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THE RELATIONSHIP AMONG CONTENT KNOWLEDGE (CK), PEDAGOGICAL CONTENT KNOWLEDGE (PCK), AND STUDENT'S SELF-REGULATED LEARNING (SRL) AND ITS IMPACT ON STUDENT MATHEMATICS LEARNING OUTCOMES

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ABSTRACT

The purpose of this research was to know the relationship among CK, PCK, and student's SRL and its impact on student mathematics learning outcomes. This research was a combination research (Mixed Methods). This research used an explanatory sequential design. The quantitative research used an ex-post facto design and the qualitative research used a descriptive qualitative design. The population of this research was all the mathematics teacher and the grade VIII students of the state junior high school in the capital city of Tabanan Regency in the even semester of the 2018/2019 academic year. The sample of teachers was taken using purposive sampling technique and the sample of students was cluster random sampling technique. The research data were collected by tests, questionnaires, observations and interviews. The quantitative data were analyzed using Path Analysis, and the qualitative data were analyzed using qualitative descriptive data analysis. The results of this research indicated that there was a direct influence of CK, PCK, and student's SRL toward student mathematics learning outcomes with a contribution of 98.2%, but there was no an indirect influence of CK and PCK toward student mathematics learning outcomes through the student's SRL.

KEYWORDS: Content Knowledge, Pedagogical Content Knowledge, Self-Regulated Learning, Mathematics Learning Outcomes.

1. INTRODUCTION

In the process of learning mathematics, the teacher has an important role in guiding and directing students to improve the student learning outcomes. Learning outcomes are the results achieved by students from the learning process within a certain period. According to Rosiyanti & Wijayanti (2015), student learning outcomes was the achievement of students after they experience the adaptation process with their environment or their own experience (learning). Before conducting learning related to a material, the teacher should understand in advance about the concepts that will be taught to students. This is in line with the opinion of Shulman (1987) that knowledge related to learning content or what is called content knowledge (CK) is the domain of knowledge that must be mastered by a teacher in improving the implementation of learning.

According to Mishra and Koehler (2008) CK was knowledge of subject matter or material that must be studied or learned, with variations in material based on age and subject level. The teacher's knowledge regarding to the material that will be taught and linking the results of previous learning with the material that will be taught are important things that the teacher must have. Clearly, the teacher must understand and comprehend the teaching material that will be taught including knowledge of facts, concepts, theories, and procedures in a particular field, knowledge of the explanatory framework that rules and connects ideas, and knowledge of the rules as well as proof of teaching material (Shulman, 1986). The level of teacher's knowledge related to the material being taught and the association of teaching material with previously understood will also affect the delivery of teaching material and the benefits of learning it to students so that it affects the way students understand the concepts of the material being taught, and increases student's motivation in learning which will affect student mathematics learning outcomes.

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Shulman (1987) argued that to improve the effectiveness of learning besides CK, a teacher must also have knowledge related to learning and how students learn mathematics called pedagogical content knowledge (PCK). PCK can be concluded from Shulman's idea as an integration of teaching and learning process with mathematical knowledge. According to Ilyas (2015) PCK was a form of special knowledge that integrates mathematical knowledge with student knowledge, learning, and pedagogy. The high level of teacher knowledge related to PCK will affect the way teachers view the learning process. It is not only knowledge related to mathematical content that must be possessed by a teacher, but also needs to integrate that knowledge in learning by looking at the way students learn the material that will be taught. The results of research from Murray, et.al. (2018) showed a correlation between CK and PCK, but from several countries that have been studied, they have different correlations. This is due to differences in the development of CK and PCK from each country. Knowledge related to PCK will make teachers understand the problems that are often faced by students in their learning and understand how to provide feedback questions to solve problems faced by students.

Research results from Olfos, et.al. (2014) showed teacher PCK was significantly related to student learning achievement. This indicates that the high level of PCK will be able to influence the level of student learning achievement and increase the effectiveness of learning that takes place in class. So that the high level of PCK is expected to cause the student learning process to be more meaningful and lead to better student understanding of teaching material, which will have an impact on the learning outcomes of these students.

In addition there are other factors that can affect student learning outcomes, namely student's self-regulated learning (SRL). Student's SRL is an activity where individuals who learn actively as regulators of their own learning process, ranging from planning, monitoring, controlling and evaluating themselves systematically to achieve goals in learning, by using various strategies both cognitive, motivational and behavioral (Fasikhah & Fatimah, 2013 : 147). Gafoor & Kuruk (2016) added that student's SRL will result in student having the ability to manage their own energy, express emotions, behavior and attention, in a socially acceptable way and help achieve positive goals, such as maintaining good relationship, learning and maintaining well-being. This reflects that there is an influence of student's SRL on the level of student responsibility. This is in line with the opinion of Zimmerman (1990) that emphasized student's SRL on the importance of the student's responsibility in controlling the knowledge and skills they have acquired.

