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# THE EFFECT OF INQUIRY MODEL ON SCIENCE PROCESS SKILLS AND LEARNING OUTCOMES

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**Abstract:**
This research is conducted based on the view that IPA is studied not only as a product but also as a process using inquiry model. The purpose of this study is to determine the effectiveness of learning outcomes of the inquiry learning model. The research method used quantitative analysis. The results showed that the inquiry model had a significant impact on the skills of the science process and the learning outcomes of the learners.

**Keywords:** inquiry, science process skills, learning outcomes

## 1. Introduction

A decade ago a constructivist philosophy education began in Indonesia. Constructive education empowers learners to gain skills and not just focus on gaining knowledge. Particularly in the subject matter of natural science, this field is studied not only as a product but also as a process of pliers in it encompassing the activity or process of actively using the mind in studying natural phenomena through the skill of the process of science. But the fact of science learning in schools is still centered on the delivery of learning materials thoroughly. The teacher eventually teaches knowledge quickly and must be completed according to the curriculum's mandate. This polemic will continue to exist if teachers do not realize the importance of teaching science process skills. The use of appropriate science process skills will make it easier for learners to understand complex and abstract concepts when accompanied by concrete examples (Dimyati and Mudjiono, 2002). This can be a consideration because when the material is taught in marathon will make learners just memorize the knowledge (Setiadi and Irhasyuarna, 2017). Memorization is a system that should be avoided, because the purpose of

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education is not just memorize, but understand well the concepts that underlie the formation of a knowledge. The right education is to make learners understand science rather than remember it as an information in memory (Fahmi and Irhasyuarna, 2017).

Learning with the inquiry model provides an opportunity for learners to discover and investigate the concept of a procedural, systematic, and interconnected between one concept with another concept. Of course at the level of junior high students need guidance when exploring a phenomenon to get a concept. This model will foster intrinsic motives because learners feel satisfied with their own experiences in their learning. This inquiry study is also very suitable for material that is cognitive, but requires a lot of time and if less guided and directed will be unclear of the material being studied (Makmun, 2009). In addition, the application of guided inquiry learning model can improve learning outcomes of learners (Untajana, 2014). In general, this study will develop the skills of the science process and the learning outcomes of learners to a certain level of hope.

## 2. Methods

The method is divided into two types, namely quantitative research to determine the effectiveness of learning outcomes and the results of the science process skill of the inquiry learning model while the qualitative descriptive statistical research is used for the learner's response. The tools already in school are developed according to the objectives and needs analysis of the research. The device is designed using a constructivist perspective with guided inquiry model. The device is validated by 5 expert validators in the field and tested through the development stages.

The population of this research is the students of State Junior High School in Banjarbaru. The sample of the research class of 25 students consisted of 14 men and 11 women and the control class was 25 students consisted of 12 men and 13 women. Study time for 8 weeks.

The research design used in this research is pretest-posttest control group. The population is taken from two different classes and randomly selected. In detail the research design can be seen in Table 1.

**Table 1:** Research Design Pretest-Posttest Control Group

| Class | Pre-Test | Treatment | Post-Test |
|---|---|---|---|
| Experiment | $O_1$ | $X_1$ | $O_2$ |
| Control | $O_1$ | $X_2$ | $O_2$ |

The effectiveness of this study is measured through two instruments covering students' worksheets and learning outcomes that are guided by indicators of each lesson plan. Data is taken through pretest and posttest result of science process skill and learning result of learners. The test of learning outcomes and science process skills includes 25 items. Data were then analyzed using SPSS 24.0 program. After measured reliability using SPSS program, obtained the reliability (coefficient alpha Cronbach) of 0.506 for the results of science process skills and 0.571 on the test results of learning.

