Exploration of teachers’ “knowledge of students” in study-based teaching on polyhedron material

Ma’rufi¹, M Ilyas², R F Pasandaran³, Salwah⁴
Universitas Cokroaminoto Palopo¹²³⁴

marufi.ilyas@gmail.com¹, muhamadilyas949@yahoo.com², riolovemath@gmail.com³, salwa_gama@yahoo.com⁴

Abstract. Teachers’ knowledge in "knowing" student problems is an important factor to support the improvement of the Mathematics learning process in the classroom. Therefore, this research aims to explore the teacher's strategies to overcome students’ errors/misconceptions in the material of polyhedron. This is an explorative study and carried out with a qualitative approach so that it contains a set of credible facts that were revealed in depth. Some instrument that used are; field notes, observation sheets for teacher activities, student activities, and learning transcripts. A phase lesson study scheme was also applied to create coherent learning scenarios. This combination resulted in findings that had an impact on improving teacher skills in dealing with the errors made by students in terms of concept, procedure, and initial knowledge systematically. The findings of this study were; the teacher can describe the types of knowledge about students’ errors/misconceptions, and then developed strategies to deal with errors/misconceptions effectively.

1. Introduction
Pedagogical Content Knowledge (PCK) in the current educational paradigm plays an important role to advance the quality of learning. Some dimensions of PCK including knowledge of the subject matter, knowledge of curriculum, knowledge of pedagogic and knowledge of students are the teacher's strategic needs in fulfilling their duties and functions. A teacher must understand his quality and capacity as the organizer of learning and this must be done continuously to increase his professionalism.

Lesson study is a vehicle for building teacher professionalism to implement the PCK concept. Both have the same final goal, but different forms and roles. PCK is the concept of identity of each teacher in advancing his learning, while lesson study is a forum for actualizing the concept of the PCK. If combined, we can hypothesize it as "quality learning". To support the quality of mathematics learning, teachers need to know the personal and intellectual characteristics of students, as well as their conceptions and misconceptions about certain topics to be taught. Teacher flexibility must include the ability to adapt learning to meet student needs, ways to overcome students' difficulties in understanding teaching material and eliminate their misconceptions effectively. The teacher also needs
to arrange a topic based on the curriculum to achieve the learning goals. Therefore, it is important to have not only knowledge of teaching material and pedagogic necessary, but also knowledge about students and curriculum of PCK [1].

The existence of PCK has shifted the classical and traditional ways of learning. PCK allows each teacher to design innovative learning scenarios which have distinctive characteristics, and of course based on student learning needs. One important aspect of PCK is the knowledge of students (KS). Knowledge about students includes ways that teachers use to know their students' knowledge, how to diagnose potential problems that may arise, as well as how to solve them. In other words, this process can be categorized as teacher metacognition of students. The ability of teachers to understand students' thinking processes allows the dynamics of learning, considering that each student has different abilities and has the potential to raise different problems. This challenge is very interesting to explore more deeply to project all the actions that teachers can take in dealing with cases of classroom learning. To formulate the problem in this article, several focus issues can be made, including:

a. How is the description of teachers’ knowledge of students (KS) in Lesson Study- based learning in polyhedron?

b. What are teachers’ strategies to overcome the errors/misconception made by students in polyhedron?

The purpose of this study are:

a. To describe the teachers’ knowledge of students (KS) in polyhedron.

b. To formulate the teachers’ strategies to overcome the errors/misconception made by students in polyhedron.

2. Literature Review

2.1 Pedagogical Content Knowledge (PCK)

Studied how many elements exist in the teacher's mathematical knowledge. They categorize it into some different views. Shulman proposed a framework for analyzing teacher knowledge that distinguishes different knowledge categories: content knowledge, general pedagogic knowledge, curriculum knowledge, pedagogical content knowledge (PCK), knowledge of students, knowledge of the educational context and final knowledge, goals, and values of education. PCK is a key aspect to overcome the problem of teaching-learning [2].

