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Correlation between Teacher's PCK (Pedagogical Content Knowledge) and Student's Motivation in Primary School

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ABSTRACT

Various learning problems occur due to the teachers' inability in managing the learning process. Teacher's learning skill is influenced by their understanding in the curriculum components which are including pedagogical knowledge and content knowledge. The aims of this research were to determine: 1) the condition of Pedagogical Content Knowledge (PCK) of primary school teachers; and 2) the relationship between the teacher's PCK with student's motivation in learning. The experiment was conducted on teachers and primary school students in Yogyakarta, Indonesia. Teacher samples were taken by purposive sampling technique, whereas the student samples were taken by random sampling technique. The data of students' motivation were collected through questionnaire, whereas data of PCK obtained from the results of teachers' competency test in the last 2013. Data were analyzed using Pearson correlation technique. The results showed there is a relationship between teacher's pedagogical content knowledge with student motivation in learning (p value is 0.000, and r is 0.0907)

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1. INTRODUCTION

Education system in Indonesia is always evolving, which has purpose to improve the quality of education. It could be seen from the changes of the curriculum contents which have been adapted along with the challenge faced by Indonesia. Curriculum 2006 and Curriculum 2013 are the examples of those curriculums that have been used by the schools in Indonesia. Both of them have the important contribution in reaching the educational purpose although they are needed to be evaluated.

In the curriculum developing process, The Government always considering the stages of students' thinking competence, so that the curriculum implementation will be right on target. These considerations cannot be separated from the application of learning theories that already exist. According to constructivism view, study is considered as change process of view, insight, hope and mindset. For teachers to promote more effective learning the teacher needs to link new information to familiar information selectively in as learner – satisfying a format as possible [1]. In other hand, in social constructivism approach, a teacher should be able to be a facilitator. A facilitator should be able to produce an individual who could construct their own knowledge through problem solving exercises. The teachers are expected to help their students to find a concept. The establishment of the ability to think is the primary responsibility of teachers in equipping students towards their future that could be reached by scientific approach [2].

Indonesian National Education Standard in primary school shows that scientific approach consists of student ability to asking, reasoning, observing, trying, forming, producing, serving and communicating. In

scientific approach implementation, the students are encouraged to think analytically. The aim is that the students would be having balance and holistic of attitude, life skill, and knowledge which are suitable toward education demand in 21st century [3].

The ideal concept of scientific approach in the implementation of Curriculum 2013 is not easily accepted. The change of curriculum may be perceived as something very complicated that may result in frustration for most teachers but it may also be perceived as something new that challenges teacher to exploit their knowledge, skill, and creativity to make teaching and learning more enjoyable and more productive. However, it must be born in mind that how to respond to the change of curriculum depends very much on the way it is perceived [4]. The diversity of teachers' skills becomes a major issue in the implementation of scientific approach in a learning process. Many teachers especially in primary school level are not ready to apply this approach yet. It is necessary to prepare teachers from the lowest level so that the teachers will be having the same ability in content knowledge or pedagogical knowledge through scientific approach. Both of this competence called as Pedagogical Content Knowledge (PCK) in the National Council for Accreditation of Teacher Education (NCATE) [5]-[7].

PCK is the combination of content knowledge and teachers' ability in choosing strategy to deliver a learning material to the students, thus helping students to learn the learning material [14]. Based on that meaning, PCK consist of two important components, namely content knowledge (CK) and pedagogical knowledge (PK) [5]-[7]. Good PK could support teachers' skill to design, apply, and asses learning process. Meanwhile Content Knowledge could support the ability of teachers in reflecting students' level in understanding the concept. Content Knowledge could support the effectiveness of learning strategy on a certain learning material. In Science, PCK is defined as "knowing science is a necessary but not sufficient condition for teaching. Science teacher must also have knowledge about science learner, curriculum, instructional strategies, and assessment through which the transform their science knowledge in to effective and learning" [8].

PCK has an important role in the success of entrepreneurship learning. In case all lecturers and instructors have expertise in content material as well as how to teach entrepreneurship through various approaches and learning strategies, the quality of teaching entrepreneurship will be improve [9]. Teachers need a very hard effort in implementing pedagogical competence to optimize students' intellectual, emotional, and moral development [10]. Indonesian Government has been strived to improve teachers' competence in each educational level such as certificate program, also the establishment of teachers' activity center, teachers council, and teachers working group. Through these activities, teachers' quality and competence are expected to improve.

