



# ICMSE 2015

INTERNATIONAL CONFERENCE ON MATHEMATICS, SCIENCE, AND EDUCATION

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## THE CORRELATION OF SCIENTIFIC APPROACH AND SCIENCE TEACHER INTERPERSONAL INTERACTION WITH STUDENT LEARNING OUTCOMES IN JUNIOR HIGH SCHOOL

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### ABSTRACT

Student learning outcomes are influenced by many factors. Two of those factors are learning approach and teacher interpersonal interaction. This research aimed to analyze the correlation of scientific approach and teacher interpersonal interaction with science learning outcomes in cognitive, affective, and psychomotor abilities. This research was a correlational study. The subjects of this research were 96 students in eight grade and a science teacher at Nine Junior High School of Semarang. Data was collected using scientific approach questionnaire, Questionnaire on Teacher Interaction (QTI) in Australian Version, the observation sheet, and documentation sheets of learning tools and student learning outcomes. The results of correlation and regression test showed that there was a correlation between scientific approach and science teacher interpersonal interaction with science learning outcomes in cognitive as indicated by 0.713 correlation coefficient ( $r$ ) and 0.509 determination coefficient ( $r^2$ ), psychomotor as indicated by  $r = 0.703$  and  $r^2 = 0.495$  and affective as indicated by  $r = 0.649$  and  $r^2 = 0.412$ . From these results, it could be concluded that there was a strong and positive correlation between the scientific approach and science teacher interpersonal interaction with student learning outcomes in cognitive, affective, and psychomotor abilities.

Key Word: scientific approach, interpersonal interaction, learning outcomes

### INTRODUCTION

The 2013 curriculum emphasizes on modern pedagogic dimension of learning is to use a scientific approach. The scientific approach is believed to be the gold footbridge development of attitude, skill and knowledge of students. The scientific approach has a close connection with the student learning outcomes in schools. Learning outcomes is often a major topic in the field of education. Learning outcomes are also used as indicators of the quality and quantity of knowledge that has been mastered by the student. In the implementation of the curriculum in 2013, emphasizing learning outcomes developed in a balanced and proportionate in all aspects of good judgment in the aspect of cognitive, affective, and psychomotor using authentic assessment. On the other hand, optimal learning results are influenced by a variety of teaching and learning component of which is the relationship between teacher and student.

Implementation of scientific approach requires a good relationship between teachers and students in the

implementation of the learning process. This is an important factor in creating a fun learning environment and in accordance with the steps of scientific approach. Teachers are required excellent communication skills. Patterns of communication between teachers and students is a pattern of communication that occurs between personal or interpersonal communication. This is consistent with a theory expressed by R. Wayne Pace was quoted by Cangara (2005) that "interpersonal communication is communication involving two or more people in a face to face setting". Furthermore, David Lazear in his book Seven Ways of Teaching as quoted by Arikunto (2012) states that one aspect that shows the intelligence aspect of a teacher is to develop students' personal psychomotor in interpersonal relationships. Thus, the ability to interaction interpersonal very important to be understood and be used by teachers and students. Interaction communicative a well-established partnerships between teachers and students will bring

comfort students' learning and teachers in teaching that will bring positive impact to the evaluation student learning outcomes.

Nine Junior High School of Semarang is a school which use curriculum of 2013 since 2013. From the initial observation, the teacher has been carrying out scientific approaches to teach science in the classroom. But from the observation, the interaction exists between teachers and students has not been effective in the classroom. Some students often actively speak for themselves and are not actively involved in learning. From interviews with science teachers also stated that the learning outcomes of students who often are not actively involved in the learning tends to be lower than other students in science subjects. Some students are also less able to interact actively with the teacher in the learning. While the results of interviews with some eighth grade students said that their active involvement in the learning depends on how teachers communicate in delivery of materials science lessons.

Research on interpersonal relationship of teachers and students are still rare in Indonesia but was mostly done by researchers abroad (Maulana *et al.*, 2011). Research on the effects of scientific approach to learning outcomes by Marjan *et al.* (2014) showed that scientific approach give a positive role in improving student learning outcomes. Results of research conducted Machin (2014) also showed that the implementation of scientific approaches give a positive effect on the cognitive, affective, and psychomotor abilities and has reached classical completeness. Based on the above description, the researchers conducted a study on the relationship between the scientific approach and a science teacher interpersonal interaction with student learning outcomes.

