International Journal of Engineering Sciences & Research Technology

(A Peer Reviewed Online Journal)
Impact Factor: 5.164

IJESRT

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[Suharta* *et al.*, 7(12): December, 2018]
IC™ Value: 3.00

ISSN: 2277-9655
Impact Factor: 5.164
CODEN: IJESS7

IJESRT

INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY

THE INFLUENCE OF TEACHER'S TRUST, SELF EFFICACY, AND CONTENT KNOWLEDGE TOWARDS PEDAGOGICAL CONTENT KNOWLEDGE AND ITS IMPACT ON STUDENT LEARNING ACHIEVEMENT

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DOI: 10.5281/zenodo.1968743

ABSTRACT

The purpose of this study is to determine the influence of Teacher's Trust (TT), Teacher's Self Efficacy (TSE), and Content Knowledge (CK) on Pedagogical Content Knowledge (PCK) and its impact on student's mathematics learning achievement. The population of this study were all math teachers and junior high school students in Buleleng Regency in 2018/2019 Academic Year. The sample of teachers was taken using area cluster random sampling technique, while the sample of student was determined using sampling purposive technique. This study used the post facto design. As independent variables were TT, TSE, and CK, the intermediate variable was PCK while the dependent variable was mathematics learning achievement. The instruments used to measure TT and TSE were questionnaires, while CK, PCK, and mathematics learning achievements were collected using tests. The methods of data collection used questionnaires and tests. Then, the data was analyzed inductively using Path Analysis. The results showed that there was no influence of TT, TSE, CK on PCK and its impact on student learning achievement. However, CK and PCK had a direct or indirect effect on student learning achievement with a contribution of 56.1%.

KEYWORDS: Teacher's trust, Teacher's Self Efficacy, Content Knowledge, Pedagogical Content Knowledge, learning achievement

1.INTRODUCTION

Learning is the process of interaction between teachers, students, and learning resources in the learning environment. Student learning achievement is influenced by student behavior, and student behavior is influenced by teacher behavior and student characteristics, as well as the attitude towards mathematics. Teacher behavior itself is influenced by teacher characteristics, teacher knowledge (material, pedagogy, student learning), teacher attitudes, teacher confidence in students, teacher's trust in learning and mathematics, student characteristics, and student behavior. If the teacher has pessimistic beliefs about students, then the teacher tends to dominate learning. The teacher does not provide opportunities for students to discuss, share ideas, explain, or find concepts. Likewise, if the teacher has the belief that mathematics is a product or is absolute, then the teacher will be more informative, and not provide opportunities for students to find out. Other important things that must be possessed by teachers are Content Knowledge and Pedagogical Content Knowledge.

Content Knowledge (CK) is the teacher's understanding of material and Pedagogical Content Knowledge (PCK) is the teacher's knowledge of learning and how students learn mathematics. Turnuklu and Sibel Yesildere (2007) conducted a study on elementary school teachers in Turkey found that there was a connection between CK and PCK, and both types of knowledge were important in mathematics learning. Paker, M (2016) found that CK anxiety had a high relationship with learning self-efficacy, and effective learning. As PCK also has a high relationship to effective learning.

Lisa Etheridge (2016) found that mathematical anxiety and self-efficacy mathematics as predictors of teacher self-efficacy in mathematics learning. Gulistan, M; Muhammad Athar Hussain and Muhammad Mushtaq.

ISSN: 2277-9655
Impact Factor: 5.164
CODEN: IJESS7

(2017) found that there was a very strong relationship between teacher's self efficacy and the mathematics learning achievement of secondary level students. Liu, X and Koirala (2009) found that there was a strong relationship between self efficacy and student achievement. Dwijayanti, Suharta, Sariyasa (2017) found that self-efficacy of students had a positive relationship with student learning outcomes in fractions.

The results of the research described above have shown that there was a very strong relationship between self efficacy, CK, PCK and student achievement. Considering the cultural aspects and teacher's trust (TT) on learning matters, it is necessary to conduct verification research on TT, TSE, CK, PCK, in relation to students' mathematics learning achievements. Therefore, the problem of this research is how the influence of TT, TSE, CK towards PCK and its impact on student learning achievement.