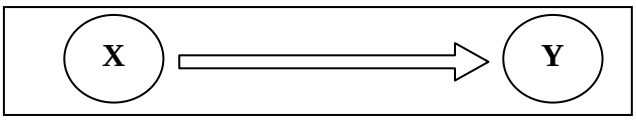
On the other hand, some data shows that the qualities of these teachers are not yet as expected. There are so many teachers do not have qualifications in accordance with the subject they teach. Fasli Jalal and DediSupriadi give the fact that 60% teachers do not have appropriate qualification, 20% teachers teach out of their expertise area [11]. As a result, many important concepts that should be taught to students just skipped because of the lack of teachers' understanding to the concept. The latest case which is became a trending topic on social media is about a teacher who teaches the wrong mathematics concept to his students. The result of a research in 2013 showed that many teachers candidate got misconception in some topics in mathematics and natural science. These misconceptions occur because of the errors concepts taught by the previous teachers. It is shows how low the teachers' competence in understanding a learning material content as well as how to teach it.

From that discussion, we could realize the enormity of the teachers' responsibility to the students' future. Teachers are not only responsible in providing material to the students, but also must be able to motivate the students. Students' motivation is influenced by teachers' learning approach [12]. When the teachers have been able to build students motivation in a learning process, they have built up easiness for students [13]. It means that students are encouraged and inspired to study continuously wherever and whenever they are. The purpose is to determine that students have motivation to lifelong learning. Based on above description, the researcher realizes that Pedagogical Content Knowledge (PCK) and students' motivation have the same important position in a learning process so it is important to analyze the correlation both of them.

2. RESEARCH METHOD

This research was conducted by collecting primary and secondary data which then has been described and analyzed. This research employed quantitative approach with Ex-post facto design. The main reason was that the researcher did not give any treatment and manipulation to the research subject [10]. To determine the correlation between each component, the researcher used correlation method with inferential

statistical analysis technique. The result of the data analysis will show the strength of the correlation between teacher's PCK and student's motivation. Figure 1 shows the research design.



Explanation:
X = Teachers' Pedagogical content knowledge (PCK)
Y = Students' motivation in learning process

Figure 1. Reaseach Programe scheme

The population of this research was all teachers of elementary schools in Yogyakarta, Indonesia. The sample was part of the number and characteristic of the population. The sampling technique on this research was purposive sampling with judgment sampling and also random sampling. Purposive sampling used to take sample of teachers whom represent very high, high, low, and very low PCK. Meanwhile random sampling used to take sample of students whom their learning motivation would be measured. They were students thought by teacher sample which taken before. There were 32 teachers and 82 students as samples.

This research used closed questionnaire as one of the instruments. It was used to measure students' motivation in the learning process. This questionnaire used Likert Scale with four possible answers to be chosen by studenta with a check mark. The indicators that have been used refer to the following characteristics. They are 1) resilient in facing adversity; 2) could work continuously for a long time, persevering in facing the task; 3) Do not need outside encourage to make the best achievement; 4) prefer to work independently; 5) capable to defend their opinion; 6) bored quickly on routine tasks; 7) not easy to take down his beliefs; 8) like to find out and solve problems [17]. The teachers' PCK variable was obtained from the data of teachers' competency test in 2013 organized by the Education Quality Assurance Department of Yogyakarta, Indonesia.

Researcher tested the validity and reliability of the instrument before using it to retrieve data. This study used construct validity by listen to the opinion and suggestion of a professional judgment. After improving the instrument based on professional judgment suggestion, further testing the instrument to a number of students which were not sample. The results of calculation using the instrument reliability Anates Version 4 showed that the reliability of the instrument motivation to learn is by 0.86 with a mean of 77.15 and standard deviation was 11.25. Anates significantly (α) = 0.05, and it was found that the correlation coefficient for 30 samples were 0.049. The result of validity test showed that r count (0.860) > r table (0.349); it can be concluded that the instrument of student's motivation stated reliable and could be used as a data collecting instrument.