## RESEARCH METHODS

This research is a correlational study used to determine the relationship between variables (Ary *et al.*, 2007). In this study, correlational study used to examine the relationship between independent variables with dependent variable. Correlational research in this study using explanatory research design (Creswell, 2012).

Research conducted at Nine Junior High School of Semarang. Subjects in the study include science teachers and students of eight grade. Samples to respondents in this research were three class of eight grade with total 96 students and one science teacher. Variables in this research include independent and dependent variables. The independent variables are

scientific approach and teacher-student interpersonal relationship while dependent variable is student learning outcomes cognitive, affective, and psychomotor abilities.

Data of scientific approach taken by a questionnaire instrument being tested for validity and reliability, documentation guidelines of learning science tools, and observation sheet. Teacher-student interpersonal interaction data obtained using the Questionnaire on Teacher Interaction (QTI) in Australian version. Student learning outcomes obtained from the tests and non test of students conducted by science teacher. Data analysis in this research using statistics and descriptive analysis. Multiple regression analysis used to determine hypothesis.

## RESULTS AND DISCUSSION

### Scientific Approach

Student response data to the scientific approach derived from 25 items in the questionnaire statement that have been tested for validity and reliability. Questionnaire of scientific approach compiled based description of each activity in scientific learning steps in accordance with The Regulation of Education and Culture Minister Number 103 of year 2014. The results of the questionnaires showed that average student given respond very well to adherence to the scientific approach. Results of student responses can be seen in Table 1.

Table 1. Results of Student Responses to Scientific Approach

Student Response Category	Total	Percentage (%)
1 Very Good	83	86,46
2 Good	12	12,50
3 Enough	1	1,04
4 Less	-	-

The support of scientific approach carried out in accordance is also indicated by the review of lesson plans that had been developed by a science teacher who showed excellent criterion. Scientific approach in learning science as a whole is in compliance with the five basic learning experiences according the Regulation of Education and Culture Minister in Number 103 Year 2014. The learning process with scientific approach applied is also able to support the students for creativity. For example, in the project assignment to make obscura camera, students in groups showed their creativity each well. This is in accordance with opinion of Dyers *et al.* (2011) that result from creativity capabilities observing, questioning, experimenting, associating, and networking in the 2013 curriculum.

**Science Teacher Interpersonal Interaction**

Data responses of teachers and students towards science teacher interpersonal interaction obtained through the Questionnaire on Teacher Interaction (QTI) in Australian Version is based on the Model of Teacher Interpersonal Behavior / MITB. Data from the teacher and student responses to interpersonal interactions are presented in Table 2 below.

Table 2. Response Score for Science Teacher Interpersonal Interaction

Interpersonal Interaction Character	Teacher Perception	Student Perception
Leadership	28	26,13
Strict	11	14,67
Uncertain	11	12,27
Freedom	22	19,04
Friendly	27	23,21
Understanding	27	24,21
Dissatisfied	9	10,21
Admonishing	7	12,11
	142	141,85

The results obtained from Table 2 can be seen that the responses of teachers and students on science teachers interpersonal interaction have a same perception. Science teacher gives the highest score on the leader character with total score is 28, as well as students who give the highest ratings to leader character with total score is 26.13. Students and teachers also gave the same assessment that the interpersonal character of science teacher after leader character was understanding and friendly. Furthermore, as many as 72 students from 96 students or as many as 75% of respondents provide an assessment that the dominant character possessed by the science teacher is a leader. It is same with assessment of science teacher character interpersonal interaction is the dominant leader. Data interpersonal teacher dominant character possessed by science teachers according to student assessment can be seen in Figure 1.

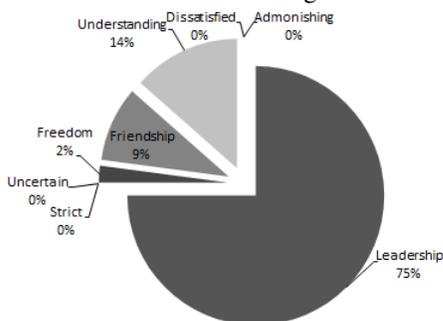


Fig 1. Science Teacher Interpersonal Character Dominance

Leader character in the opinion of the Khine & Atputhsahamy Cetin *et. al* (2014) is an important factor that affects many aspects of the learning environment. Teachers with leaders character have the ability to well-versed set, guide, manage tasks, determine procedures, know what is happening, providing a structure, explained, the aim to clear, and master class (Wubbels & Brekelmans, 2005). Results or is in accordance with the situation is actually in the classroom that teachers will be able to create a good closeness with the students.

