

# The Effect of Scientific Approach at Natural Science Learning on Elementary Students' Learning Outcome

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**Abstract**—This study aims to: (a) design the description of the application of the scientific approach to science learning in elementary schools, (b) discuss whether there is an effect of scientific approaches to science learning on student motivation and students' learning outcomes in elementary schools. This type of research is a pre-experimental design with the design of one group pretest-posttest design. The variables of this study are independent variables and dependent variables. The independent variable is the scientific approach, and the dependent variables are learning motivation and science learning outcomes. The sample of this study is 12 teachers of the fifth-grade of elementary school and 406 students coming from 12 different elementary schools that apply K13 in Gowa Regency. Data collected includes observation techniques, questionnaires, tests, and interviews. The data were analyzed by SPSS version 2.2 statistical t-test technique. The results of the study show that: (a) a scientific approach to science learning is applied using 5M principle in thematic science teaching. However the 5M indicator has not been applied wholly, (b) students' learning motivation is fit to the "motivated" category, and (c) the students' learning outcomes are in the "good" category. In addition, there is an effect of the application of the scientific approach to science learning on students' learning motivation and learning outcomes. It is recommended that principals encourage teachers to develop their pedagogical competencies by attending workshops and apply a scientific approach to learning in all subjects in elementary school.

**Keywords**—scientific approach, motivation, learning outcomes

## I. INTRODUCTION

One of the main keys to the success of education in Indonesia lies in the quality of teachers and the curriculum as a learning tool. No matter how good the curriculum is, if the teacher is not able to apply it properly according to the demands of the curriculum, then the curriculum objectives are difficult to achieve. For this reason, it is necessary to strengthen the application of educational regulations that require every teacher to have competence, especially pedagogical, professional, personal and social competencies.

National education functions to develop the ability and form the character and national civilization in order to educate the life of the nation, aiming at the development of potential students to become human beings who believe and devote to God Almighty, have noble character, healthy body, knowledge, capability, creativity, independence, and being a

responsible citizen [1]. In connection with the objectives of national education, the teacher as a professional is expected to be able to carry out effective learning. The effectiveness of learning is characterized by the use of a scientific approach. The scientific approach is a part of the 2013 curriculum (K13).

In 2014, K13 came into effect at all levels of education [2]. One of the characteristics of K13 is the use of a scientific approach to learning on each subject in school. Characteristics of scientific approach with 5M (Observing, Questioning, Reasoning, Trying, and Forming networks) that is, in learning each subject, it is expected that there are observation, questioning, reasoning, experiments, and network formation activities [3].

In essence, K13 learning is learning by emphasizing authentic learning and assessment processes to achieve the competency of attitudes, knowledge, and skills. To achieve these three competencies, one of the approaches that must be used by teachers is a scientific approach, where learning encourages students to be better able to observe, ask, reason, try, and communicate ideas. One of the main objectives expected by the implementation of this scientific approach is the formation of improvements and a balance between the ability to become good people and human beings who have the skills and knowledge to live properly (hard skills) owned by students which cover the aspects of attitudes, knowledge and skills competencies.

Nurhamidah et al. [4] explained that there are several factors that can support the success of the application of K13, i.e. (1) the suitability of the competence of educators and education staff with the curriculum taught and the textbooks used; (2) the availability of books as teaching materials and learning resources; (3) integrating the four curriculum development standards; (4) fits to the learning interaction model; (5) fit to the integrated thematic learning that prioritizes the scientific approach; (6) authentic based assessment; (7) supporting the effectiveness of the education system.

In summary, it can be concluded that one of the factors supporting the success of K13 is teacher competence, starting from the preparation of learning, the use of teaching materials and learning resources to the maximum assessment which must be mastered so that learning in K13 can achieve goals. Another important thing is the ability of the teacher to apply the scientific approach to learning

especially in thematic science learning. Based on the results of interviews with several teachers about the application of the scientific approach, teachers generally apply all the principles of the 5M scientific approach to science learning. However, the 5M indicator has not been fully implemented by the teacher, so that students lack learning experience. Some teachers still emphasize the transfer of knowledge (telling), from the questions that arise in the class that emphasize what questions (what), instead of why and how. Based on this background, it is important to examine the application of the scientific approach to thematic science learning in elementary schools [5]. In addition, this study also examined the scientific influence of approach on learning motivation and student learning outcomes in thematic science subjects. The scientific approach is believed to be the golden mark on the development of students' attitudes, skills, and knowledge. In approaches or work processes that meet scientific criteria, scientists prioritize inductive reasoning rather than deductive reasoning [6]. Teaching with scientific approach emphasizes fact-based learning or phenomena that can be explained by certain logic or reasoning, not limited to mere imagination, legend, or fairy tales. So basically the scientific approach (scientific approach) makes students do various experiences of learning through observation and explain the results of their observations [7].

