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# Inquiry Learning Model Assisted by Factile Application to Improve Science Learning Outcomes

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***ABSTRAK***

*Rendahnya mutu pendidikan di Indonesia, khususnya pada tingkat dasar dan menengah, menjadi masalah utama bagi kapasitas sumber daya manusia negara. Berbagai upaya telah dilakukan untuk meningkatkan mutu pendidikan secara nasional melalui beberapa jalur. Maka, penelitian ini bertujuan untuk menganalisis pengaruh model pembelajaran inkuiri berbantuan aplikasi factile dalam meningkatkan prestasi belajar IPA siswa. Penelitian ini menggunakan pendekatan kuantitatif dengan jenis penelitian eksperimen semu (quasi experimental). Penelitian ini mensurvei 78 peserta di dua kelas dengan masing-masing 38 dan 40 peserta. Pengumpulan data dilakukan dengan menggunakan metode tes dengan instrumen berupa tes hasil belajar IPA. Pengambilan data dilakukan melalui pretest dan posttest. Hasil analisis menunjukkan bahwa rata-rata nilai posttest kelas kontrol berbantuan aplikasi faktil adalah 86,12, sedangkan rata-rata hasil belajar pretest kelas eksperimen adalah 86,96. Uji normalitas Kolmogorov-Smirnov menunjukkan bahwa data mengikuti distribusi normal. Hasil uji uji-t menunjukkan bahwa terdapat pengaruh penggunaan model inkuiri berbantuan aplikasi faktil terhadap hasil belajar IPA siswa kelas IV. Disimpulkan bahwa model pembelajaran inkuiri berbantuan aplikasi factile berpengaruh terhadap hasil belajar siswa Sekolah Dasar.*

**ABSTRACT**

The low quality of education in Indonesia, particularly at the primary and secondary levels, is a major problem for the country's human resource capacity. Various efforts have been made to improve the quality of education nationally through several channels. Thus, this study aims to analyze the effect of the factile application-assisted inquiry learning model in improving students' science learning achievement. This research uses a quantitative approach with the type of quasi-experimental research. This study surveyed 78 participants in two classes, 38 and 40 respectively. Data was collected using the test method with an instrument in the form of a science learning achievement test. Data collection was carried out through pretest and posttest. The analysis showed that the average posttest score for the control class assisted by factile applications was 86.12, while the average pretest learning achievement for the experimental class was 86.96. The Kolmogorov-Smirnov normality test shows that the data follows a normal distribution. The t-test results showed an effect of factile application-assisted inquiry models on the science learning outcomes of grade IV students. It was concluded that the factile application-assisted inquiry learning model affected the learning outcomes of elementary school students.

## 1. INTRODUCTION

Natural Science is one of the learning contents in the elementary-level curriculum (Astomo, 2021; Barus & Sani, 2018; Ferdi, 2013). Science learning at the basic education level aims to understand natural phenomena systematically, living things, and their environment (Pour et al., 2018; Saihu, 2020). In addition, science learning at the basic education level also aims to train students to think scientifically, which relies on data collected through experiments, observations, and deductive thinking patterns to provide a scientific explanation of an event/phenomenon. The principles of scientific thinking must be applied in developing the science curriculum at the basic education level, including applying the scientific method for problem-solving. The scientific method includes generating hypotheses, planning and conducting experiments, analyzing and interpreting data, and developing generalizations, laws, and applicable theories (Duran &

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Dökme, 2016; Maryam et al., 2020). The science learning process is more important than product mastery at the elementary school level. It means that learning about discovery alone is not enough. Students must actively participate (Hasanah et al., 2020; Lovisia, 2018).

Facts on the ground show that the science learning process in elementary schools has yet to be implemented optimally. The packaging of science learning often creates conditions supporting students' thinking skills and scientific attitudes in building their knowledge. It indirectly is also one of the factors causing low science learning outcomes (Ilhamdi et al., 2020; Nurmayani et al., 2018). Science learning is currently dominated by applying learning models, methods, and strategies less relevant to developing students' thinking skills and scientific attitudes. Science learning is also not packaged interestingly and innovatively, so science learning seems unattractive, difficult to understand, and boring (Inde et al., 2020; Puspitasari & Nurhayati, 2019). In line with this, empirical evidence on fourth-grade students at SDN 02 Delingan, Kecamatan Karanganyar, Kabupaten Karanganyar, suggests that the science lessons that have been followed so far have only been in the form of explanations of the topics in the student books. Students are only listeners and are asked to record important information the teacher conveys. Then the learning is continued by giving practice questions based on the topics the teacher has explained.