Zimmerman & Schunk (1989) described that the level of student's SRL will reflect control over themselves and will bring students into masters (experts / have mastered) in their learning process. In line with this we can conclude that student's SRL in learning will have an impact on the learning process and learning outcomes. In the case of developing student's SRL, teachers have an important role to facilitate and guide students to become self-regulated learners.

According to Butler (2002) to improve student's SRL, teachers must help students to be actively and adaptively involved in the cycle of cognitive activity (task analysis, selection and use of learning strategies, and self-adjustment to the problems faced). This is supported by research from Gafoor & Kurukkan (2016) which concluded that student's SRL can be encouraged by interventions in the classroom. The selection of appropriate learning methods and strategies will also affect student learning processes in stimulating learning conditions to be more conducive, as well as providing stimulus to students to become self-regulated learners.

In addition to facilitating and guiding students in their learning, the ability of teachers to represent problems contained in teaching materials will also affect student's SRL. Representation in mathematics is an arrangement that can represent something mathematical problems that are faced in the form of symbols, images, written words, graphs, numbers, and diagrams (Goldin, 2008, Stylianou, 2010). When explaining teaching material and guiding students, the teacher will use knowledge to create other forms that can represent the mathematical problems encountered. This will affect the way students think to become self-regulated learners. The improvement of student's SRL in learning will have an impact on the development of student's knowledge actively and will affect the improvement of student learning outcomes.

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2. MATERIALS AND METHODS

Materials

A. Content Knowledge (CK)

Content Knowledge (CK) is the domain of knowledge that must be mastered by a teacher in improving the implementation of learning. According to Mishra and Koehler (2008) CK was knowledge of the subject matter or material that must be studied or will be taught, with variations in material based on age and subject level. Clearly, the teacher must understand and comprehend the teaching material to be taught including knowledge of facts, concepts, theories, and procedures in a particular field, knowledge of the explanatory framework that rules and connects ideas, and knowledge of the rules as well as proof of teaching material (Shulman, 1986).

A teacher must have knowledge about what will be taught to students in achieving learning objectives. According to Ball, et.al. (2008) there were three things that can be used to measure the knowledge of teaching material from a mathematics teacher, including: 1) Common Content Knowledge (CCK), namely the knowledge held by a teacher related to teaching material in general, 2) Specialized Content Knowledge (SCK) , namely the knowledge possessed by a teacher related to teaching material specifically, and 3) Horizon Content Knowledge (HCK), namely the knowledge possessed by a teacher related to the use of mathematics teaching material in a wider scope. Furthermore, according to research from Olfos, et.al. (2014) there were the following things that can be used as indicators to see the level of teacher's CK, among others: 1) Conceptual Knowledge (CcK), namely the knowledge that teachers have, including general and specific mathematical knowledge. 2) Representational Knowledge (RK), which is teacher knowledge related to representing mathematical knowledge possessed.

Based on the description and opinions of the experts, it can be concluded that the CK of a mathematics teacher is in-depth knowledge of a teacher related to teaching material which is reflected in the way the teacher understands the concept of teaching material in general and specifically and builds its relationship with the concept of related teaching material. In line with this, the indicators used in this study to measure the level of CK of a mathematics teacher are 1) Conceptual knowledge in mathematics (Conceptual knowledge / CcK) with the observed aspects is the concept of mathematics teaching material concepts, and 2) Horizontal Knowledge in mathematics (Horizon Knowledge / HK) with the observed aspect is the knowledge of the relationship between a teaching material concept and other teaching material concepts related to the curriculum (Olfos, et.al., 2014: 919, Ball, et.al., 2008).

B. Pedagogical Content Knowledge (PCK)

According to Ilyas (2015) PCK was a form of special knowledge that integrates mathematical knowledge with students' knowledge, learning, and pedagogy. PCK can be concluded from Shulman's idea as an integration of teaching and learning process with mathematical knowledge. The high level of teacher knowledge related to PCK will affect the way teachers view the learning process. It is not only knowledge related to mathematical content that must be possessed by a teacher, but also needs to integrate that knowledge in learning by looking at the way students learn the material that will be taught.

Research results from Olfos, et.al. (2014) showed PCK was significantly related to student learning achievement. This indicates that the high level of PCK will be able to influence the level of student learning achievement and increase the effectiveness of learning that takes place in class. So that the high level of PCK is expected to lead to more meaningful student learning processes and result in better student understanding of teaching material.

According to research from Olfos, et.al. (2014) the following things that can be used as indicators to see the level of teachers' PCK include: a) Knowledge of Teaching of Content (KTC), namely teacher knowledge about organizing the applicable school mathematics curriculum and its parts, constructivist learning concepts in learning mathematics and learning theories proposed by experts, including in guiding decision making, learning planning, and teacher actions in class. b) Knowledge of Students' Knowledge (KSK), namely the knowledge that the teacher has regarding the knowledge obtained by students, awareness of the understanding of concepts

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and knowledge students have in completing the given task, including knowledge of the difficulties and mistakes that students often do in learning.

