Journal Homepage: - www.journalijar.com
INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)
Article DOI: 10.21474/IJAR01/6384
DOI URL: http://dx.doi.org/10.21474/IJAR01/6384

RESEARCH ARTICLE

BELIEFS OF TEACHER OF KNOWLEDGE OF MATH IN DEFINITIONS TEACHING MATH IN SCHOOL.

Febryandi Ginting's, Herman Mawengkang and Syahril.
Faculty of Math and Science Universitas Sumatera Utara.

Manuscript Info

Manuscript History

Received: 22 November 2017
Final Accepted: 24 December 2017
Published: January 2018

Key words:-
Mathematical Knowledge For Teaching, Teacher Beliefs, Mathematical Definitions.

Abstract

This study is a study that discusses the importance of mastery mathematics teacher to teach mathematical definition in the learning process so it can adding the teacher's self-esteem. Math knowledge that meant here is a standard mathematical knowledge that must be possessed by teachers in teaching mathematical definition. Where the definition of mathematics here is a mathematical definition in teaching, so that every student who learns math has an understanding and a standard definition of the topic or material they studied, in our study doing a review of some research that has been done before. The results are gained are many teachers who regard the standard math ability for teaching is very important to be mastered however, only some of them are correct.

Introduction:-

Learning and teaching are two activities that are single but have a different meaning , Learning is defined as a change in behavior as a result of the experience gained during the process. While teaching is the provision of conditions that can stimulate and guide the learning activities of students to acquire knowledge, skills, values and attitudes that can lead to changes in behavior.

A teacher is expected to have the belief that teaching is the most important profession in the world. Successful teachers are teachers who know the reason why they want to become teachers, the person jumping in education are usually faced with problems that often become problematic for him when in fact what is menajadi reasons above are not appropriate and in line with the reality. The math teacher is not an easy profession to be lived, considering math is often a problem for children in school, not only in studies but who teaches. A teacher, in class, at school and in the community is a person, not just any person. A dilematika especially for new teachers who undergo this profession sometimes made him ask themselves about whether yankin with the profession being undertaken.

Assess teachers' belief in their own abilities in helping students succeed, according to Jeanne Ellis Ormrod (2008: 27) referred to as *self-efficacy* of teachers. When teachers have *self-efficacy* a highregarding their effectiveness in the classroom. They affect the achievements of students in some respects Jeanne Ellis Ormrod (2008: 28);

1. Teachers are more willing to try a strategy-new teaching strategies that help students learn better.
2. Teachers have higher expectations for performance students arena that sets a higher standard of performance as well.
3. Teacher handing a greater effort in their teaching and more persistent*(persistent)*help students learn.Research has been done showing the importance of the teacher's knowledge of the mathematical definition as forming

Corresponding Author:- Febryandi ginting's.
Address:- Faculty of Math and Science Universitas Sumatera Utara.

their confidence in implementing the teaching and learning activities. There are still many unknowns about the specific knowledge that must be mastered teachers to teach mathematics involving the definition and related teacher beliefs. In the study conducted by Fauskanger (2012) analyzed the mathematical definition of a teacher by interviewing a particular group. Previous research focused on areas of Norway then testing adaptation in the United States. Then developed measures of mathematical knowledge in teaching definition. The method used is qualitative analysis of where the content is applied to learn more about the beliefs of teachers to students in the teaching of mathematics knowledge Fauskanger definition (2012). The results showed that teachers believe knowledge in mathematics is an important aspect in teaching, but they do not regard it as a thing that is really important to understand the mathematical definition itself Fauskanger (2012).

In recent years, researchers have been trying to translate, adapt and use items PMM (Mathematical Sciences for Mengajaran) in some countries Blömeke and Delaney (2012). The first effort of Delaney (2008), is adjusting and using PMM devices for use in Indonesia and Ireland. Researchers who have translated and used items PMM in other countries after this, it will usually directly describing the results and suggestions so that it will continue to evolve PMM Mosvold, Fauskanger, Jakobsen, and Melhus (2009). Some researchers analyzed the challenges in adapting the PMM items to other countries and show their cultural differences in teaching. Because PMM conceptualized in practice. Cole (2012) suggested that the question "Is the teaching assignment is not dependent on the environment and cultural context?" This question is a logical thing to be asked in their study of the difficulties experienced by teachers Norwegian adapt to PMM items that applied in the United States, Fauskanger and Mosvold (2010) also indicate that there may be cultural issues involved.