High-quality teachers and experts not only understand the subject matter but also know how to teach certain knowledge called PCK [3]. [4] agreed that being an effective math teacher requires knowledge of mathematical content and an understanding of the teaching process which is needed to efficiently transfer this knowledge to students. He chose seven expert teachers, each of whom had taught for 12-25 years, for a case study. To determine which teacher was an expert teacher, Leinhardt traced the increase in students to standardized mathematics tests over a period of 5 years. The principal and supervisor were also asked to review each mathematics teacher and to advise outstanding mathematics teachers. In the case study, expert teachers were observed and recorded to find out what factors lead them to be high-quality teachers in teaching mathematics. The results of the study indicated that PCK teachers were very important for their success. The aspects involved in this study to measure PCK teachers were knowledge of teacher teaching materials and teacher's pedagogic knowledge (for example, patterns used in developing lessons and academic involvement using various teaching materials). [5] supported that a teacher with a mathematical PCK tends to display high-quality mathematics teaching. Their study proved that teachers who have an understanding of how to support children’s problem-solving abilities in mathematics tend to support children’s problem-solving strategies more often than teachers who don’t.

2.2 Knowledge of Students (KS)

Knowledge of students is generally defined as an understanding of the characteristics of a particular group of students, how to build an appropriate classroom environment and learning planning skills to meet student needs [6]. Student learning needs can be met if the teacher can develop the planning in an
effective way related to teaching certain topics, assessing students' understanding, and overcoming their difficulties.

PCK is a specific knowledge which integrates knowledge of mathematics concept, knowledge of pedagogic, and knowledge of students. The PCK is an important knowledge in teaching because it can help teacher to anticipate students’ learning misconception and mistake and be ready to give alternative model or explanation to overcome those misconception and mistake [7]. Teachers should understand their teaching material comprehensively and be aware of the learning process to understand what students understand and what is difficult for them to understand [2]. Teachers need to create meaningful learning for students by connecting students 'previous knowledge with the new one(s) through various representations, examples, and manipulations and focusing on students' conceptual understanding of procedures or rules. To avoid the occurrence of conceptual misconceptions of students, the teacher must identify opportunities for the emergence of misconceptions correctly and eliminate these misconceptions with questions that are investigating or leading students' thoughts in building an idea.

This can affect the preparation of the teaching plan (RPP). The teacher is expected not only to help students overcome misconceptions but also to have special skills to develop RPPs that contain the possible sources of students’ difficulties and errors and some steps to anticipate them effectively.

2.3 Lesson Study
Lesson Study is a model of professional educator development through a collaborative and sustainable study of learning based on collegiality principles that help each other in learning to build learning communities. Based on the definition of Lesson Study, it has 7 keywords, namely professional development, learning study, collaborative, sustainable, collegiality, mutual learning, and learning communities. Lesson Study aims to carry out professional development of educators in a sustainable manner so that there is an increase in educator professionalism continuously. If there is no continuous coaching, professionalism can decrease as time goes by. It could be built by studying continuous and collaborating learning. Learning how to teach must be conducted regularly. The learning assessment cycle is carried out in three stages. Conventional training is a top-down process, meaning that the training material has been prepared and provided by the instructor, whereas training through Lesson Study is bottom-up because the problem-based training material found by teachers in schools is then studied collaboratively and sustainably.

Lesson Study is sustainably carried out in three stages, namely planning, implementing, and reflecting. In other words, Lesson Study is a way to improve the quality of education that never ends (continuous improvement). Lesson Study has a considerable role in making changes systemically. The five paths that Lesson Study can take are 1) presenting the goals of educational standards to the real world in the classroom, 2) promoting improvements based on a database, 3) targeting various achievements based on student qualities that influence learning activities, 4) creating the demands for learning and 5) upholding the teachers’ value [8]. There are 7 stages or steps included in Lesson Study, namely: forming a Lesson Study team, focusing on Lesson Study, arranging a lesson plan, preparing for observation, carrying out teaching and observations, carrying out question-answer/discussion and reflecting and planning the next stage.

3. Research Method
This research is a qualitative case study conducted on the material of polyhedron taught at SMP 8 Palopo in February-April 2019. The research data are in the form of statements and arguments derived from observations and field notes. The main instrument of research is the researchers themselves, as collectors, processors, and interpreters of data. In addition, supporting instrument are also used to collect data such as; field notes, observation sheets for teacher activities, student activities, and learning transcripts. This research was conducted in 3 cycles of lesson study in each class. Each cycle consisted of planning, implementation and reflection stages. Researcher observed the learning three times. The observation result are recorded in observation sheet, field notes, and video recording. The notes are then reduced to learning transcript. Researcher analyzed learning transcript to find out the
types of teacher’s knowledge that used to overcome the student’s errors/misconception. Furthermore, the results of this analysis are discussed and used as research findings.