Based on the descriptions and opinions of these experts, it can be concluded that the PCK of a mathematics teacher is knowledge related to understanding student's problems in completing assignments, management and organizing learning in class, and providing feedback in learning to stimulate students to solve problems related to the material learned. In line with this, the indicators used in this study to measure the PCK level of a mathematics teacher are 1) knowledge related to teaching mathematics content (Knowledge of Teaching of Content / KTC), with the observed aspect is the ability of subject matter management in accordance with the applicable curriculum , the ability to carry out constructivist learning, and the ability to choose learning methods that are suitable with teaching material, 2) knowledge related to student's knowledge (Knowledge of Student's Knowledge / KSK) with the observed aspects are the ability to analyze student errors in learning and the ability to provide feedback in overcoming student's problems in learning (Olfos, et.al., 2014).

C. Student's Self-Regulated Learning (SRL)

Self-regulated learning (SRL) is an activity where individuals who learn actively as regulators of their own learning processes, ranging from planning, monitoring, controlling and evaluating themselves systematically to achieve goals in learning, using a variety of strategies both cognitive, motivational and behavioral (Fasikhah & Fatimah, 2013: 147). Gafoor & Kuruk (2016) added that student's SRL will result in students having the ability to manage their own energy, express emotions, behavior and attention, in a socially acceptable way and help achieve positive goals, such as maintaining good relationship, learning and maintaining well-being. This reflects that there is an influence of student's SRL on the level of responsibility of students. This is in line with the opinion of Zimmerman (1990) that student's SRL emphasize the importance of the responsibility of students in controlling the knowledge and skills they have acquired.

Zimmerman & Schunk (1989) described that the level of student's SRL will reflect control towards themselves and will bring students into masters (experts / have mastered) in the learning process. In line with this we can conclude that student's SRL in learning will have an impact on the learning process and student learning outcomes. In this regard, Hidayati&Listyani (2007: 10) formulated indicators used to measure the student's level of SRL, namely: a) independence from others, b) self confidence, c) disciplined behavior, d) have a sense of responsibility, e) behave based on their own initiative, and f) do self-control.

Based on the definitions and opinions of these experts, it can be concluded that the student's SRL is the ability of students to determine their learning process independently that reflects behavior that does not depend on others, believes in their own abilities, disciplined in learning, can utilize learning resources, and has control over its activities to achieve learning objectives. In line with this, the indicators used in this study to measure the student's level of SRL in learning mathematics are:1) independence from others, 2) self confidence, 3) disciplined behavior, 4) have a sense of responsibility, 5) behave based on their own initiative, and 6) do self-control (Hidayati & Listyani 2007: 10).

D. Student Mathematics Learning Outcomes

According to Sudjana (1989: 5) learning was "a process that is marked by a change in self" .Learning is a thing that cannot be separated from everyone's life, because learning is very useful for individual development both physically and mentally (Rosiyanti & Muthmainnah, 2018). This is in line with the opinion of Hamalik (2009: 27) which stated that learning was "a modification or reinforce behavior through experience". Learning requires active efforts from students in the learning process to find and process information related to the material being studied. After the learning process, students will experience a development. This is consistent with the opinion of Suardi (2018: 11) that learning is "a change in a person that can be expressed by the mastery of a new greeting pattern, in the form of experience, skills and attitudes as a result of the process of the experience experienced".

According to Slameto (2003) change as a result of learning can be in the form of changes in knowledge, understanding, attitudes and behavior, skills, and other aspects that exist in each individual, and these changes

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will be evident in all aspects of behavior. There are two factors that influence one's success in learning according to Slameto (2003), which are as follows.

a). Factors from within students (internal factors).
Such as: mental states, emotions, interests, learning motivation, responsibility, independence, senses, maturity of health, physical and intelligence, etc.

b). Factors from outside students themselves (external factors).
Such as: facilities, learning environment, learning time, learning media, how teachers teach, teacher knowledge, socio-economic status of parents and parenting parents, etc.

Learning outcomes are the results achieved by students from the learning process within a certain period. According to Rosiyanti & Wijayanti (2015) student learning outcomes was student's achievement after experiencing the process of adaptation to the environment and experience (learning). According to Bruner (in Rosiyanti, 2015) in learning mathematics students learn about mathematical concepts and structures, and look for relationships between mathematical concepts and structures of the material learned. From the description above it can be concluded that mathematics learning outcomes are the results achieved by individuals after undergoing a process of adaptation to their environment and experience (learning) using symbolic language, thus teaching individuals to use their reasoning to be able to think logically (Rosiyanti & Wijayanti, 2015: 39).