According to Fennema and Franke (1992) the components of mathematics teacher knowledge are mathematical knowledge, knowledge of mathematical representation, student knowledge, and knowledge of learning and making decisions. Ball, DL and MH Thames (2008) stated that the domain of teacher knowledge to teach mathematics consists of Subject Matter Knowledge and Pedagogical Content Knowledge. Subject Matter Knowledge consists of general material knowledge, special material knowledge, and horizon material knowledge, while Pedagogical Content Knowledge consists of material knowledge and curriculum, material knowledge and students, and material and learning knowledge. Based on these two opinions, the teacher's knowledge to teach mathematics is in the form of material knowledge and knowledge of pedagogic material. Material knowledge or often called CK is knowledge of general material, specific material needed relating to certain learning, and also knowledge related to the material in the next class or level. Knowledge of pedagogic material or often referred to as PCK is the teacher's knowledge of the curriculum that is being applied, knowledge of how students learn and think mathematics, and how to teach a material so students can understand.

Grossman's (1990) states that the PCK components are (1) the conception of learning objectives, knowledge and beliefs of learning objectives, (2) knowledge of students including student understanding, conception, and errors in the concept of material, (3) curricular knowledge, and (4) knowledge about learning strategies. The development of PCK components between experts one and the other shows inconsistency. However, from various views, the components of knowledge about students are emphasized, including the conceptual errors made by students. In this case, this component becomes a particular concern. Therefore, PCK assessment of teachers is related to understanding of conceptual errors, understanding students' reasons for conceptual errors, creating solutions to changing students' conceptual errors, and asking appropriate questions to correct students' conceptual errors.

Jones & Moreland (2004) described the framework and cognitive tools which have been developed to improve teacher PCK. Daehler & Shinohara (2001) explored the potential of science teaching cases to deepen CK and PCK teachers. An, Kulm, & Wu (2004) compared PCK mathematics teachers in the US and Chinese secondary schools. McDuffy (2004) examined the reflective practice of two basic pre-service teachers during an internship teaching their students and found limitations in PCK and a lack of trust that prevented the reflection of teacher services while teaching.

Stacey at all (2001) examined preservice CK primary school teachers and PCK decimal numbers. They asked prospective teachers to complete decimal comparisons of marking items that they though would be difficult for students, and explained it. The results demonstrated the need for teacher education to emphasize integrated CK in different aspects of the amount of knowledge, and PCK which included a thorough understanding of general difficulties. Sánchez & Llinares (2003) sought to identify the effect of subject matter knowledge of the teacher on teaching the pedagogical reasoning. Their findings indicated that the four teacher candidates in Indonesia differed in their subject knowledge to teach both the different aspects of the concepts that they emphasized and in the use of representations to the structure of learning activities.

Teacher's trust in students will color the teacher's mental attitude in making learning plans. If the teacher is optimistic that students have strong learning motivation, hard work and discipline, the teacher will carry out learning that allows students to explore, discuss, or discover. Conversely, if the teacher has a low level of trust in students, then the teacher's learning design is more directed at teacher-centered. Students will receive more

ISSN: 2277-9655
Impact Factor: 5.164
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teacher information, and less emphasis on discovery. Thus, the teacher's trust in students relates to the teacher's confidence in students' commitment and abilities. Student commitment includes the focus and pleasure in learning and doing mathematical tasks, has encouragement and learning needs, and responsibilities. Meanwhile, the aspect of ability involves understanding mathematical concepts and procedures, desiring achievement, and working hard in solving mathematical problems.

Bandura (1997) defined self efficacy as a person's belief in his ability to regulate and carry out actions to achieve set goals, and attempt to assess levels and strengths in all activities and contexts. Teacher's self efficacy towards Mathematics Learning is interpreted as the teacher's self-confidence in his ability to plan, implement, and assess to be effective in the classroom and achieve the expected competencies. This self efficacy will provide a strong impetus to conduct optimal learning so that effective learning is achieved. Teachers who have self-efficacy are good, so they can implement effective learning and can affect student achievement (Guskey and Passaro, 1994). In addition, Tschannen Moran & Woolfolk Hoy (2001) found that teacher self-efficacy influences student performance, student attitudes toward learning, and student growth.