Before testing the hypothesis, the researcher conducted the analysis prerequisite test analysis in this study includes test of normality and homogeneity of the sample. Normality test was used to investigate whether the data in this study were normal distribution or not. Homogeneity test was used to determine whether the variances from some population were the same or not. Based on the test that have been performed using SPSS20 was gotten the conclusion that all samples were distributed normal and homogeneous, so the hypothesis could be done using statistical parametric with Pearson correlation analysis. Pearson correlation coefficient (Product Moment Correlation) was used with consideration of several reasons, namely: sampling of the population should be random; The data that the correlation was sought should be a scale interval or ratio; the score variation of both variables that the correlation was sought should be the same; variable score distribution that the correlation was sought should be an unimodal distribution; the relationship between variables X and Y should be linear [16], [18].

3. RESULTS AND ANALYSIS

3.1. Description of teachers'*Pedagogical Content Knowledge* data

PCK data are grouped into 4 categories i.e very high, high, low and very low. 1) Very high($X \geq X_i + 1.5*SB_i$); 2) high ($X_i + 1.5*SB_i < X \geq X_i$); 3) low ($X_i < X \geq X_i - 1.5*SB_i$); and 4) very low ($X < X_i - 1.5*SB_i$). The mean of PCK is 65,59; whilethe standard deviation is 15,89. Based on those criteria, we could conclude that from 32 teachers of Muhamadiyah elementary schools in Yogyakarta are no teacher who has

very low PCK, 6 Teachershave low PCK, and 15 teachers have high PCK. Those data are presented in table 1 below.

Table 1. Description of teachers' Pedagogical Content Knowledge data

Calculation Result	Very lowPCK	Low PCK	High PCK	Very high PCK
N	-	6	15	11
SD	-	6.31	5.97	5.03
MEAN	-	40.63	63.33	82.27
MIN	-	31.25	52.50	75.00
MAX	-	47.50	73.75	91.25

Based on the Table 1, the data shows that there is no elementary school's teacher in very high PCK, but there are 6 teachers have low PCK, with minimumscore is31,25; maximum score is 47,50; average score is 40,63; and standard deviation is 6,31. 15 teachers have high PCK with minimum score is 52, 50; maximum score is 73, 75; average score is 63, 33; and standard deviation is 5, 97. While 11 teachers have very high PCK with minimum score is 75, 00; maximum score is 91, 25; average score is 82, 27; and standard deviation is 5, 03. Histogram of the distribution of teachers' PCK score can be seen in Figure 2.

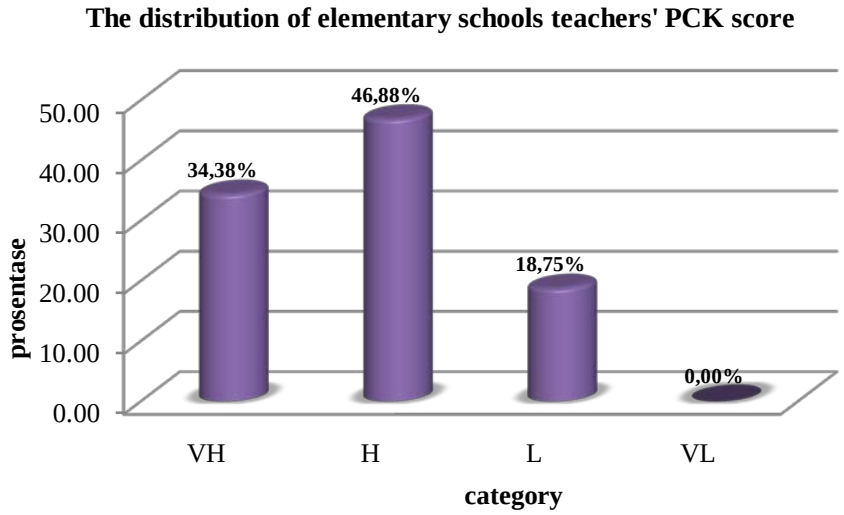


Figure 2.The distribution of PCK score

Based on figure 2, it can be seen that the largest presentage of teachers' PCK score is the high criteria in 46,8 %; then the second is the very high criteria in34,38%; the low criteria is 18,75%; and the very low criteria is 0,00%. It shows that most teachers have high PCK and will provide a positive impact on student performance [20].