**Student Learning Outcomes**

Student learning outcomes in the cognitive, psychomotor, and affective domains showed good results. Student learning outcomes in the aspect of cognitive of the material senses of vision and optical instruments showed that the highest score reached 3.72 from 4.00 and the lowest is 3.28 for cognitive domain. The learning outcomes average in cognitive aspect at 3.4 with B+ criteria. Furthermore, psychomotor aspect acquired through the results of the practice, project and portfolio assesment on senses of vision and optical devices. The thoroughness of learning outcomes in the aspect of cognitive defined by the mean score of the results of the task and daily tests are  $\geq 2,67$  accordance with the Regulation of Education and Culture Minister in number 104 year 2014. The result showed that overall the student has completed the skill aspect learning outcomes is above 66.75 or  $\geq 2,67$ . While the results of studying the aspect of affective obtained through spiritual and social affective assesment in the sense of vision and optical devices material. From the results of the overall study students showed that learning outcomes in affective aspects are from good to very good.

**Hypothesis Testing**

**Correlation between Scientific Approach and Interpersonal Interaction with Learning Outcomes in Cognitive Domains**

Based on the multiple regression analysis test conducted with the help of IBM SPSS Statistics Program obtained positive results and a strong relationship between the scientific approach and interpersonal interaction with the learning outcomes in aspect of cognitive as indicated by the multiple correlation coefficient of 0.713 and the determination coefficient of determination  $R^2$  is 0.509. Data can be seen in Table 3 below.

Table 3. Table R square Model Correlation between Scientific Approach and Interpersonal Interaction with the Learning Outcomes in Cognitive Domain

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.713 <sup>a</sup>	.509	.498	3.37039

Predictors: (constant), scientific approach, Interpersonal Interaction

Table 4. Linearity Test of Multiple Regression between Scientific Approach and Interpersonal Interaction with Learning Outcomes in Cognitive Domain

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	31.314	6.349		4.932	.000
	Scientific Approach	.299	.035	.630	8.660	.000
	Interpersonal Interaction	.171	.035	.359	4.941	.000

Dependent variable: learning outcomes in cognitive domains

**Correlation between Scientific Approach and Interpersonal Interaction with Learning Outcomes in Psychomotor Domains**

Based on the multiple regression analysis test conducted with the help of IBM SPSS Statistics Program obtained positive results and a strong relationship between the scientific approach and interpersonal interaction with the learning outcomes in psychomotor domain as indicated by the multiple correlation coefficient of 0.713 and the determination coefficient of determination R<sup>2</sup> is 0.509. Data can be seen in Table 5 below.

Table 5. Table R square Model Correlation between Scientific Approach and Interpersonal Interaction with the Learning Outcomes in Psychomotor Domain

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.703 <sup>a</sup>	.495	.484	3.01703

Predictors: (constant), scientific approach, interpersonal Interaction

Calculation of multiple regression analysis on the significance of regression testing is also known that the increase or decrease in the psychomotor aspect of science learning outcomes was 49,5% influenced by the scientific approach and interpersonal interaction through regression equation  $\hat{y}_k = 39,586 + 0,269 X_1 + 0,132 X_2$ ,

Calculation of multiple regression analysis on the significance of regression testing is also known that the increase or decrease in the cognitive aspect of science learning outcomes was 50.9% influenced by the scientific approach and interpersonal interaction through regression equation  $\hat{y}_p = 31.314 + 0.299 X_1 + 0.171 X_2$ , and besides it was as much as 49.1% is determined by other factors. The calculation result can be seen in Table 4.

and besides it was as much as 50,5 % is determined by other factors. The calculation result can be seen in Table 6.

**Correlation between Scientific Approach and Interpersonal Interaction with Learning Outcomes in Affective Domains**

Based on the multiple regression analysis test conducted with the help of IBM SPSS Statistics program obtained positive results and a strong relationship between the scientific approach and interpersonal interaction with the learning outcomes in affective domain as indicated by the multiple correlation coefficient of 0.649 and the determination coefficient of determination R<sup>2</sup> is 0.422. Data can be seen in Table 7 below.