The study results of the Patricia F. Campbell, at all (2014) relating to the knowledge relationship between CK and PCK secondary school teachers found that there was a very strong association with student learning achievement. These results support the findings of Turnuklu and Sibel Yesildere (2007) that there is a very strong correlation between CK and PCK and these two types of knowledge are important in mathematics learning. On the other hand Peker, M (2016) found that CK anxiety had a high relationship with learning self-efficacy, and effective learning. Once the case with PCK that has a high relationship to effective learning.

Gulistan, M; Muhammad Athar Hussain and Muhammad Mushtaq. (2017) found that there was a very strong relationship between teacher's self efficacy and the mathematics learning achievement of secondary level students. Liu, X and Koirala (2009) found that there was a strong relationship between self efficacy and student achievement. Dwijayanti, Suharta, Sariyasa (2017) found that self-efficacy of students has a positive relationship with student learning outcomes in fractions.

Thus CK and PCK are necessary conditions for the implementation of effective learning. In addition, the teacher's trust in students and class will increase the teacher's confidence to be able to carry out optimally in planning, implementing, and assessing learning so that the teacher's behavior in the classroom is very optimal and has an impact on student behavior that also becomes optimal. The behavior of students in the class will affect the student learning presatsi.

According to Shulman (1986), knowledge of mathematical content and knowledge of pedagogical content are two integrated parts of effective mathematics teaching. To build mathematical concepts in students' minds, knowledge of pedagogical content and knowledge of mathematical content are needed. The way the teacher connects subject matter with pedagogical knowledge and how knowledge of mathematical content is considered as part of the pedagogical reasoning process are seen as the integration of pedagogical content knowledge (Cochran, DeRuiter & King, in Turnuklu and Sibel Yesildere, 2007). On the other hand, the teacher's trust in the ability of students tends to have an impact on teacher behavior in carrying out learning. Similarly, self efficacy also has an impact on the selection of learning done by the teacher. This teacher's behavior will color the teacher's PCK and the teacher's PCK will have an impact on student learning achievement.

2. METHODS

The subject of this study is all mathematics teachers in class VIII and class VIII students of Public Junior School in Buleleng Regency in the 2018/2019 Academic Year. The steps for taking research samples are as follows.

a. Randomly determine 1 sample school from each sub-district
b. Assign a teacher from the sample school.
c. Assign students as many as 30-40 students taught by the sample teacher

The teachers involved were as many as 8 people and 266 students who were distributed into 8 schools in Buleleng Regency. This study uses the post facto design. Meanwhile, the independent variables are CK, TT, and TSE, the intermediate independent variable is PCK, while the dependent variable is student learning achievement.

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The instrument used to measure CK, PCK, and student achievement is a test, while measuring TT and TSE uses a questionnaire. The CK test was developed by referring to the material taught in semester 1 and taken from enrichment questions in the Class VIII Mathematics Teacher's Book (Kemdikbud, 2014). The material consists of coordinate systems, algebraic operations, functions, straight line equations, Pythhorhoras theorems, and statistics. The number of question for each topic is 1, so the teacher's CK test is 6 questions. CK is seen by using indicators of the concept usage to solve mathematical problems that are enriching and the ability to see other concepts related to problem solving.

PCK is measured through solving mathematical problems in the classroom. Each problem fundamentally focuses on the teacher's interpretation of students' misconceptions or misunderstanding of mathematical knowledge. In general, the expectations of the teacher are; understanding students' conceptions / reasoning, understanding students' reasoning, creating solutions to improve students' wrong reasoning, can ask appropriate questions to understand students' thinking, and asking questions to improve students' reasoning or conceptual understanding (Turnuklu and Sibel Yesildere, 2007).

Mathematics learning achievement is the ability of students to solve problems related to coordinate system material and algebraic operations collected by objective form tests and referring to basic competencies and indicators. Questionnaires of TT were developed by researchers with reference to aspects of commitment and students' abilities, , while the TSE questionnaire was developed by with reference to the belief in the implementation of learning and accommodating a questionnaire developed by Lisa Etheridge (2016) as many as 21 items.

