

## The Influence of a Scientific Approach with Fun Science on Learning Motivation and Understanding of Physics Concepts

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### Abstract

*The objective of this study is to know about the influence of learning Science using scientific approach with fun science to learning motivation of JUNIOR HIGH SCHOOL students, the influence of learning Natural Science using scientific approach with fun science towards an understanding of the concept of Natural Science of JUNIOR HIGH SCHOOL students, and the influence of learning Natural Science using scientific approach with fun science to learning motivation and understanding of the concept of Natural Science of JUNIOR HIGH SCHOOL students. The object of this research is the VII grade students with "change in physics and chemical changes" learning material. This is a quasi experiment research with Pretest-Posttest Nonequivalent Control Group Design conducted in SMP Negeri 1 Panyabungan Utara . The sample in this research were determined with cluster random sampling techniques, therefore it resulted VII A class as the control class and VII B class as the experimental class. The treatment given to the experimental class was using scientific approach to learn with fun science (blobs in a bottle, ice cream, rapid color-changing chemistry, and merapi vulcano), while in the control class was the implementation of EEK learning-based (exploration, Elaboration, and confirmation). The students' learning motivation data was obtained using students' learning motivation observation sheets. The students' understanding of Natural Science data were collected by giving tests before (pretest) and after (posttest) learning. The Hypothesis testing was done by using a manova test after the test met the prerequisites. A prerequisite tests conducted were normality tests and homogeneity test. The results showed that learning using scientific approach with fun science has significantly impact on the students' learning motivation and understanding concept of Natural Science. The influence of the scientific approach with fun science learning motivation up to 20,1% by average grade learning motivation experiments reached category enough. Scientific approach with fun science also has an impact on the students' understanding of the concept of Natural Science up to 24,2% with an average increased to reached the category medium.*

**Keywords:** *scientific approach, fun science, blobs in a bottle, ice cream, rapid color-changing chemistry, merapi vulcano, learningmotivation, understanding of the concept of the Natural Science*

### ABSTRAK

Penelitian ini bertujuan untuk mengetahui pengaruh pembelajaran IPA menggunakan pendekatan saintifik dengan fun science terhadap motivasi belajar peserta didik SMP, pengaruh pembelajaran IPA menggunakan pendekatan saintifik dengan fun science terhadap pemahaman konsep IPA peserta didik SMP, dan pengaruh pembelajaran IPA menggunakan pendekatan saintifik dengan fun science terhadap motivasi belajar dan pemahaman konsep IPA peserta didik SMP. Penelitian dilakukan pada peserta didik kelas VII dengan materi pembelajaran "Perubahan Fisika dan Perubahan Kimia". Penelitian ini merupakan penelitian quasi experiment dengan desain Nonequivalent Pretest-Posttest Control Group Design yang dilakukan di SMP Negeri 1 Panyabungan Utara. Sampel dalam penelitian ini ditentukan dengan teknik cluster random sampling, sehingga diperoleh Kelas VII A sebagai kelas kontrol dan kelas VII B sebagai kelas eksperimen. Perlakuan yang diberikan pada kelas eksperimen yaitu melaksanakan pembelajaran menggunakan pendekatan saintifik dengan fun science (blobs in a bottle, ice cream, rapid color-changing chemistry, dan merapi vulcano), sedangkan pada kelas kontrol pelaksanaan pembelajaran berbasis EEK (Eksplorasi, Elaborasi, dan Konfirmasi). Data motivasi belajar peserta didik diperoleh dengan menggunakan lembar observasi motivasi belajar peserta didik. Data pemahaman konsep IPA peserta didik diperoleh dengan memberikan tes sebelum (pretest) dan sesudah (posttest) pembelajaran. Pengujian hipotesis dilakukan dengan uji manova setelah memenuhi uji prasyarat yang meliputi uji normalitas dan uji homogenitas. Hasil penelitian menunjukkan bahwa pembelajaran menggunakan pendekatan saintifik dengan fun science memiliki pengaruh secara signifikan terhadap motivasi belajar dan pemahaman konsep IPA peserta didik. Pengaruh pendekatan saintifik dengan fun science terhadap motivasi belajar peserta didik sebesar 20,1% dengan rata-rata motivasi belajar kelas eksperimen mencapai kategori cukup. Pendekatan saintifik dengan fun science juga memiliki pengaruh terhadap pemahaman konsep IPA peserta didik sebesar 24,2% dengan rata-rata peningkatan yang mencapai kategori sedang.

**Kata Kunci :** pendekatan saintifik, fun science, blobs in a bottle, ice cream, rapid color-changing chemistry, merapi vulcano, motivasi belajar, pemahaman konsep IPA

### INTRODUCTION

At this time, the potential of a nation or country is no longer measured by the abundance of natural wealth but is measured by the potential of human resources formed through the world of education. Education is a long-term investment in human resources

(HR) which has strategic value for the continuity of human life in the world. Education is basically a conscious effort to develop the potential of students' human resources by encouraging and facilitating their learning activities (Pratiwi, 2017). According to Asrial (2019), Education is an effort to

create quality human resources, so it is important to improve education in Indonesia. To improve the quality of education in Indonesia, it must also be supported by improving the quality of educational staff.