Table 7. Table R square Model Correlation between Scientific Approach and Interpersonal Interaction with the Learning Outcomes in Affective Domain

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.649 <sup>a</sup>	.422	.409	1.99689

Predictors: (constant), scientific approach, interpersonal Interaction

Calculation of multiple regression analysis on the significance of regression testing is also known that the increase or decrease in the affective aspect of science learning outcomes was 42,2 % influenced by the

scientific approach and interpersonal interaction through and besides it was as much as 57,8 % is determined by other factors. The calculation result can be seen in Table 8.

$$\text{regression equation } \hat{y}_s = 55.279 + 0,111 X_1 + 0,131 X_2,$$

Table 6. Test of Multiple Regression between Scientific Approach and Interpersonal Interaction with Learning Outcomes in Psychomotor Domains

Models	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
<sup>1</sup> (Constant)	39,586	5,683		6,965	.000
Scientific approach	.269	.031	.641	8,685	.000
Interpersonal interaction	.132	.031	.316	4,279	.000

Dependent variable: learning outcomes in psychomotor domain

Table 8. Linearity Test of Multiple Regression between Scientific Approach and Interpersonal Interaction with Learning Outcomes in Affective Domains

Models	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
<sup>1</sup> (Constant)	55,279	3,762		14,696	.000
Scientific approach	.111	.020	.426	5,402	.000
Interpersonal interaction	.131	.020	.506	6,413	.000

Dependent variable: : learning outcomes in affective domain

The relationship between scientific approach and interpersonal interactions of science teacher with student learning outcomes in domain of cognitive, psychomotor, and affective in this research when adjusted for interpretation guidelines correlation values according Sugiyono (2012) is in a strong criteria. This can be explained because each independent variable are scientific approach and interpersonal interactions science teacher gives each its influence on student learning outcomes.

The learning process with the scientific approach capable of touching the cognitive domain that the students "know what", the psychomotor domain that the students "know how" and the affective domain that the students in the substance or the material being taught "know why". These results are consistent with research Nugent (2009), Fraser *et al.* (2010), and Wubbels & Brekelmans (2005) showed a positive relationship between interpersonal interaction of teachers and students with student learning outcomes. Similarly, the results of research conducted Ernawati & Tjalla (2008) showed a significant positive relationship between students and lecturer interpersonal interaction with student results. It is also supported by research from

Marjan *et al.* (2014) which shows that the scientific approach is a positive role in improving student learning outcomes. Results of research conducted by Machin (2014) also showed that the implementation of scientific approaches give a positive effect on student learning outcomes in the aspect of cognitive, psychomotor, and affective domains.

Learning science by using scientific approaches that take place in Nine Junior High School of Semarang requires students to actively participate in scientific skills so as to make the student interaction with teachers and students by the students will be established effectively. Establishment of student interaction with teachers and students with student would be able to nurture positive social attitude for students. This social attitude is an attitude which was considered in the process of learning science at school. If the student already has a social attitude, it can be increased to the optimum. This is according to research conducted by Wartini *et al.* (2014) which states that the use of better scientific approach and effective to improve the social attitudes of students in the learning process.

Research results from Fraser *et al.* (2010) showed that the students' perception of the classroom

environment and the results of their study showed a good relationship between student achievement in both cognitive and affective learned through relationship between teachers and students. Wubbels & Brekelmans (2005) in his research also showed that there is correlation between teacher-student interaction with student learning outcomes. This is because the relationship of students and teachers who are good will increase the motivation of students to learn. Therefore, with high motivation to learn the results of student learning is also getting better.

Results of student learning as one of the indicators of achievement of learning goals in the classroom can not be separated from the factors that influence learning outcomes. These factors can be derived from internal factors and external factors. Scientific approach or the approach taken in learning and interpersonal interaction of teachers and students are the two factors that affect student learning outcomes. Outside of these two factors, there are many other factors that affect student learning outcomes such as student background, teacher factor, learning atmosphere, facilities, curriculum and the environment (Hanafi & Suhana, 2009). In addition, many other factors that affect student learning outcomes.

## CONCLUSION

Based on the results and discussion can be concluded there is a strong positive relationship between the scientific approach and interpersonal interactions science teacher with three domains of student learning outcomes. Correlation between scientific approach and teacher-student interpersonal relationship with the cognitive learning outcomes shown by correlation coefficient 0.713 and determination coefficient 0,509. Correlation between scientific approach and teacher-student interpersonal relationship with the psychomotor learning outcomes demonstrated by correlation coefficient 0,703 and determination coefficient 0,495. Correlation between scientific approach and teacher-student interpersonal relationship with the affective learning outcomes demonstrated by correlation coefficient 0.649 and determination coefficient 0.412.

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