Based on the definitions and opinions of the experts, it can be concluded that student mathematics learning outcomes is the ability to master mathematics subject matter that students have in mathematics after undergoing a process of adaptation to the environment and their experience (learning) within a certain period of time. In this research the cognitive learning outcomes observed from student mathematics learning outcomes are focused and analytically assessed in relation to student mathematics problem solving abilities. So that in this research student mathematics learning outcomes will be seen from the tests that refer to indicators of student mathematics problem solving abilities, namely 1) understanding the problem, 2) planning the solution, 3) implementing the plan, 4) checking back (Sudiarta, 2012: 219).

E. The Relationship between Content Knowledge (CK) and Student's Self-Regulated Learning (SRL)

In implementing learning, the teacher's knowledge related to the teaching material to be taught is very important to provide an initial picture of the learning objectives to the teacher. CK of a mathematics teacher is not only focuses on how the teacher understands and comprehends a teaching material but also how the teaching material relates to the material that has been studied previously. This will affect the continuous learning process (continuous). CK will affect the quality of teachers in implementing learning. The development of teacher's CK will be able to improve student's SRL and make students become self-regulated learners. Students will become self-regulated learners if they have goals and motivation in learning.

In supporting this, the teacher must have in-depth knowledge related to teaching materials in order to convey benefits and provide reasons for students to learn teaching material. Knowledge of in-depth teaching material from the teacher is needed in this matter. During the learning process, teachers must teach with in-depth knowledge and experience related to teaching materials (National Research Council, 2000).

Knowledge of the concept of teaching materials from the teacher will also affect the understanding of student teaching materials. In-depth understanding of teachers related to teaching materials will lead to better and clearer teacher performance in the delivery of teaching materials and objectives in learning them. This will make students more motivated to learn and become self-regulated learners. The teacher's horizontal knowledge will make students better recognize the material because the teacher's explanation is related to mathematics teaching material that is related to each other or continuously. This has an impact on the development of students becoming more confident, disciplined, responsible and initiative in learning, andnot dependent on others, and exercising control towards their learning activities.

F. Relationship between Content Knowledge (CK) and Student Mathematics Learning Outcomes

CK of a mathematics teacher will influence the teacher's adaptation to teaching material and the quality of learning implemented (Ward, et.all., 2015). This will have an impact on the process and development of

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students in learning mathematics. The teacher must understand the organization of concepts, structures, and rules in determining the steps taken to solve a mathematical problem (Ball, et.al., 2008). This will affect the way and increase student's ability to solve a mathematical problem. In solving a mathematical problem, students need to know how the concepts, structures, and rules and steps that must be taken to solve these problems, this is strongly influenced by the CK of the mathematics teacher who teaches and can influence in improving student mathematics learning outcomes.

G. Relationship between Pedagogical Content Knowledge (PCK) and Student's Self-Regulated Learning (SRL)

In an effort to improve student's SRL to make students become self-regulated learners the teacher's PCK development needs to be done. Mathematics teacher's PCK will influence the implementation of learning in the classroom. Constructivist learning is highly demanded today. Therefore, teachers must understand how students learn and how to design learning in class so that students build their own understanding. Mathematics teacher's PCK includes knowledge related to teaching mathematics material and knowledge related to student's knowledge. By having both of these knowledge, the teacher will better understand how to teach mathematics teaching material in class. This is reflected in the ability of teachers to organize curriculum-based material, conduct constructivist learning, select approaches and methods in learning, analyze student errors in learning, and provide feedback in overcoming student's problems during learning (Olfos, et.al., 2014).

The PCK level of mathematics teachers will have an impact on the ability of teachers to organize teaching materials according to the curriculum, conduct learning that can stimulate students to build their own knowledge, design learning processes by choosing approaches and learning methods that are appropriate to the way students learn, analyze student errors in learning in order to facilitate The teacher recognizes students better, and guides students when having problems by giving questions that stimulate student's knowledge. The selection of learning methods that are appropriate to the teaching material will also affect the way students learn. Appropriate learning methods can make students more initiative, disciplined learning, responsible, and not dependent on others in learning, and by providing guidance in learning will be able to motivate students and increase student confidence in learning. In this case the teacher's PCK can be said to have an influence on student's SRL to make students self-regulated learners.

H. Relationship Between Pedagogical Content Knowledge (PCK) and Student Mathematics Learning Outcomes

In constructivist learning, the main task of the teacher in the classroom is as a guide and facilitator, which is supported by the teacher's ability to manage learning to improve student mathematics learning outcomes. This relates to the PCK owned by a teacher. Research results from Olfos, et.al. (2014) showed teacher PCK was significantly related to student learning achievement. The results of this study indicate that the level of teacher'sPCK will be able to influence the level of student learning achievement and increase the effectiveness of learning that takes place in class. Based on this, PCK are very important in improving student mathematics learning outcomes. By having a high level of PCK, a mathematics teacher will be able to carry out more effective learning in implementing meaningful learning that has an impact on mathematics learning outcomes of these students.