Learning and teaching activities are directed at mental formation, creating a learning environment that can influence students' cognitive development and help them become more aware of their thinking processes, for example in terms of students' basic abilities, knowledge, attitudes, and motivation. Whether or not learning outcomes are achieved cannot be separated from the teacher in implementing models and methods that can encourage students to learn.

Learning is a communication process, namely communication of messages from the teacher to students and an interaction between the two occurs. The enthusiasm of students in the learning process is a valuable step because this sense of enthusiasm will make it easier for students to understand the material presented by the teacher. Part of the enthusiasm of students depends on the level of motivation they have.

Based on the results of observations at SMP Negeri 1 Panyabungan Utara, the ongoing learning process still often uses the demonstration method. Observation results also show that teachers still use a teacher-centered learning approach, there is a lack of student

participation, it was found that many students are still often making noise and disturbing the concentration of other students during the learning process, and there is still a lack of understanding of concepts for some students.

Based on the description of the problem, the learning process needs innovation. A teaching method is a method or series of activities directed by educators towards students in the learning process at each stage of learning. The method is a way to implement strategies in a learning model. Methods are one of the tools to achieve goals (Fatniaton Adawiyah, 2021). The learning process should be more student-centered so that learning outcomes will be more meaningful. One approach that is centered on students is the scientific approach. A scientific approach is something used in the learning process that is designed so that students actively construct concepts, laws, or principles through a scientific approach (M. Hosnan, 2014: 34).

The scientific approach has 5 steps, namely observing, asking, collecting data (trying), reasoning/analyzing, and communicating.

Apart from being student-centered, the learning process also needs to be packaged into a fun activity, so that learning objectives can be achieved more optimally. This is in accordance with the

statement by Ismail S.M. (2008:47), who states that fun learning will attract students' interest so that learning objectives will be achieved optimally. Apart from that, fun learning will be a reward for students which can then encourage their motivation to become more active and appreciate subsequent learning activities.

Motivation is not instant but is obtained and shaped by the environment. The development of motivation is one of the essential foundations that is able to encourage humans to develop, grow, and progress towards achieving something (Conny Semiawan, 2008: 79). Learning motivation is defined as an effort made by the teacher or that arises from within the students so that it gives rise to feelings and desires in students towards learning activities to achieve learning goals. Motivation has characteristics (aspects), including, (1) being persistent in facing tasks, (2) being tenacious in facing difficulties, (3) the enthusiasm and activeness of students, (4) students being focused on tasks related to achieving results learn, (5) enjoy looking for and solving problems, and (6) can defend their opinions. Brendzel in Carroll (2011: 24) states that "games provide a natural motivation, are part of good teaching strategies, and, fortunately, there are many

that can be used to help build concepts". Games generate motivation naturally and are part of a good teaching strategy and another advantage is that they can be used to help build concepts.

According to Krathwohl (2002: 215), understanding concepts is determining the meaning of instructional messages including verbal, written, and communicating graphics. Aspects of understanding the concept in this research include, among others

- (1) interpreting (interpreting),
- (2) exemplifying (giving examples),
- (3) classifying (classifying),
- (4) inferring (suspecting, drawing conclusions),
- (5) comparing (comparing), and
- (6) explaining (explaining).

As an effort to improve the quality of learning that requires innovation, this research focuses on the influence of a scientific approach with fun science on learning motivation and understanding of science concepts in the material "Physical Changes and Chemical Changes". Many students are often confused about distinguishing between physical changes and chemical changes, so they need a better understanding of this material.

Thus, this research aims to analyze: 1) the influence of the scientific approach with fun science on the learning motivation of junior

high school students, 2) the influence of the scientific approach with fun science on the understanding of concepts of junior high school students, and 3) the influence of the scientific approach with fun science on motivation learning and understanding the concepts of junior high school students.

## RESEARCH METHODS

The writing method in this research uses a quasi-experimental research type with a Nonequivalent Pretest-Posttest Control Group Design. Observations in this design were carried out in the control class and experimental class. The experimental class was given learning using a scientific approach with fun science (blobs in a bottle, ice cream, rapid color-changing chemistry, and Merapi volcano), while the control class was given learning based on EEK (Exploration, Elaboration, and Confirmation). Before the learning process, both classes were given a pretest to determine the students' initial abilities. During the learning process, observers observe students' learning motivation. After completing the learning process, students are given another test (posttest) to determine the student's final abilities.

The data obtained in this research is qualitative data (the sum of learning motivation scores and concept understanding test scores).

This data was obtained using learning instruments and research instruments. Learning instruments include syllabus, lesson plans, and LKPD, while the research instruments include observation sheets on the implementation of scientific approaches with fun science (blobs in a bottle, ice cream, rapid color-changing chemistry, and Merapi volcano); learning motivation observation sheet; and questions to test students' conceptual understanding abilities. Learning motivation data was obtained by observing students during the learning process using a learning motivation observation sheet, while concept understanding data was obtained by giving a test before (pretest) and after (posttest) the learning process.