Data was obtained through learning observation, by recording all learning activities from the beginning to the end. After the data was collected, it was validated through triangulation by looking at the compatibility of data from each research instrument. The data collected will be reviewed for consistency. Data which was consistent/relatively the same is regarded to be valid and can be analyzed. Data analysis was performed using Miles and Huberman techniques (Data Collection, Data Reduction, Data Display, Data Verification) interactively and continuously to obtain patterned data forms, with the following steps.

a. Data collection through observation sheet, field notes, learning transcript, and video recording
b. Data reduction is the process of selecting, abstracting, and transforming raw data. Data reduction in this study is done by making a summary that consist of; essence, process, and statements that are consistent with the research objectives. Validation technique used in this study is an observation extension.

c. Data presentation which includes data classifications and identifications. The set of Organized and categorized data are written to produce valid data.
d. Data presentation and interpretation contains discussion of valid data. The aim is to produce established research findings.

4. Findings and Discussion

Exploration was carried out by observing learning in the lesson study material based on lesson study prism. Observations were focused on the forms of conceptual errors/student misconceptions that arose during the learning process. The following presents the process of research findings based on the type of student’s errors and the solution strategies.

| Kinds of Misconception | Cognitive Levels | Misconception Domain | Teachers’ Knowledge to Overcome Misconception |
|------------------------|------------------|----------------------|---------------------------------------------|
| Students could not differentiate between a plane figure and a solid figure | C2 | Understanding of concept | a. Providing the student with models of the plane figure and a solid figure. <br> b. Asking the student to identify their criteria. <br> c. Writing their differences. |
| Students could not mention the formula of areas of plane figures forming the prisms | C1 | Prior Knowledge | a. Asking students to read a case made by a teacher related to the area of a plane figure. <br> b. Asking students to rewrite the area formulas that have been identified. |
| Students could not mention kinds of plane figures forming prisms | C1 | Prior knowledge | a. The teacher gave an example of some plane and non-plane figures. <br> b. Students were asked to write the similarities and differences of some plane figures. |
| Students could not differentiate between lateral face and base | C2 | Understanding the concept | a. The teacher asks students to define the polyhedron and base of a solid figure. |
| Kinds of Misconception                              | Cognitive Levels | Misconception Domain                          | Teachers’ Knowledge to Overcome Misconception |
|--------------------------------------------------|------------------|-----------------------------------------------|----------------------------------------------|
| of prisms                                        |                  |                                               |                                              |
| Students could not sum all areas of plane figures forming prisms | C3               | Applying the procedure                        | b. Students discussed those definitions.      |
| Students could not simplify the algebra of area of prisms surface | C3               | Applying the procedure                        | a. The teacher had to prepare an additional meeting to explain the algebra operation and its properties. |
| Students could not conclude the formula of area of prisms surface | C1, C2, C3       | Prior knowledge, understanding concept, and applying procedure | a. Developing students worksheet (LKS) which specifically presents the three domains through lesson study-based teaching |
|                                                  |                  |                                               | b. Making a prop which specifically presents the three domains through lesson study-based teaching |

5. Discussion

The learning material was the area of prisms surface. It was designed with cooperative learning models through guided discovery techniques. To achieve this, the lecturer and teacher designed the learning to allow students to be actively involved through student worksheets (LKS). LKS contains a number of instructions and entries that must be followed and completed by students. The learning instructions were expected to guide students independently without direct guidance from the teacher, while the questionnaire was provided with the aim of building students’ reasoning on an ongoing basis, by making simple information connections into complex information. In addition, manipulative props were also provided in the form of beam and cubes models from cardboard.

The use of props can minimize the level of abstractness of the prism concept. In line with the results of research which explains that the application of learning methods using teaching aids especially in the field of mathematics is based on the fact that in that subject there are many subjects that need tools to describe them, including on prism material [9]. Through teaching aids, both teachers and students interact when asking and providing assistance. Teacher’s technique to help students is one form of knowledge of students.