One of the teaching received attention in previous studies is the "Selecting and developing definitions that could be used" Ball, Thames, and Phelps (2008). In his study of the mathematical knowledge of Indonesian teachers to teach geometry, Ng (2012) found that PMM action there is discrimination between teachers who adopt an inclusive definition and those who adopt the definition exclusively between the master knowledge and less master. He argued that there may be some differences in culture using the definition of geometric inclusive between teachers and the US and Indonesian teachers, he also believes that it is very important to use measures that are useful to provide a better understanding of what needs teacher to know in order to do the teaching in Indonesia ,

Math teachers around the world cope with the demands associated with the selection and development of appropriate definitions for use among their students, Zazkis and Leikin (2008). This shows that the teacher's knowledge of mathematical definition and description of their concept influence their instructional decisions, the explanation they give in the classroom, how they guide their students, and how they perform mathematical discussion. To plan for the future professional development of teachers is indispensable their beliefs about teaching science teacher might do, and influence their interpretation of their experience, Ravindran, Greene, and Debacker 2005. From the results of previous studies, we find it relevant to the analysis effort to learn more about the beliefs of teachers to the mathematical knowledge needed for teaching.

Literature Review:-

Definition of Learning:-

Learning is a process of behavior change actively, the process of reacting to all situations that are around people, processes directed to a goal, a process done through a variety of experiences, the look, observe, and understand something that is learned. While teaching itself has a meaning:

1. Teacher efforts to "raise" the means to cause or encourage a person (student) learning. (Rochman Nata Wijaya, 1992)
2. Creating an enabling environment terjdinya learning process. (Hasibuan JJ, 1992)
3. An attempt to make students learn, the effort for a change in behavior. (Gagne)

Learning is a process of interaction of learners with educators and learning resources in a learning environment. Learning is the assistance provided educators to be a process of acquiring knowledge and learning,mastery of skills and temperament,as well as the formation of attitudes and beliefs on learners. In other words, learning is a process to help students to learn well. (Wikipedia.com)

Instruction or learning is a system that aims to help the student learning process, which contains a series of events planned, structured in such a way to influence and support the students' learning processes that are internal. Gagne and Briggs (1979: 3). The term "learning" as "instruction or" teaching ". Teaching has meaning to teach or preach.

(Purwadinata, 1967, p 22). Thus the teaching synonymous with the act of learning (by students) and Teaching (teacher). The learning activities are an integral part of two events in the same direction. Learning is the primary activity, while teaching is a secondary activity that is intended to enable the optimal activity.

Understanding of Mathematics Teaching:-

Teaching or learning is a tool that allows the learning process. But not all learning processes occur because of learning from his own experience. This is in accordance with what was stated by Winataputra (1994: 4). Learning or teaching in relation to the concept of learning can be argued that teaching or learning is a suggestion to enable the process of learning in the sense of changes in individual behavior through the process of experiencing something created in the stimulus of the learning process. However, it should be noted that not all learning processes occur because there is a learning process such as learning from experience

The Nature of Mathematics:-

Many experts interpret the notion of mathematics in general or in particular. Herman Hudojo states that: "mathematics is an abstract idea that is given the symbols are arranged hierarchically and the reasoning is deductive, so learning mathematics is a high mental activity." While James in his mathematical dictionary states that "Mathematics is the science of the logic of form, structure, quantity and other related concepts with large numbers that are divided into three fields, namely algebra, analysis and goemetri". Mulyono Abdurahman argued that mathematics is a direction to find answers to problems facing humans.

Beliefs about Teaching Knowledge:-

Fives and Buehl (2010) suggest teachers' beliefs about what they need to know is a different domain. Bendixen and Feucht (2010) support this, and they argue that this "gives additional depth to our understanding of the personality of the epistemology teacher". Different beliefs about various aspects of teaching of knowledge exist, such as the source of teaching knowledge, the stability of teaching knowledge and the structure of the teaching of knowledge (Buehl & Fives, 2009).

Knowledge of Mathematics for Teaching:-

It is clear that teachers need to have knowledge of the content they expect to teach. It is also generally agreed that teacher knowledge needs to be slightly beyond the content they teach; Their knowledge must be deeper than the usual knowledge of the contents of the curriculum. The burning question is, however, what characterizes the content of knowledge needed to teach subjects like mathematics. Building on Shulman's (1986) idea of a unique domain of content knowledge for the teaching profession, Ball, Thames and Phelps (2008) strive to contribute to the further development of our understanding of this particular kind of knowledge.