## RESULTS AND DISCUSSION

### The Influence of a Scientific Approach with Fun Science on Students' Learning Motivation

Data on student learning motivation was obtained from observations using student learning motivation observation sheets. Assessment of students' learning motivation is carried out by giving a checklist mark (√) for each indicator that is met during the learning process. Each indicator that appears will get a score of 1, whereas if it does not appear the student will get a score of 0. The total score obtained is then converted into a percentage to determine the motivation category

achieved. The results of data analysis show that the average motivation score for the control class is 8.33 and the experimental class is 11.63.

Based on the average value, when converted into percent (%) it is 34.72% for the control class and 48.44% for the experimental class. Based on the classification on a scale of 5 according to Eko Putro Widoyoko (2009: 242), the learning motivation of control class students is classified as lacking and the learning motivation of experimental class students is classified as sufficient. From these data, it is clear that students in the experimental class have higher motivation than students in the control class, in other words the scientific approach with fun science has an influence on students' learning motivation. This is in accordance with Jamal Ma'mur Asmani's statement (2011: 69), that students' learning motivation will increase because the learning approach used by teachers is centered on students.:

Based on the results of the MANOVA test, the Sig value was obtained. smaller than 0.05, namely 0.000, which means that the scientific approach with fun science has an influence on students' learning motivation. The magnitude of the influence of the scientific approach with fun science is shown by the Adjusted Rsquared value of

20.1%. This means that 20.1% of students' learning motivation is influenced by the learning approach used, while the remainder (79.9%) is influenced by other factors. These other factors include gifts, praise, grades, punishment, etc. (Arends, 2013: 148). The Influence of a Scientific Approach with Fun Science on Students' Understanding of Science Concepts

Data on students' conceptual understanding consists of initial ability data (from pretest results) and students' final abilities (from posttest results). Based on the calculation of the test scores, the average pretest score for the control class was 42.92 and the average pretest score for the experimental class was 47.81. Meanwhile, the average posttest score for the control class was 58.33 and the average posttest score for the experimental class was 73.28.

Data on students' initial abilities and final abilities in understanding concepts can also be used to determine the improvements obtained after the learning process takes place by calculating N-Gain. The calculation results show that the N-Gain value for the control class is 0.27 (low category) and the experimental class is 0.49 (medium category). Based on the test results, the significance value is 0.000, so it can be said that the scientific approach with fun science has an

influence on students' understanding of science concepts. The magnitude of this influence can be seen in the Adjusted Rsquared value, which is 24.2%, meaning that 24.2% of students' ability to understand concepts is influenced by the use of a scientific approach with fun science in the learning process. This is in accordance with the statement of Jamal Ma'mur Asmani (2011: who states that fun learning will increase students' attention to learning, so that it will improve their learning outcomes. Through fun learning it will also help build students' concepts (Carroll, 2011: 24).

The Influence of a Scientific Approach with Fun Science on Students' Learning Motivation and Understanding of Science Concepts. The influence of the independent variable on the two dependent variables in the MANOVA test can be seen from the significance value of Hotteling's Trace in the Multivariate Tests output. This significance value shows that the scientific approach with fun science has an influence on students' learning motivation and understanding of science concepts with a significance value of 0.000. The influence of the independent variable on the two dependent variables in the MANOVA test can be seen from the significance value of Hotteling's Trace in the Multivariate Tests output. This significance value shows that the

scientific approach with fun science has an influence on students' learning motivation and understanding of science concepts with a significance value of 0.000. The scientific approach with fun science is an approach that is centered on students. Direct involvement of students in the learning process will increase students' attention during the learning process, so that this can have an impact on improving student learning outcomes. This is in accordance with the statement of Jamal Ma'mur Asmani (2011: 61), who states that enjoyable learning will increase students' attention to learning, so that it will improve learning outcomes.

A scientific approach with fun science provides students with the opportunity to discover concepts for themselves through fun experiments. Through these fun experiments, students can experience their own learning experiences, so that the knowledge they gain will be more meaningful. Apart from that, having fun learning will attract students' motivation in the learning process so that learning goals can be achieved better. This is in accordance with the statement of Ismail SM (2008)that with learning.

Fun will achieve maximum learning goals, while a pleasant atmosphere will be a reward for students which can then encourage their motivation to become more

active and achieve more in subsequent learning activities.

## KESIMPULAN

Based on the results of the research that has been carried out, several things can be concluded, namely: 1) there is a significant influence of science learning using a scientific approach with fun science on the learning motivation of junior high school students by 20.1% and reaching the sufficient category with a percentage of 48.44%; 2) there is an influence of science learning using a scientific approach with fun science on junior high school students' conceptual understanding of 24.2% and reaching the moderate improvement category with an N-Gain value of 0.49; and 3) there is a significant influence of science learning using a scientific approach with fun science on junior high school students' learning motivation and understanding of science concepts.

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