The combination of worksheet and teaching aids was expected to stimulate student participation in learning because the main trigger of low mathematics learning outcomes in these schools is the students’ relatively low activity. In addition, the lecturers and teachers also designed several types of evaluation tools in the form of problem-solving tests integrated into the student worksheets and individual tests that are given at the end of learning. Both types of tests had different objectives. Tests in LKS aimed to train students to work in groups to apply the concepts they found in problem-solving, while individual tests aimed to test the understanding of their concepts independently. Overall, the planning stage was oriented towards learning that was expected to help students build and develop their ideas on an ongoing basis. The assessment was not based on the final results but rather focused on changing student behavior in expressing their ideas in depth.

When starting learning, the teacher first conveyed the learning objectives, namely finding the surface area of the prism and using it in problem-solving. When performing apperception, the teacher
did not explain directly about the facts related to the prism but used examples and questions that guided students to construct definitions of several terms in prisms, such as edge and plane. But students could not distinguish them. The teacher overcame this by taking a triangular prism and pointing to the edge of the prism and calling its term. The sides we were shown by rubbing the planes that make up the prism. The teacher also asked a number of questions as follows.

\[ G: \text{"how many plane figures am I touching?"} \]
\[ S: \text{"there are five, Bu!" (students answered it simultaneously)} \]
\[ G: \text{"How about the number of the edges?"} \]
\[ S: \text{(silent).} \]

This silence shows that they could not determine the number of edges precisely. After that, the teacher showed a video showing prisms and ask students to pay attention to below prisms picture.

![Picture 1. Triangular Prisms](image1.png)

![Picture 2. Triangular Prisms](image2.png)

The teacher shows an edge of the prism (AD). This example enabled students to mention other edges i.e. AB, BC, CA, CF, BE, ED, DE, and FE. Then teacher re-asked students;

\[ G: \text{"how many edges am I touching?"} \]
\[ S: \text{"There are 9, Bu!"} \]

Then the teacher asked students to unwrap the prism model in their group so it shows the net. The teacher took one net and showed it to the students. She gave some instructions as follows:

\[ G: \text{"this is called as prisms net. Is this net a solid figure of a solid figure?"} \]
\[ S: \text{"Solid figure, Bu!" (students answered simultaneously), some students whispered softly "that's a solid figure, Bu!"} \]

The teacher was shocked and again gave some assistance through questions such as;

\[ G: \text{"What figures can you observe through this object?"} \]
\[ S: \text{"triangular and square.....some students mentioned triangular and rectangle!"} \]
\[ G: \text{"Nah,,triangular, square, and rectangle, are they solid figure or solid figure?"} \]
\[ S: \text{"planes, Bu!"} \]
\[ G: \text{"Correct! So, what is the difference between prisms and its net?"} \]
\[ S: \text{"prism has space and its net is a solid figure, Bu?"} \]
\[ G: \text{Good! Correct answer!} \]

Based on the above script, the teacher was guiding students to find a concept by provoking inquiry questions. Students were involved in the observation to determine the correct conclusions from the results of his observations. Subsequent investigations were carried out on the formula for the area of the planes forming prisms. The teacher asked the formula for the area of a triangle and the area of a rectangle through the following conversation.
G: “How many triangles can you see in a prisms net?”
S: “There are 2, Bu!”
G: “How about rectangle, how many?”
S: “There are 3, Bu!”
G: “Is there any square?”
S: “There is no, Bu!”
G: “Alright, so, the net of a prisms consists of ……?”
S: “two triangles and three rectangles, Bu!”
G: “Anyone remembers the formula of the areas of triangle and rectangle??”
S: “base is multiplied by height, and the length is multiplied by the width bu”!
G: “How about the formula of the circumference of both figures?
S: silent…………

Students recorded the material in slides in their books, then the teacher asked students in the group to work on the worksheets according to the instructions listed on them. But before that, the teacher again showed students about the process of unfolding a prism into nets and how to calculate the total area of the net. At the same time, the teacher gave affirmations such as:

G: “remember, our goal is to identify the area of each figure forming the prisms and sum them.”!
S: “Alright, Bu!”

This affirmation serves as a reminder for students so that they can describe the process of finding the prism surface area correctly. In the learning process, visual media was used at the starting step, in this case, the stage of delivering information. Concrete media was used in the main learning activities. It was distributed to each group with the aim of encouraging student activities in learning. The activities included holding the prism model, cutting, and measuring it. During her involvement in learning activities, the teacher did not explain the material/instructions on the board but always visited each group even though the work instructions had been written on the worksheet.