Based on some of these facts, learning innovation needs to be done to improve the quality of the science learning process, which will impact improving the quality of science learning outcomes. Guided inquiry learning is one solution that can be applied as a learning innovation. Several previous studies stated that guided inquiry learning is appropriate for use in learning science at the elementary school level. Guided inquiry learning has characteristics that can optimize the role of students in the learning process. These characteristics include: emphasizing activities that involve collaboration between students, reducing the teacher's active role in learning, maximizing student involvement in the discovery process, making learning more meaningful, and increasing student interest in the process of discovering their knowledge (Muliani & Wibawa, 2019; Saputra et al., 2020; Widiawati et al., 2020). In addition, guided inquiry learning also contains a series of activities that can maximize all students' abilities to search for and investigate something systematically, critically, logically, and analytically, so students can confidently formulate their findings (Evita et al., 2019; Sudarsana, 2018).

The novelty of this research is integrating guided inquiry learning with factile application in learning science in the fourth grade of elementary school. The steps of guided inquiry learning assisted by factile application are: formulating problems, proposing hypotheses, collecting data through simple experiments, testing the results of simple experiments/experiments with related facts/theories, and concluding the findings. The purpose of inquiry learning assisted by factile application is to direct students to be actively involved in discussions, asking questions, looking for answers, explaining, or listening to facts conveyed by their friends. This study aims to analyze the effect of the factile application-assisted guided inquiry learning model on the science learning outcomes of fourth-grade elementary school students.

## 2. METHOD

This research is educational research using a quantitative research approach. This research is quasi-experimental (quasi-experimental) with a one-group pretest-posttest design. This study involved the factile application-assisted inquiry learning model as the independent variable and science learning outcomes as the dependent variable. Based on the design used, the selected sample is given a pretest. Furthermore, treatment was given in the form of guided inquiry learning assisted by factile application. Then, after being given treatment, the selected samples were given a posttest.

The population involved in this study were all fourth-grade students at SD Negeri 02 Delingan, Kecamatan Karanganyar, Kabupaten Karanganyar, totaling 123 students. The number of samples used in this study was 78 students. Determination of the sample begins with an equivalence test in all classes to ensure consistency in the number of samples. The equivalence test was carried out using the SPSS 25.00 for Windows applications with a significance level of 5%. The results of the population equivalence test are shown in Table 1. The results of the equivalence test show that all classes in the population are functionally equivalent.

**Table 1.** The Results of the Equivalence Test Using the T-Test

| Group | t- count | t- table | df | Sig. | Description |
|---|---|---|---|---|---|
| IV A –IV B | 1.346 | 2.021 | 37 | 0,187 | Equivalent |
| IV A –IV C | 1.289 | 2.021 | 39 | 0,205 | Equivalent |
| IV B –IV C | 0,471 | 2.021 | 37 | 0,641 | Equivalent |

Data collection in this study was carried out using the test method. Science learning outcomes as the dependent variable are measured using the science learning outcomes test instrument. Before use, the instrument was tested for validity and reliability. The validity test was carried out by being assessed by experts. Based on the experts' assessment, all items on the instrument were declared valid. Reliability testing shows a coefficient of 0.97, included in the very high-reliability category. Descriptive and inferential statistical methods were used to analyze the data collected in this study. Descriptive statistical methods used include measures of central tendency and dispersion. Descriptive analysis aims to describe the data. The inferential statistical analysis method is used to test the formulation of the hypothesis that has been formulated. Inferential analysis in this study is the Paired Sample t-test. The analysis is preceded by prerequisite tests in the form of normality and homogeneity tests. The data analysis process in this study used IBM SPSS Statistics 25.00 for Windows with a significance level of 0.05.

## 3. RESULT AND DISCUSSION

### Result

### Descriptive Analysis Results

The results of the descriptive analysis of the pretest and posttest data in this study are presented in Table 2.