Result:-

Comparison of Past Research:-

In an attempt to learn more about teacher confidence in their teaching knowledge, we set up focus group interviews (Fauskanger, 2014, p49). Focus groups have the potential to start "Concentrated conversations that may never happen in the real world" (Morgan, 1998, p. 31). Such focused discussions can provide a realistic picture of what teachers think about adapting PMM items "because they are forced to think and revise their views" (Bryman, 2004, p. 348). The initial purpose of this interview was to investigate whether our adaptation to the PMM action was successful by carrying the questionnaire (Fauskanger, Jakobsen, Mosvold, & Bjuland, 2012). In our previous analysis of interviews (eg Fauskanger, 2012, Fauskanger & Mosvold, 2010), we learned that teacher practitioners also discussed various aspects of knowledge that they found relevant and irrelevant to their work as teachers-including aspects related to mathematical definitions (Fauskanger, 2012).

Participants:-

In the research (Fauskanger, 2014, pp. 49) there were fifteen teachers participating in seven semi-structured focus group interviews, and these teachers were selected according to the wishes of the school and teachers. All participants have a particular interest in mathematics and are teachers of mathematics education. Two interviews will be held first held at the university, while others are held at the university or each teacher's school. The first group consisted of two experienced teachers, while the second group consisted of three inexperienced teachers. Participants from these two groups were selected based on their level of experience and their particular interest in mathematics education, all from different schools. In the next five interviews, teacher pairs from five schools were

selected to participate in collaboration between principals and researchers; these five schools were selected from a total sample of 17 schools participating in our pilot study.

Instruments and Procedures

Before the interview, we used the form (Elementary Form A, MSP_A04) of the item from the LMT Project to measure the teacher's PMM. This item has been translated and adapted for Norwegian teachers (Fauskanger et al., 2012; Mosvold et al., 2009). The form consists of 30 bar items and 61 items and contains three sets of PMM following items: concept and operation numbers (27 items), geometry (19 items), and patterns, functions and algebra (15 items). After the test, the teachers are given a short break. After this break, selected Teachers are interviewed in focus groups of two or three teachers. This interview was designed to study our adaptation to PMM size, and the question is to ask the following:

The teacher's background

1. General considerations of PMM action
2. Special considerations with respect to MC format
3. Comments on mathematical topics, structures and difficulty items based on the given item.
4. Comments and reflections that complement other issues discussed in the interview (Fauskanger et al., 2012).

Data analysis:-

Focus group interviews were recorded and written orally; This transcription was analyzed using a combination of two different approaches to qualitative content analysis. As part of the data reduction-and to know more about what teachers do about the definition of summative qualitative content analysis first applied to the data (Hsieh & Shannon, 2005).

First starts by identifying all the discussed related to the PMM item that focuses on the definition, and all that is said to be related to the definition while discussing.

Both authors of this article perform independent data analysis. To ensure the accuracy of one of the content analyzes with the help of the NVivo10 (QSR International) computer software, others do the analysis using an open source tool for text analysis. Both authors searched for transcripts for the occurrence of the word 'definition' and derived terms.

In this section of analysis, we define speech as a coding unit; context units are defined as two utterances before and after speeches whose key words appear (Krippendorf, 2004). While reading the transcripts, we find that words like 'concepts' and 'formulas' are used more or less as synonyms of 'definition'. Therefore we are also looking for transcripts for this requirement. In another analysis we did, we ended up with an almost perfect overlap of transcript quotes. This is a quote (context unit) that has been subject to further qualitative content analysis and discussion below in the second part of this data analysis; we use a more conventional content analysis (Hsieh & Shannon, 2005), with inductively developed categories. In the results section some transcripts have been slightly adjusted to avoid gap multipliers and repeats

Results:-

When analyzing our interview data, to investigate teacher reflection on PMM results revealed their beliefs about the definition of PMM, we ended up with two overlapping categories. Some teachers seem to believe that knowledge of definitions is an important part of their PMM. Other teachers seem more reluctant, and although they may believe that knowledge of definitions is important, they argue that the teacher does not do the real thing. Because they need to remember the mathematical definition or formula to become a better teacher. Here is a presentation and discussion of the results of our analysis.