Regarding the teacher's trust data, the positive stem was given a score of 1-5 and for the negative statement the score was reversed. Since there were 12 TT questionnaires items and 21 TSE questionnaires items, the maximum score of TT was 60, and the TSE was 105. CK was assessed by referring to predetermined indicators, and the extent to which they could apply the concepts in daily life. CK assessment was in accordance with the stages of problem solving by Polya, namely understanding the problem, planning solutions, implementing solutions, and looking back. Since there were 6 questions, and each correct answer was given a score of 10, so the teacher's maximum score was 60. Therefore, the PCK assessment of teachers was related to (1) understanding of conceptual errors, (2) understanding the reasons for students' misconceptions, (3) creating solutions to change students 'conceptual errors, and (4) asking appropriate questions to correct students' conceptual errors. Since there were 6 questions about PCK, and if the correct answer was given a maximum score of 4 while the wrong answer was given a score of 1, the maximum score was 24 and the minimum was 6. Then, all data was converted to scale 100. To test the hypothesis, the data was analyzed inductively using Path Analysis .

3. RESULTS AND DISCUSSION

The zero hypothesis formulation relating to the research hypothesis is "there is no influence of TT, TSE, and CK on PCK and its impact on student learning achievement". To test the zero hypothesis, a significant level of 5% is used. This means that if the significance value in the table is less or equal with 0.05, then zero hypothesis is rejected. And if the significance value in the table is more than 0.05, then the zero hypothesis is accepted. A summary of path analysis is shown in the following table.

Table 1: Analysis Summary Model

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.965[a]	.932	.881	4.82441
a. Predictors: (Constant), SEG(X3), CK(X1), KG(X2)				

Table 2: Analysis Coefficients

Coefficients[a]

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Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-76.893	23.649		-3.251	.031
	CK(X1)	.758	.181	.754	4.192	.014
	KG(X2)	.059	.219	.051	.267	.802
	SEG(X3)	1.106	.232	.674	4.777	.009

a. Dependent Variable: PCK(Y)

In accordance with Table 2 above, the significance value for X1 is 0.014 which is smaller than 0.05, the significance value of X2 is 0.802 which is greater than 0.05, while the significance value of X3 is 0.009 which is smaller than 0.05. This means that at the 5% significance level, X1 and X3 have a contribution to Y with beta 0.754 and 0.674, while the contribution of X2 to Y is not significant. This means that the X2 variable, TT, can be ignored. Therefore, a re-calculation of the regression model is performed. The results of the summary analysis are presented in table 3 and table 4 as follows.

Table 3: Analysis Summary Model

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.965[a]	.931	.903	4.35349

a. Predictors: (Constant), SEG(X3), CK(X1)

Table 4: Analysis Coefficients

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-73.620	18.262		-4.031	.010
	CK(X1)	.791	.119	.786	6.636	.001
	SEG(X3)	1.083	.194	.661	5.574	.003

a. Dependent Variable: PCK(Y)

Based on table 4 above, the significance of X1 is 0.001 and X2 is 0.003, both of them are less than 0.05. This means that at the 5% significance level, X1 and X3 have a contribution to Y with beta values of 0.786 and 0.661. Based on table 3, the error (e) can be calculated from SQRT (1-0,931) = 0.26. The analysis of X1, X3, Y on student achievement without involving TT can be shown in table 5 and table 6.

Table 5: Analysis Summary Model

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.883[a]	.779	.613	9.41906

a. Predictors: (Constant), PCK(Y), SEG(X3), CK(X1)

Table 6: Analysis Coefficients

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Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-107.577	81.457		-1.321	.257
	CK(X1)	2.484	.807	2.282	3.077	.037
	SEG(X3)	2.241	1.129	1.263	1.985	.118
	PCK(Y)	-2.855	.968	-2.638	-2.951	.042
a. Dependent Variable: Achievement(Z)						

Based on table 6, the significance value for X1 is 0.037 (less than 0.05), the significance value for X3 is 0.118 (greater than 0.05), and the significance value for Y is 0.042 (smaller than 0.05). This means that CK and PCK have influence toward the learning achievement. Therefore, a re-analysis is carried out without involving X3. The summary of the analysis results is as follows.