## 3. Results and Discussion

### 3.1 Effectiveness in the Skills of Science Process

**Table 2:** Test of Normality of Processing Skills of Science

| | | Kolmogorov-Smirnov | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| | **Factor** | **Statistic** | **df** | **Sig.** | **Statistic** | **df** | **Sig.** |
| Value | Experiment | .174 | 25 | .049 | .899 | 25 | .017 |
| | Control | .229 | 25 | .002 | .866 | 25 | .004 |

Based on the normality test, the data obtained are not normally distributed. Because the data is abnormal to be able to use Wilcoxon test as an alternative choice. The Wilcoxon test is used to determine whether there is an average difference between two paired samples. The results of the Wilcoxon test on the skills of the scientific process are presented in Table 3.

**Table 3:** Wilcoxon Signed Ranks Test on the Skills Process of Science

| | **Posttest – Pretest** |
|---|---|
| Z | -4.375 |
| Asymp. Sig. (2-tailed) | .000 |

Based on Wilcoxon test results showed a significant difference between pre-test and post-test. This indicates that the inquiry model is considered to have an impact on the development of the science process skills of the learners. Learners initially confused in solving problems about the skills of the science process, but after the learning model inquiry so they are able to solve it. This can't be separated from LKPD filling activity, where the activity of learners reflects the learning phase of inquiry model which is formulating the problem, formulating the hypothesis, collecting the data, analyzing the data and making the conclusion so as to bring up the science process of the students. Scientific process skills are the thinking skills used to solve problems and formulate results (Ozgelen, 2012).

In addition, the use of inquiry learning model that involves the stages of inquiry process can help learners in improving the skills of the science process so as to help learners in finding concepts that are not just memorizing but also enduring even in the memories of the students. This is in line with Simsek (2010) and Bekiroglu (2013) studies which suggest that inquiry-based learning can improve the conceptual understanding of learners and develop students' learning process skills.

### 3.2 Effectiveness on Test Results Learning

**Table 4:** Test of Normality on Learning Outcomes

| | | Kolmogorov-Smirnov | | | Shapiro-Wilk | | |
|---|---|---|---|---|---|---|---|
| | **Factor** | **Statistic** | **df** | **Sig.** | **Statistic** | **Df** | **Sig.** |
| Value | Experiment | .298 | 25 | .000 | .790 | 25 | .000 |
| | Control | .251 | 25 | .000 | .799 | 25 | .000 |

Increasing the value of learning results shows an increase in understanding and understanding of learners between the class of experiments and control classes significantly. However, in the normality test showed abnormal data distribution so to see the effect of data through Wilcoxon test.

**Table 5:** Wilcoxon Signed Ranks Test on Test Results Learning

| | **Posttest - Pretest** |
|---|---|
| Z | -4.409[b] |
| Asymp. Sig. (2-tailed) | .000 |

Based on the results of Wilcoxon test p value <0.05 indicates a significant influence of inquiry model on test results learners. This can be understood as inquiry learning can improve learning outcomes because the step in inquiry learning encourages learners to explore and discover for themselves the concept of learning they are learning. This leads learners to experience a more memorable learning experience so that the concepts they find themselves are easier for them to remember and understand.

This is in accordance with the theory of constructivism which states that knowledge is formed not only of the objects alone but also depends on the individual itself as a subject that captures every object observed. Therefore, knowledge is not static but dynamic depending on the individual who sees and constructs it (Sanjaya, 2011). Based on research Schall (2012), states that inquiry-based learning can improve the cognitive learners. The same thing was also raised by research Koksal (2012) and Nuangchaleum (2009). In addition, according to Bekiroglu (2013) research results that inquiry-based learning can improve students' conceptual knowledge skills and science process skills. Lati et al. (2012) also put forward the same thing in the results of his research is that inquiry science activity effectively improve learners' learning outcomes. Similarly, the results of Abdi's (2014) study suggest that learners who are taught with inquiry-based learning have higher learning outcomes than learners taught through traditional methods.

## 4. Conclusion

Inquiry is known as a model that organizes learners into a phenomenon, which in turn will arise questions, and also acquire knowledge and develop it into a concept. Researchers and teachers believe this way is able to boost learners' skills in learning, not only from the perspective of cognitive but also psychomotor and affective. This study

proves how improvements occur in learners after receiving inquiry interventions in their study. Quantitatively, the facts found inquiry model improve the ability of students' learning process and their learning outcomes.

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