I. Relationship between Student's Self-Regulated Learning (SRL) and Student Mathematics Learning Outcomes

In improving student mathematics learning outcomes, student's SRL are very important in the intensity of student learning. Gafoor&Kurukkan (2016) argued that with the presence of student's SRL will result in students having the ability to manage their own energy, express emotions, behavior and attention, in a socially acceptable way and help achieve positive goals, such as maintaining good relationship, learning and maintaining well-being. This reflects that there is an influence of the student's SRL level on the level of responsibility of the student. The level of a student's SRL will have an influence on increasing student responsibility in the learning process and will have an impact on mathematics learning outcomes.

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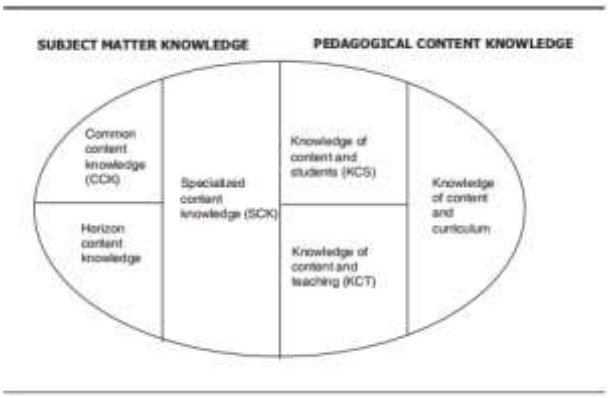
J. Relationship among Content Knowledge (CK), Pedagogical Content Knowledge (PCK), and Student's Self-Regulated Learning (SRL) and Student MathematicsLearning Outcomes

The teacher has responsibilities at every stage of the learning process. Related to this, the teaching ability ofthe teachers in creating a conducive learning atmosphere is needed in effective learning. According to Shulman (1987) CK and PCK were the realm of knowledge that must be possessed by a teacher to improve the quality of learning. CK and PCK were very related but were in different domains of knowledge (Turnuklu & Yesildere, 2007). This can be understood with the following figure.



(Ball,et.al, 2008: 403)

Figure 1. Domain Knowledge in Teaching Mathematics

Based on Figure 1, teacher's knowledge related to mathematics teaching material (Subject Matter Knowledge) or in this research related to CK has a close relationship with teacher's PCK. Knowledge related to in-depth teaching material from the teacher will affect the process and quality of learning carried out. It is important for teachers to understand the use of principles, structures and rules that are used in relation to the understanding of material to be taught to students (Ball, et.al., 2008). Whereas teacher's PCK will be related to teacher teaching techniques that affect the way students learn mathematics teaching material. Teachers will access content knowledge as well as knowledge about teaching and learning mathematics that they have to be able to use when implementing mathematics learning in class (Campbell, et.al., 2014). Furthermore, Turnuklu & Yesildere (2007) argued that in developing understanding of mathematical concepts in student's minds, teacher knowledge related to CK and PCK is very necessary. This will affect the ability to solve mathematical problems owned by students that affect the learning outcomes of these students.

Based on the previous discussion, aside fromteacher's CK and PCK, there are also students' SRL that influence student mathematics learning outcomes. A self-regulated learner will be able to carry out his own learning process independently. The teacher plays an important role in developing students into a self-regulated learner, where the teacher is a mentor and facilitator of students in their learning. In line with this Suharta, et.al (2018) argued that teacher'sCK and PCK are very closely related to the performance of a teacher in carrying out learning. This indicates that the importance of teacher's CK and PCK in the development of student's SRL, because it is closely related to the learning carried out by the teacher in encouraging students to actively learn independently, so as to stimulate students to be more confident, disciplined, responsible and initiative in learning, and not depend on other people, and exercise control over their learning activities. With an active learning process independently will make these students better understand mathematics subject matter, and this will have an impact on improving mathematics learning outcomes.

Methods

This research was a combination research (Mixed Methods) using an explanatory sequential design. Quantitative research uses ex-post facto research and qualitative research uses descriptive qualitative research.

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In this research, the independent variables were CK, PCK, and student's SRL, while the dependent variable was student mathematics learning outcomes.

The subjects in this research were all mathematics teachers and eighth grade students of State Junior High Schools in the Capital City of Tabanan Regency in the academic year 2018/2019. The steps of sampling in this research were as follows.

1. Random selection of 2 schools located in the city center and 2 schools located in the suburbs.
2. Selection of grade VIII mathematics teachers who have passed certification in each of the sample schools.
3. Random selection of 1 class taught by each sample teacher (18-32 students).

In this research, it was selected 7 mathematics teachers and 198 students of grade VIII junior high school students from 4 public schools in the Capital City of Tabanan Regency.