3.2. Description of Students learning Motivation

Students learning motivation also be grouped in 4 categories,they are very high, high, low, and very low.1) Very high ($X \geq X_i + 1.5*SB_i$), 2) high ($X_i + 1.5*SB_i < X \geq X_i$), 3) low ($X_i < X \geq X_i - 1.5*SB_i$), and 4) very low ($X < X_i - 1.5*SB_i$). The average of students' learning motivation is 67, 13, meanwhile their standard deviation is 8, 27. That data is shown by Table 2.

Based on Table 2 above, there is no student have very low learning motivation, but there are 5 students who have low learning motivation which minimum score is47,5; maximum score is 54,50; the average score is 51,00; and standard deviation is 3,50. There are 45 students who have high motivation which minimum score is 56,00; maximum score is 71,25; the average scoreis 63,175; and standard deviation is 4,50. Meanwhile there are 26 students who have very high learning motivation. The minimum score is 72, 50; maximum score is 82, 00; the average is 78, 17; and standard deviation is 3, 89.Histogram of distribution of the student's motivation score is shown byFigure 3.

Table 2.Description of Students Motivation (SM)

Calculation Result	Very lowSM	LowSM	High SM	Very highSM
N	-	5	45	26
SD	-	3.50	4.50	3.89
MEAN	-	51	63.175	78.17
MIN	-	47.5	56	72.5
MAX	-	54.5	71.25	82

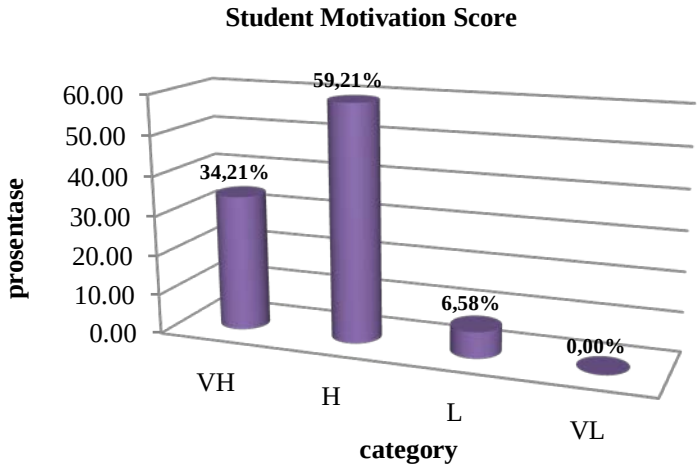


Figure 3. Students Motivation Score

Figure 3 shows that the largest presentageto students' motivation is in high criteria in 59,21%, then in the second rank is in very high criteria in 34,21%, then the low criteria is 6,58 %, and the very high criteria is 0,00 %.

3.3. Hypotheses Test

Hypotheses in this research could be tested using product moment correlation to investigate the correlation between PCK and student motivation. After inputting the data of each variable into worksheet SPSS 20 and then the researcher did the hypotheses experiment, and the result could be seen in table 4 below:

Table 4 shows that the coefficient correlation between teachers' PCK and students' motivation are 9, 07. It means that correlation between two variables have strong positive value, because it is near to 1. It shows that the improvement of teacher's PCK will be followed by the improvement of students' motivation. This result is strong with P Score (0,000) are lower than significant degree ($\alpha = 0.05$), so the hypotheses is rejected, it means there is correlation between PCK and students' motivation.

Table 4.Result of hypotheses Test

Correlations			
		Teachers' PCK	**Learning Motivation**
Teachers'PCK	Pearson Correlation	1	0.907**
	Sig. (2-tailed)		0.000
	Sum of Squares and Cross-products	16.219	189.750
	Covariance	0.523	6.121
	N	32	32
Learning motivation	Pearson Correlation	0.907**	1
	Sig. (2-tailed)	0.000	
	Sum of Squares and Cross-products	189.750	2695.625
	Covariance	6.121	86.956
	N	32	32

Reduction and data analysis was done to divide the result of teachers' competency test to be some criteria i.e very high, high, low, and very low. After getting criteria of PCK, the researcher took samples of teacher. It used purposive sampling technique with judgment sampling technique. The use of this technique

was based on the consideration of the samples taken from the PCK could represent the entire population as well as the ease access to retrieved student's motivation data. Based on that step, the researcher got 32 teachers as sample in the first variable (PCK).