The teacher instructed each student to investigate the prism net model, but not all students did so. Therefore the teacher provided limited assistance by scaffolding in parts that were difficult for students to do. Teacher activities were still dominant so the guided discovery that was planned did not work as it should because students were not used to working independently and just waited for instructions from the teacher. This process required a lot of time so that the time allocation was not in accordance with the plan. As a result, individual and group assessments could be done because time was up. The following were the results of student entries in the LKS.

The results of the apperception about the area and circumference formula yielded results. Students understood when and how the formula works. Difficulties actually occurred when students added up the area of each plane forming a prism to be a formula for prism surface area. The problem lied in the student’s ability of algebraic manipulation which was, especially in using distributive properties. Students could only calculate the size of the area of each field but could not yet write it into an algebraic form.

The difficulties experienced by students were an indication that they were unable to remember the concept, the inability to deduce useful information from a concept and the lack of understanding skills (schematic knowledge) which was indicated by the difficulty experienced in writing formulas [10]. The teacher handled it by giving an example of a rectangle, then students were asked to follow the existing examples.

The area of each plan could be determined by students based on the area of plane I which had been written in the LKS. Another problem occurred in the determination of the total plane area. Students could not simplify the following algebra formula.
The teacher overcomes this by asking students to write each formula that represents each plane, then to determine the factors of the formula of those five figures. Those factors were the same variable, which was always attached to each algebra term. The teacher gave the following instructions.

_G_ : “what letters do always exist in each formula you are writing?”
_S_ : “T and AB, Bu!”
_G_ : “Extract those letter from the bracket!”

After being simplified, students made another mistake by crossing the variable ‘t’ and distribute the number ‘2’ in each formula of the triangle area. Based on this mistake, the teacher re-instructed students to pay attention to the formula simplification process which can be seen in the following transcript.

_G_ : "Why do you cross the letter ‘t’?"
_S_ : “because ‘t’ has been removed from the bracket”
_G_ : “does ‘t’ disappear or ......?”
_S_ : “No, Bu. ‘t’ was only removed from the bracket, therefore I crossed it”
_G_ : “well, remember that the ‘t’ does not disappear, so there it shouldn’t be crossed because there is no reduction operation”!
_S_ : “Alright, Bu!”
_G_ : “How about the number ‘2’ which is inserted into the triangle formula?”
_S_ : silent...........................

Therefore, the teacher then wrote \( \frac{1}{2}ab + \frac{1}{2}ab = \ldots \) on the board and then asked students the following questions.

_G_ : “ how is the result? ”
_S_ : silent.........................
_G_ : “how many fraction \( \frac{1}{2} \), letter a, and letter b do you see? ”
_S_ : “they are two, Bu”

Then the teacher completed the note on the board to be \( \frac{1}{2}ab + \frac{1}{2}ab = 2 \left( \frac{1}{2}ab \right) \), then pointed one student to continue it. He/she completed it to be \( \frac{1}{2}ab + \frac{1}{2}ab = 2 \left( \frac{1}{2}ab \right) = 1(ab) = ab \). The teacher then gave appreciation to that student. The formula of the prism surface area can be proven by using concrete props (prism nets), visual props (powerpoint and prism video) and LKS. The teacher’s role also strongly supports this activity. Even though she dominated the learning, the teacher seemed astute in overcoming each student’s difficulties in various ways. She utilized some questions that aimed to

---

**Picture 3. Students work in worksheet**
lead students to understand and reason, through the expression of words or terms that can reduce the level of abstractness of a symbol / algebraic form. Everything was performed systematically even though it was not yet fully constructivist. From this study, there was at least an important note that teacher flexibility in using approaches in guiding students was a characteristic of knowledge of students in PCK. In line with this, [11] explained that changes in teaching strategies are natural, especially when addressing the demands of a dynamic student situation. Unexpected student reactions or responses, such as discussions that cannot work well, none of the questions prepared can be solved by students, or no students willing to explain their answers in front of the class need to be anticipated quickly by the teacher. The sensitivity of the teacher in reading the classroom situation is an indication that the teacher has the right knowledge about the condition of his students.

The teaching strategy employed by the teacher must also be tailored to the needs and situation of students. On the other hand, the concept reconstruction process must also go according to the Guided reinvention principle which strongly recommends that the mathematical process be carried out inductively. Learning Mathematics with the teacher must be carried away just as mathematics is found. The process of discovering the concept of prism surface area above is a representation of a concept built through the activities of investigation and discovery.