The instruments used in the collection of quantitative CK data and student mathematics learning outcomes were tests, and PCK and student's SRL use a questionnaire. Meanwhile, the instruments used in qualitative data collection were observation sheets for PCK data, student's SRL, and student mathematics learning outcomes, as well as interview guidelines for CK, PCK, student's SRL data, and student mathematics learning outcomes. The CK test used was a test that was developed from the mathematics learning material for junior high school level. The material included in the test were four main materials in junior high school mathematics learning, namely numbers, algebra, geometry and measurement, as well as statistics and opportunities. The total items on the CK test were 25 items. CK was seen using indicators: (1) Conceptual Knowledge (CcK) and (2) Horizontal Knowledge of Mathematics (Horizon Knowledge / HK) (Olfos, et.al., 2014: 919, Ball, et.al. , 2008).

The PCK questionnaire used refers to the indicators: (1) knowledge related to teaching mathematics material (Knowledge of Teaching of Content / KTC) and (2) knowledge related to student's knowledge (Knowledge of Student's Knowledge / KSK) (Olfos, et .al., 2014: 919), with a total of 20 items on the PCK questionnaire.

The student's SRL questionnaire used refers to indicators: (1) independence from others, (2) self confidence, (3) disciplined behavior, (4) have a sense of responsibility, (5) behave based on their own initiative, and (6) do self-control (Hidayati & Listyani, 2007: 10), with total items on the students SRL questionnaire was 20 items.

The student mathematics learning achievement test used was an essay-shaped test that was developed referring to the material surface area and volume of the geometrical shape of cubes, beams, and prisms, with the total items on the student mathematics learning achievement test being 6 items. The tests were scored analyticallyusing scoring formats refer to student mathematics problem solving abilities, namely: (1) understanding the problem, (2) planning the solution, (3) implementing the plan, (4) checking back (Sudiarta, 2012: 219).

The quantitative research data were classified on the basis of ideal mean (M_i) and ideal standard deviation (SD_i) as follows.

Table 1. Classification of Research Results Data

Score Range	Criteria
$\bar{X} \geq M_i + 1.8SD_i$	Very high
$M_i + 0.6SD_i \leq \bar{X} < M_i + 1.8SD_i$	High
$M_i - 0.6SD_i \leq \bar{X} < M_i + 0.6SD_i$	High enough
$M_i - 1.8SD_i \leq \bar{X} < M_i - 0.6SD_i$	Low
$\bar{X} < M_i - 1.8SD_i$	Very low

(Candiasa, 2010b)

Furthermore, in a qualitative descriptive research, data were analyzed by observation and interview results. In this research, a teacher was selected based on the average grouping of criteria and had the highest average score of student mathematics learning outcomes according to the recapitulation of student mathematics learning

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outcomes data to be observed and interviewed, as well as from the class the teacher was randomly selecting 2 students to be interviewed. The instruments used were the observation sheet and the interview guide referring to the indicators for each variable in this reseach, as explained earlier.

3. RESULTS AND DISCUSSION

3.1 The Quantitative Research

The null hypothesis in this study were: (1) there was no significant influence of CK (X_1) on student's SRL (X_3), (2) there was no significant influence of PCK (X_2) on student's SRL (X_3), (3) there was no significant influence CK (X_1) on student mathematics learning outcomes (Y), (4) there was no significant influence of PCK (X_2) on student mathematics learning outcomes (Y), (5) there was no significant influence of student's SRL (X_3) on student mathematics learning outcomes (Y), (6) there was no significant influence of CK (X_1) on student mathematics learning outcomes (Y) through student's SRL (X_3), and (7) there was no significant influence of PCK (X_2) on student mathematics learning outcomes (Y) through student's SRL (X_3). To test the hypothesis in this research used a significance level of 5%. It means that if the p-value (Sig.) was less than or equal to 0.05 then the null hypothesis was rejected, and if the p-value (Sig.) was more than 0.05 then the null hypothesis was accepted. The structural equation model in this research was as follows.

The structural equation model could be seen as follows:

Table 2. Research Structural Equation Models

Structural Equation Model 1	Structural Equation Model 2
$X_3 = b_{31} X_1 + b_{32} X_2 + e_1$	$Y = b_{Y1} X_1 + b_{Y2} X_2 + b_{Y3} X_3 + e_2$

Where:

X_1 : CK X_3 : Student's SRL e: Error
X_2 : PCK Y : Student Mathematics Learning Outcomes

The results of the path analysis in this research were as follows.