The problems in this study are: (1) what is the description of the application of the scientific approach in thematic science learning in elementary schools? is their an effect of the application of the learning to the students' motivation and learning outcomes in elementary school?.

## II. METHOD

The type of research is pre-experimental designs, which is so labeled because this design is not yet a true experiment [8]. There are still variables that influence the formation of dependent variables [9]. This study aims to describe the description of the application of scientific approaches and examine the effect of scientific approaches to learning motivation and learning outcomes of students in thematic science subjects. The design of the research is one group pretest-posttest design.

<b>O<sub>1</sub></b>	<b>X</b>	<b>O<sub>2</sub></b>
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O1: Pretest Score

O2: Posttest Score

X : Treatment (the application of scientific approach in Natural Science Learning)

The design of this study shows that before (O1) and after (O2) a scientific approach was applied, students are given pretest and posttest. The variables of this study consist of independent variables and dependent variables. The independent variable of this research is the scientific approach. The dependent variables are learning motivation and learning outcomes and natural thematic science. The operational definition of the variables are described as follows

- The scientific approach is characterized by 5M used by the teacher in making the students learn the

contents of thematic science learning in the fifth grade of elementary school.

- Learning motivation is the encouragement of the inner and outer self of students evoked by the application of the scientific approach
- Learning outcomes are the level of mastery of knowledge and content skills of thematic science learning achieved by students.

The population is a generalization area consisting of: objects/subjects that have certain qualities and characteristics set by the researcher to study and then the conclusion is [9]. Based on the understanding of the population, the population of this study is all elementary schools that apply K13 in Gowa Regency. A number of elementary schools that apply K13 as many as 48 (forty-eight) schools. The samples of this study are 12 teachers teaching in grade class 406 fifth grade students from 12 elementary schools which apply K13 in class I to class VI. The research sample was determined by purposive sampling technique [9]. The 12 school names are shown in Table 1.

TABLE I. THE SCHOOLS APPLYING K13 IN GOWA

No	School	Grade
1	SD Negeri Bontokamase	I – VI
2	SD Negeri Centre Mangalli	I – VI
3	SD Negeri Paccinongang	I – VI
4	SD Negeri Salajo	I – VI
5	SD Inpres Biringkaloro	I – VI
6	SD Inpres Lambengi	I – VI
7	SD Inpres Manuruki	I – VI
8	SD Inpres Pandang-Pandang	I – VI
9	SD Inpres Pare-Pare	I – VI
10	SD Inpres Sanrangang	I – VI
11	SD Inpres Tete Batu	I – VI
12	SD Inpres Tete Batu I	I – VI

Table 2 suggests that there are 4 (four) Public Elementary Schools and 8 (eight) Private Schools that apply K13 starting from grade I to grade VI. The data collection used in this study is observation, questionnaire, interview, and pretest, and posttest. Descriptive statistical analyzed was used of which frequency distribution and percentage table were made to measure the ability of students [10].

The learning motivation data are grouped into several categories, i.e.: highly motivated (SM), motivated (M), unmotivated (TM), highly unmotivated (STM), and the learning outcomes data are grouped into categories: very good (SB), good (B ), bad (TB), very bad (STB).

TABLE II. MOTIVATION CATEGORY

Score	Grade	Category
139 - 184	A	Highly motivated
93 - 138	B	Motivated
47 - 92	C	Not motivated
1- 46	D	Highly unmotivated

**TABLE III. LEARNING OUTCOME CATEGORY**

Score	Converted Score	Grade	Category
39-40	100	A	Very good
37-38	95		
35-36	90		
33-34	85		
31-32	80	B	Good
29-30	75		
27-28	70		
25-26	65	C	Fair
23-24	60		
21-22	55		
19-20	50	D	Bad
17-18	45		
15-16	40		
13-14	35		
10-12	10-30	E	Very Bad

Inferential statistical analysis was used to test t-test aimed to identify whether there was an effect.

### III. RESULTS AND DISCUSSION

The results of the study suggest that: (1) the principles of the 5M scientific approach have been applied by the teacher to teach thematic science. However, the 5M principle indicators have not been fully implemented by the teacher in teaching thematic science as the teachers have no comprehensive understanding, (2) students' learning motivation is in the "motivated" category characterized by the scores ranging from 93 to 138, and (3) science learning outcomes are in the "good" category shown by the scores ranging from 29 to 34 resulting the converted score 78 - 85. It can be drawn several conclusions namely: (1) not all scientific indicators of 5M have been applied by teachers in teaching thematic science in grade V in elementary school, (2) students' learning motivation in thematic science learning is in the motivated category, (3) learning outcomes achieved by students in the good category, (4) there is effect

of the scientific learning on learning motivation and learning outcomes of students science learning.

### IV. CONCLUSION

1. All principles of the 5M scientific approach are applied by several teachers in. However, the other teachers don't apply 5M indicators in learning.
2. There is an effect of the application of the scientific approach to science learning on students' learning motivation and learning outcomes.

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