color variations and images of tools and materials *	✓	-	-
9. Instructions for use of practicum *	✓	-	-
10. Science Process Skills Procedure Sheet *	✓	-	-

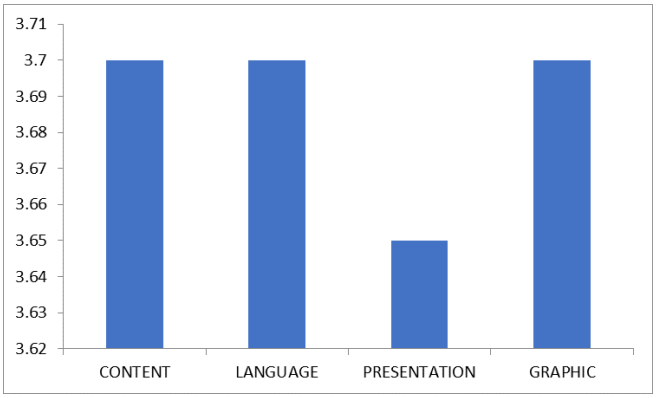

Figure 2. Validation Results for Practical Guidance Feasibility Test

Overall students taught using innovative practical guidance on the material of additives and addictive substances to get an average value of 91.5 while students taught using practical handbook schools get grades 78.93. The average value of experimental class 1 is higher than the experimental class 2 with the percentage increase in learning outcomes of experimental class 1 students by 87 %, while the percentage of increase in learning outcomes of experimental class 2 students is 69 %. In summary, the average student learning outcomes and the improvement in learning outcomes can be seen in Table 3.

Table 3. Average student learning outcomes and percent improvement in student learning outcomes

Class	Average value	Percent (%)
Experiment 1	91.55 ± 8.7	87
Experiment 2	78.93 ± 6.9	69

Based on Table 3 it can be concluded that the innovative practicum guides on additive and addictive substances are more effective in increasing student learning outcomes by 87 % and this value is higher than the percent increase in student learning outcomes in experimental class 2 by 69 %.

Overall students who are taught with innovative science practicum guidance get a higher average score than students who are taught with school practicum guidance. This is also in line with the science process skills that are carried out during the practicum. Science Process Skills of students who use innovative practicum guides get an average value of 90.5 % in understanding the explanations in the practicum guide. While the science process skills that only use in school just by 70 % only. In summary, it can be said that students who use an innovative guidebook based on guided inquiry integrated scientific skill process have higher learning outcomes than students who use school handbooks. We can see this in fig. 3.

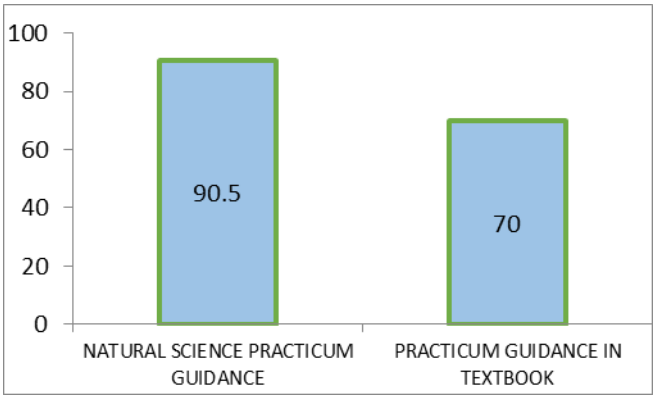

Figure 3. Comparison between the Average Value of Learning Outcomes and the Average Value of Science Process Skills

Based on figure 3, it can be concluded that the average value of Experiment 1 learning outcomes is higher than experimental learning outcomes 2. Likewise, the average value of science process skills in Experiment 1 is higher than the value of Experimental Science Process Skills 2. This shows that the relationship between the average value of learning outcomes and the average value of science process skills is the better the average value of learning outcomes, the average value of science process skills will be better too. This is because in innovative science guidance based on science process skills students understand better in working step by step in doing practicum.

4. CONCLUSION

Based on the research results and discussion, it can be concluded that : (1) The result of the analysis of the natural science practicum guidance in the school are 3.1. The natural science practicum guidance in the school still include in the lesson book, (2) The feasibility of natural science practicum guidance which is developed are 3.6 which is mean that the natural science practicum guidance was very good. Based on the review result from 3 validator that filled the questionnaire shown that about all of them select the high score of each assessment, (3) The propriety level of natural science practicum guidance have been based on guided inquiry and can improve scientific skills is 3.69 and (4) The difference of learning outcomes of learners between those who were taught with the result of development natural science practicum guidance with science practicum guidance in school shown in the percentage of student's average gain (students' achievement) in experiment class I that taught using natural science practicum guidance is 87%, while for experiment class II, the average gain (students' achievement) is 69%.

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