**Table 2.** Descriptive Analysis Results

| Statistics | Pretest | Posttest |
|---|---|---|
| Mean | 84,12 | 86,96 |
| Median | 88,00 | 88,00 |
| Variance | 49,54 | 52,34 |
| Std. Deviation | 7,03 | 7,23 |
| Minimum | 67,00 | 76,00 |
| Maximum | 90,00 | 98,00 |

### Analysis of prerequisite test results

The prerequisite tests carried out in this study included the normality test of data distribution and the homogeneity of variance test. Based on the normality test analysis using the help of the IBM SPSS Statistics 25.0 for Windows program, the significance score (Kolmogorov-Smirnov) of the pretest data is 0.200, and the posttest data is 0.200. Based on these results, it can be seen that the Sig. > 0.05 for all data groups. So it can be concluded that the two data groups are normally distributed. The data variance homogeneity test results in this study, using the help of the IBM SPSS Statistics 25.0 for Windows program, showed that the significance score (Based on Mean) was 0.096. Based on these results, it can be seen that the Sig. >0.05. So it can be concluded that the variance of the data is homogeneous. All analytical prerequisites related to the Paired Sample T-Test/ Correlated Sample t-test have been fulfilled so that the Paired Sample T-Test/ Correlated Sample t-test can be used to test the hypothesis of this study.

### Hypothesis Test Results

Based on the analysis of the Paired Sample T-Test/ Correlated Sample t-test using the help of the IBM SPSS Statistics 25.0 for Windows program, a significance score (Sig. 2-tailed) was obtained of 0.000. Based on these results, it can be seen that the Sig. < 0.05. So it can be concluded that H0 is rejected and Ha is accepted. In other words, there are significant differences in students' natural science learning outcomes before and after participating in learning using factile application-assisted inquiry learning.

### Discussion

Inquiry-based learning assisted by factile applications can improve students' science learning outcomes. This is in line with the main objective of learning science in elementary schools, for students to gain knowledge and understanding of scientific concepts, have the opportunity to generate ideas, and develop process skills to investigate the environment through scientific observations and experiments (Artawan et al., 2020; Inde et al., 2020). The factile application-assisted inquiry learning model can teach students to find and use information for themselves instead of relying solely on their teacher (Ardisa et al., 2022; Sianturi & Motlan, 2022). Students will actively participate in their mental processes for conclusion through observation, measurement, and data collection. Students taught with the factile application-assisted inquiry learning model are more likely to want to carry out their scientific experiments and develop their hypotheses while studying (Pour et al., 2018; Saihu, 2020). The guided inquiry learning model prioritizes learning outcomes and learning processes.

This study's findings align with several previous studies which stated that guided inquiry learning is appropriate for use in learning science at the elementary school level. Guided inquiry learning has characteristics that can optimize the role of students in the learning process. These characteristics include: emphasizing activities that involve collaboration between students, reducing the teacher's active role in learning, maximizing student involvement in the discovery process, making learning more meaningful, and increasing student interest in the process of discovering their knowledge (Muliani & Wibawa, 2019; Saputra et al., 2020; Widiawati et al., 2020). In addition, guided inquiry learning also contains a series of activities that can maximize all students' abilities to search for and investigate something systematically, critically, logically, and analytically, so students can confidently formulate their findings (Evita et al., 2019; Sudarsana, 2018).

Based on the findings of this study, factile application-assisted inquiry learning can be used as an alternative to innovative learning models in the implementation of science learning in elementary schools. The use of this model can be applied by considering the level of process skills possessed by students and the cognitive level of students. Furthermore, the recommendation to other researchers is to be able to use this research as a reference for conducting similar research with different choices of learning content, as well as a longer research time to get a more convincing picture of the effect of factile application-assisted inquiry learning on students' science learning outcomes elementary school. In addition, researchers are expected to be able to vary the dependent variable, which is measured as the impact of applying this factile application-assisted inquiry learning.

## 4. CONCLUSION

Based on the research results on the effect of the factile application-assisted inquiry learning model on science learning outcomes, the process influences the learning outcomes of fourth-grade students at SD Negeri 02 Delingan. Based on the findings of this study, factile application-assisted inquiry learning can be used as an alternative to innovative learning models in the implementation of science learning in elementary schools. The use of this model can be applied by considering the level of process skills possessed by students and the cognitive level of students.

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