Table 3. Analysis of Structural Equation Models 1

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	18.670	2	9.335	.833	.498[b]
	Residual	44.824	4	11.206		
	Total	63.493	6			

a. Dependent Variable: X_3
b. Predictors: (Constant), X_2, X_1

Tabel 4.Analisis Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.542[a]	.294	-.059	3.34753	.294	.833	2	4	.498

a. Predictors: (Constant), X_2, X_1

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Tabel 5. Analysis Coefficients

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	93.561	23.118		4.047	.016
	X_1	-.231	.191	-.519	-1.210	.293
	X_2	-.047	.238	-.084	-.196	.854

a. Dependent Variable: X_3

Based on the results in Table 3, the p-value (Sig.) Of the model was 0.498 (greater than 0.05), so this model was not significant. This was supported by the results in Table 5, the p-value (Sig.) X_1 was 0.293 (greater than 0.05), the p-value (Sig.) X_2 was 0.854 (greater than 0.05), this means that the significance level of 5% X_1 and X_2 had no significant influence on X_3. So in this research, it can be concluded that there was no an influence of CK and PCK on student's SRL.

Furthermore, the results of the analysis of structural equation model 2 were as follows.

Table 6. Analysis of Structural Equation Models 2

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	482.927	3	160.976	53.391	.004[b]
	Residual	9.045	3	3.015		
	Total	491.972	6			

a. Dependent Variable: Y
b. Predictors: (Constant), X_3, X_2, X_1

Tabel 7.Analisis Model Summary

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics: R Square Change	F Change	df1	df2	Sig. F Change
1	.991[a]	.982	.963	1.73638	.982	53.391	3	3	.004

a. Predictors: (Constant), X_3, X_2, X_1

Tabel 8: Analisis Coefficients

Coefficients[a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	49.362	27.066		1.824	.166
	X_1	.669	.116	.540	5.775	.010
	X_2	-1.433	.124	-.926	-11.534	.001
	X_3	.926	.259	.333	3.569	.038

a. Dependent Variable: Y

Based on the results in Table 6, the p-value (Sig.) Of the model was 0.004 (smaller than 0.05), so this model was significant. This was supported by the results in Table 5, the p-value (Sig.) X_1 was 0.010 (less than 0.05), the p-value (Sig.) X_2 was 0.001 (smaller than 0.05), and the p-value (Sig.) X_3 was 0.038 (less than 0.05), this means that the significance level of 5% X_1, X_2, and X_3 had a significant influence on Y with beta of 0.540, -0.926, and 0.333.

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If calculated partially, X_1 had a direct and positive influence on Y by 0.540 or rounded to 54% while 46% is influenced by other factors not examined, X_2 had a direct and negative influence on Y by 0.926 or rounded up to 93% while 7% was influenced by other factors not examined, and X_3 had a direct and positive influence on Y by 0.333 or rounded up to 33% while 67% was influenced by other factors not examined. Based on Table 7 obtained R^2 of 0.982, this means that X_1, X_2, and X_3 had an influence of 0.982 or 98.2% while 1.8% was influenced by other factors not examined. The value of Error (e_2) was calculated by $e_2 = \sqrt{1 - R^2} = \sqrt{1 - 0{,}982} = 0{,}134$. So in this reseach, it can be concluded that there was an influence of CK, PCK, and student's SRL on student mathematics learning outcomes.

From the results of the path analysis test that had been done, it can be calculated the total effect of CK, PCK, and student's SRL on student mathematics learning outcomes were as follows.

Table 9. Details of The Total Effect Against Student Mathematics Learning Outcomes

	Direct effect	***Indirect effect through X_3***	***Total effect***
X_1	0,540	0	0,540
X_2	-0,926	0	-0,926
X_3	0,333	0	0,333
Total	-0,053	0	-0,053

Based on Table 9, it can be concluded that there was a direct influence of CK, PCK, and student's SRL on student mathematics learning outcomes, and there was no an indirect influence of CK, and PCK on student mathematics learning outcomes through student's SRL.

Structural model of the influence of CK, PCK, and student's SRL toward student mathematics learning outcomes in accordance with this research was as follows

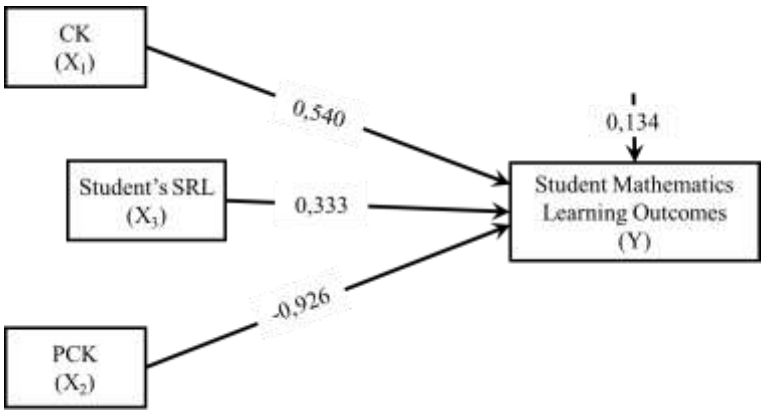

Figure 2. Structural Model of The Influenceof CK, PCK, and Studen's SRL Toward Student Mathematics Learning Outcomes.