Table 7: Analysis Summary Model

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.749[a]	.561	.385	11.86864
a. Predictors: (Constant), PCK(Y), CK(X1)				

Table 8. Analysis Coofficients

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	48.334	27.138		1.781	.135
	CK(X1)	1.052	.456	.967	2.305	.049
	PCK(Y)	-1.073	.454	-.991	-2.364	.044
a. Dependent Variable: Achievement(Z)						

Based on table 8 above, the significance value of X1 is 0.049, and the significance value of Y is 0.044, both of them are smaller than 0.05. This means that at a significance level of 5%, then X1, and Y have a direct influence toward Z. From the table 7, The Model Summary is obtained by R2 of 0.561. This means that there is 56.1% of student achievement that is affected by CK and PCK, while the remaining 43.9% is influenced by other factors, excluding research. The error (e) is = SQRT (1-0,561) = 0.66. The relationship between the structure of CK, PCK and student achievement is shown in the following figure.

CK

ISSN: 2277-9655
Impact Factor: 5.164
CODEN: IJESS7

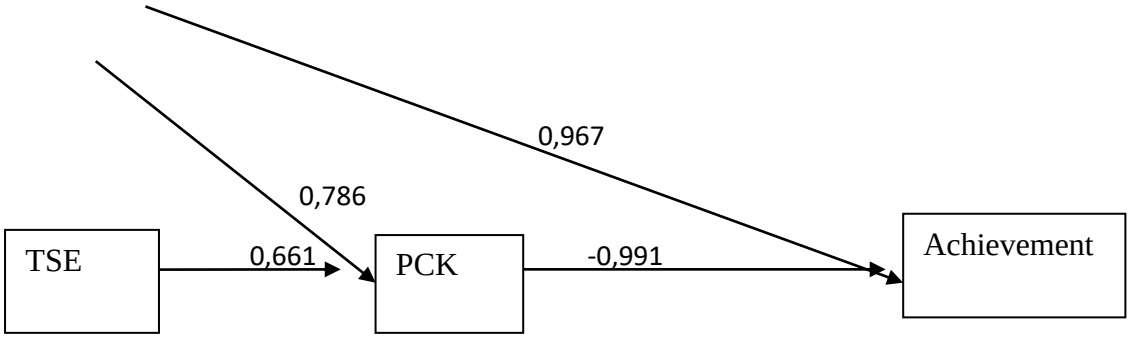

Figure 1. Structure Model of TSE, CK, PCK, and Achievement

4. CONCLUSIONS

One of the factors that influence student achievement is the teacher. Teacher's trust (TT), teacher's self efficacy (TSE), content knowledge (CK), and pedagogic content knowledge (PCK) possessed by teachers are aspects of the teacher that are closely related to the performance of the teacher. Teacher's trust (TT) is a belief in students' commitment and ability, TSE is the teacher's self-confidence in his ability to implement learning in order to achieve the expected competencies. CK is the teacher's understanding of learning material and knowledge with other material related to what is taught. PCK is concerned with understanding the conceptual errors made by students, understanding the reasons students make mistakes, creating student solutions to change students 'conceptual errors, and asking appropriate questions to correct students' conceptual errors. Based on emperical data and a significance level of 5% it can be seen that:

a. there was no significant effect of TT on CK and PCK
b. there is no significant effect of TT and TSE on student learning achievement
c. there is a direct influence of TSE on PCK.
d. there is a direct influence of CK on PCK.
e. there is a direct influence of CK on student learning achievement.
f. there is a direct influence of PCK on student learning achievement.
g. there is a direct influence of CK on student learning achievement and indirect CK through PCK on learning achievement with the contribution of CK and PCK to learning achievement is 56.1%.

Based on the conclusions above, it is recommendation as follows.

a. to other researchers to conduct research using the same variables as this study, but they involve a wider population and sample.
b. CK and PCK teachers need to be continuously improved because they have a direct or indirect impact on student learning achievement.
c. although teacher trust and self-efficacy of teachers do not affect student learning achievement, it continues to need to be developed positively because consciously or unconsciously affects teacher behavior in the classroom.

5. ACKNOWLEDGEMENTS

The thank very much to Rector of Universitas Pendidikan Ganesha for support fund in this research.

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