In the future, teachers must be more courageous in providing more opportunities for students to take part in learning. Aspects of student activity must be built through a series of investigative activities. Systematic investigations will give rise to a variety of solutions and can build students’ divergent thinking skills.

On the other hand, lesson study helps the teacher to do reflection through continuous student interaction. The details of the observation allow the teacher to map out the forms of learning interactions so that they can activate each student and also accommodate their learning needs. The teacher PCK described through Lesson Study illustrates it influences their mathematical teaching. [12] explained that the form of influence can be seen not only from the teaching object, the structure of teaching ideas but also in terms of education, teaching emotions, teaching design, teaching language, students’ mathematical thinking, student learning attitudes and so on.

6. Conclusion

Teacher’s knowledge about student in polyhedral include:

a. The teacher identifies some students who cannot distinguish between plane figure and solid figure Guru.
b. The teacher finds some students who cannot mention formulas of surface area of plane figure that build a prism.
c. The teacher reveals the mistake of students who cannot add the surface area of plane figure that build the prism.
d. The teacher reveals the mistake of student in simplifying the algebraic form in surface area of prism.
e. The teacher reveals the mistake of student that cannot write the formula of surface area of prism.

Strategies that can be done to overcome the student’s errors/misconception are;

a. Shows the concrete models of plane figures and solid figures, give student to opportunity to observe the solid figures and ask them to write down their characteristics.
b. Asks to student to reread the surface area material and then write down the formula of the surface area in student’s worksheet.
c. Asks student to show nets of prism and then guide student to add every surface area of plane figure.
d. Provide examples of algebraic additional operation on the board or on the student’s worksheet.
e. In student’s worksheet, teacher lists the simple algebraic characteristics that students can use in formulating surface area of prism.
References

[1] Kilic, H. (2011). Preservice Secondary Mathematics Teacher's knowledge of Students. *Turkish Online of Qualitative Inquiry*. **Vol. 02**. No. 02, Pages 2.

[2] Shulman. (1987). *Knowledge and Teaching. Harvard Educational Review*. Foundations of The New Reform. Harvard Educational Review. United States of America.

[3] Kennedy, M. (1998). Education Reform and Subject Matter Knowledge. *Journal of Research in Science Education*. **Vol. 35**. No. 03. Pages 253.

[4] Leinhardt, G & Smith, D. A. (1986). *Expertise in Mathematics Instruction*. Subject Matter Knowledge. Journal of Educational Psychology. **Vol. 77**. No. 3. Pages 248.

[5] Carpenter. (1989). Using Knowledge of Children's Mathematics Thinking in Classroom Teaching : An Experimental Study. *American Educational Research Journal*. **Vol. 26**. No. 04. Pages 520.

[6] Fennemma, E., & Franke, M. (1992). *Teacher's Knowledge and Its Impact*. New York: Handbook of Research on Mathematics Teaching and Learning. United States of America.

[7] Ma’rufi. (2018). Pedagogical Content Knowledge: Teacher’s Knowledge of students in Learning Mathematics on Limit of Function Subject. *Journal of Physics IOP Conference Series*. **954** pages 2.

[8] Lewis, C. (2002). *Lesson Study: A handbook of teacher Instructional Change*. Philadelphia: Research for Better Schools.

[9] Yensy, B. N. A. (2012). Penerapan Model Pembelajaran Kooperatif Tipe Examples Non Examples dengan Menggunakan Alat Peraga untuk Meningkatkan Hasil Belajar Siswa di Kelas CIII SMPN 1 Argamakmur. *Jurnal Exacta*, **Vol. X**, No. 1. Pages 26.

[10] Tanjungsari, R. D., Soedjoko, E., & Mashuri. (2012). Diagnosis Kesulitan Belajar Matematika SMP Pada Materi Persamaan Garis Lurus. *Unnes Journal of Mathematics Education. UJME 1 (1)* (2012). Pages 53.

[11] Mahmudi, A. (2009). Mengembangkan Kompetensi Guru Melalui Lesson Study. *Forum Kependidikan*, **Vol.28, No. 02**. Pages 2-6

[12] Li, M., & Yu, P. (2009). Study on Effect of Mathematics Teachers Pedagogical Content Knowledge on Mathematics Teaching. *Journal Of Mathematics Education*. **Vol.02, No. 1**. Pages 66-67.