3.2 The Qualitative Research

Based on the analysis of descriptive qualitative data, it can be concluded that the teacher already knew the importance of the knowledge of teaching material and its benefits in implementing learning. This indicated that teachers had an awareness related to the importance of increasing and developing knowledge related to teaching materials to create a structured and sustainable learning process in classroom learning. Furthermore, the ability of teachers to link concepts related to solving mathematical problems, reflected that the teacher had a very high level of CK.

The teachers guided students well and helped students when solving problems in learning, and facilitated students in constructivist learning, reflecting the very high level of PCK that the teachers had. While in terms of students, they still tended to depend on the teachers in the learning process, although there were students who

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could and tried to learn by themselves and made their assignments, but in general students still tended to expect help from the teachers and this made the help of the teachers will have a negative impact on the process and learning outcomes of these students.

Mathematics learning was a learning that was less liked by students, therefore mathematics learning that was carried out tended to make students depressed in learning mathematics and just by passing it, even though there were various methods that teachers did to make students learned and developed their own knowledge, but students still did not like math. This indicated that the CK and PCK of the teachers in this research did not affect the student's SRL, but its still affected the development of student's knowledge which would have an impact on their mathematics learning outcomes. Besides this, the learning carried out by the teacher was less varied in terms of learning resources that were still too much based on textbooks and worksheets used by schools, and this also hada negative impact on student mathematics learning outcomes because students would find it difficult to develop their knowledge related to the material being studied.

Based on the things that had been explained above, it can be concluded in this research that the very high level of CK and PCK that the teachers possessed did not affect the student's SRL level, but would affect the student's mathematics learning outcomes if CK, PCK and students' SRL were combined, because teachers' CK and PCK would affect the performance of the teachers (Suharta, et.al., 2018), and students' SRL will affect the performance of the students. CK, PCK and student's SRL were three things that were very important in the learning process and improved the student mathematics learning outcomes.

4. CONCLUSION

In improving student mathematics learning outcomes, the teacher is a very important factor. CK and PCK that teachers have will affect the performance of teaching (Suharta, et.al., 2018). This is because in-depth knowledge of teaching materials that teachers have and how teachers relate mathematical concepts in solving problems faced will affect student's understanding of the material being studied. Teachers who already know about the importance of knowledge of teaching material and its benefits in implementing learning, indicate that the teachers have awareness related to the importance of increasing and developing knowledge related to teaching materials to create a structured and sustainable learning process in classroom learning, and will support student's understanding of the material learned. Learning methods and approaches that teachers apply can help students in understanding the material being studied, as well as the assistance and feedback that teachers do can stimulate the knowledge students have in solving problems encountered. Teachers who have implemented learning that is tailored to the characteristics of students will affect the learning process that students do so that it has an impact on student mathematics learning outcomes.

In addition to external factors such as teacher's CK and PCK there are also internal factors such as student's SRL which will affect student's performance in learning. Student's SRL can influence the learning process of these students which has an impact on mathematics learning outcomes. If students who always try first by themselves in solving problems encountered before asking their friends or teachers, it will have an impact on their understanding of learning, so that it will affect the student mathematics learning outcomes.

In this research, the very high level of CK and PCK that the teacher possessed did not affect the student's SRL level, but the student's SRL would affect the student mathematics learning outcomes if the CK, PCK and student's SRL were combined, because the student's SRL would affect the performance of student. CK, PCK and student's SRL were three things that were very important in the learning process and improve the student mathematics learning outcomes. Based on the results of the research that had been obtained, in this research it can be concluded at the State Junior High School in the Capital City of Tabanan Regency in the academic year 2018/2019 was as follows.

a. There was no a direct influence of CK on the student's SRL of Grade VIII students.
b. There was no a direct influence of PCK on the student's SRL of Grade VIII students.
c. There was a direct influence of CK on the student mathematics learning outcomes of Grade VIII students.
d. There was a direct influence of PCK on the student mathematics learning outcomes of Grade VIII students.

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e. There was a direct influence of student's SRL on the student mathematics learning outcomes of Grade VIII students.
f. There was no an indirect influence of CK on the student mathematics learning outcomes through the student's SRL of Grade VIII students.
g. There was no an indirect influence of PCK on the student mathematics learning outcomes through the student's SRL of Grade VIII students.
h. There was a direct influence of CK, PCK, and student's SRL on the student mathematics learning outcomes with the contributionof98.2%, but there was no an indirect influence of CK, and PCK on the student mathematics learning outcomes through the student's SRL.

Based on the conclusions above, the suggestions from this study for other researchers are as follows.

a. The instruments used to measure CK, PCK, student's SRL, and student mathematics learning outcomes in this research need to be developed in order to adapt to the latest theories so that the instruments developed are in line with the changing times.
b. Conducting research in other areas by using a larger population, because in this research the population used is a junior high school in the capital city of Tabanan Regency which is still relatively small.

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