The next step was taking sample of the students which their learning motivation would be measured. The sample were students of the teachers who also become sample in this research. It used random sampling technique. There were 128 students as sample but just 82 students who gave back the questioner. Student's motivation data was taken by closed questioner which has been validated by expert judgment then tested to the students. The questions in this questioner were arranged based on the indicator that have been prepared before. Learning motivation score were divided into four criteria, i.e. very high, high, low, and very low.

The prerequisites test result showed that the samples were distributed normally and homogeneous. Therefore, parametric statistics could be used to test the hypotheses. In this research, hypotheses testing were done by Pearson Correlation. The result was the coefficient correlation between teacher's PCK and student's motivation was 0,097. It indicated strong positive correlation between teacher's PCK and student's motivation.

Teacher's PCK is a combination of pedagogical and professional competency. In pedagogy competence, teachers are required to have the abilities of: 1) students characteristic, 2) curriculum development, 3) the development of communication and technology, 4) the development of students' potential, assessment system, and learning evaluation, 6). Effort to develop fun learning. In the professional competence, the teacher must be able to: 1) mastering the learning material, structure, concept, knowledge mindset that support the lesson subject, 2) master the competence standards and basic competences of teaching subjects, and 3) developing the teaching learning materials effectively [3]. Teachers' pedagogical content knowledge was theoretically and empirically distinguishable from their content knowledge. Multilevel structural equation models revealed a substantial positive effect of pedagogical content knowledge on students' learning gains that was mediated by the provision of cognitive activation and individual learning support [21].

By understanding the characteristics of learners, teachers can customize the learning strategies suitable with the students' stage of thinking. In the 1st until 3rd grade, the students are in concrete thinking step. In this step, the students can think logically, but just in concrete things. Meanwhile in 4th until 6th grade, it risen into the abstract step. At this stage, children are able to think abstractly with the mindset of "possibility" and be able to think scientifically. By knowing the development of student's thinking, the teacher can choose the suitable learning strategy, thus students do not find difficulty grasping new knowledge. The students become more interested in learning so their motivation will be higher [19].

The curriculum must be constantly adjusted to current development and future challenges. Teachers are the main actors to carry out curriculum in the schools. The curriculum which designed ideally will be optimal while the teachers understand the concept. In the first year of the implementation of Curriculum 2013, teachers were complaint about the lack of their understanding in that curriculum concept. However the government's effort to provide training assisted by higher education that always giving assistance was able to be solution in that problem. Elementary school's teachers in Yogyakarta became more competent in the implementation of Curriculum 2013 which has positive effect in the learning process. Scientific approach in the learning process can optimize students' potential. Students have the same opportunity to explore themselves and develop all abilities in learning. This is what makes the students are motivated to learn.

In Curriculum 2013, the information and communication technologies must be integrated into the learning process. Teachers are required to master ICT in order to develop ICT-based learning media. With the help of the media, learning becomes more interactive. Students can also access teaching materials from many internet sources. Thus, students are more motivated to learn. An assessment and evaluation system is an important part of the learning process. Teachers are required to be able to develop assessment and evaluation system that capable of measuring all students' competence. Those students' competences are not only in cognitive aspect, but also attitude and skill aspect. Knowing that all they have done to be recognized as a result of learning, students will be more active and motivated to learn. This activeness and high motivation has implications for the high quality of the learning process and the outcomes of students learning.

Teachers Competence in implementing the curriculum requires mastery of the learning material content. In Curriculum 2013 structure, learning material presented in themes. They are no longer presented separately as subjects. In 4th grade, science and social studies subjects get its own portion that is three hours every week. Then, the other learning materials are presented thematically through scientific approach. Through this thematic learning, the government is trying to ease the burden of teachers who formerly required administering a number of subjects. Therefore, teachers' load is getting lighter so they are more freely to improve their mastery of the learning material.

The benefit of thematic learning is the flexibility of time, so that the teacher who mastering learning material content will be able to adapt learning material to students' needs. Students' load is lighter that could motivate students' to learn more. By understanding the content or pedagogical knowledge, the teacher will be able to design an interesting learning. Teacher will be more competence to develop learning material, especially combining certain subject into interesting themes in accordance to the student's thinking skill. The teachers also have more flexibility to connecting the learning material with environment and students' daily experience so that learning becomes more meaningful.

4. CONCLUSION

From the data analysis and discussion, it can be concluded that there is strong positive correlation between Pedagogical Content Knowledge (PCK) with students' learning motivation (p value was 0.000, and r was 0.0907).

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