Discussion:-

Research on the knowledge of mathematics teachers has evolved over the last few decades and the number of studies most studied by Shulman (1986). Research conducted by Ball and colleagues at the University of Michigan to develop theory-based practice of mathematical knowledge for teaching (Ball, Thames, & Phelps, 2008) is widely recognized, and their theory is the source of our understanding of mathematics teacher knowledge. This theory has been criticized and considered to be percussive, but it is finally acceptable because of one issue stating that criticism is accepted due to lack of entry of confidence (eg, Beswick, 2011, 2012).

Despite a large amount of research on beliefs and knowledge, researchers have still not reached a consensus about the relationship between the two. Some argue that the two are closely related (eg, Furinghetti & Pehkonen, 2002), while others propose that a distinction should be made between two (eg, Philipp, 2007). In this article, we have followed (ibid.) Philipp's advice and distinguished between belief and knowledge.

When it comes to belief and knowledge as two distinct categories, it makes sense to investigate beliefs about knowledge. Beliefs about knowledge-often referred to as epistemological beliefs-have been studied by researchers for a long time (eg, Perry, 1970; Schommer, 1994). We construct suggestions by Buehl, Alexander and Murphy (2002) that the epistemological beliefs are of particular domains, and thus we argue that it makes sense to learn the teachers' beliefs about PMM. Toddlers and Buehl (2010) propose that teachers 'beliefs about the knowledge they need as teachers represent different domains of teachers' beliefs. We support that, and we have tried to take this idea one step further in this article.

In our analysis, we have focused on teachers' beliefs about the mathematical knowledge needed to teach definitions. Most teachers in our study expressed confidence about the importance of that knowledge. In their discussion, however, differences arise regarding their understanding of what this means. A teacher, Benjamin, argues that teachers need to "Have a clear definition and know little about it". "Having" and "knowing" means different things for different teachers, and this is related to Ernest's (1989) category of beliefs about learning mathematics (second column from right in table 2). Some teachers express belief in supporting the idea that knowledge of definitions includes remembering them, while others, like Zacharias, do not seem to believe that knowing the definitions is really important.

Teachers like Zachariah may hold beliefs that show an emphasis on understanding content beyond mastering skills and remembering facts. Zachariah and his colleague Zelda also seem to care more about adjusting the definition to those particular groups of students. Zakaria argues that some definitions such as inclusive definitions-can be confusing for students, and we can interpret this as a belief about PMM that implies a focus on adjusting and differentiating content. Ball, Thames and Phelps (2008, p.400) presented "selecting and developing a usable definition" as a teaching math task, and this may include the way they adapt to be more suitable for students. This also fits with the belief expressed by Karen and Ken. They argue that an inclusive definition-albeit mathematically correct-is not necessarily appropriate to introduce to students in lower classes. Both examples also show the relationship between teachers' beliefs about teaching and their beliefs about PMM. Based on the results of our analysis of these teachers' beliefs regarding this specific aspect of PMM, we suggest a more general category of teacher confidence should also be considered for inclusion in this extended (2012) version of the Beswick table.

In this study, we analyzed data from focus group interviews with Norwegian teachers who had been measured with a set of adjusted PMM items. This approach differs from the traditional use of PMM items, and also differs from the more traditional approach to investigating teachers of epistemological beliefs (eg, Fives & Buehl, 2008). We suggest, however, that such an approach may be useful for further investigation. When asking teachers to comment on items that have been developed to measure PMM, the context for discussing beliefs about PMM has been clearly defined. Discussions that naturally appear in such contexts as discussions of particular definitions-can, we argue, provide interesting information about teachers' beliefs on particular issues. There is, however, a need for further research to investigate whether or not more general categories that we have suggested can also be found when analyzing beliefs about other aspects of PMM. The study can also learn more in discussions about the role of beliefs in relation to PMM. Finally, we want to make comments on cultural issues. The study was conducted in the Norwegian context, and other researchers, such as Ng (2012) and Cole (2012), have suggested that there is a cultural difference in the use of definitions and how the students developed the emphasized algorithm. These differences may also affect teachers 'beliefs about PMM, and further research is needed to learn more about the effect that cultural differences in teaching practice on teachers' beliefs about PMM. This is also related to the larger question of possible cultural differences in such PMM.

Conclusion:-

1. It is important for teachers to master the knowledge of mathematics to teach (PMM). It is important to add teachers' confidence during the learning process.
2. Culture is one of the decisive factors in the teaching and learning process so it is very important to adjust the culture during the learning process takes place to create a conducive situation.
3. Teachers who have been sampled in the study largely assume that the knowledge of mathematics to teach is important to be mastered in order to create uniformity in defining a problem related to mathematics in school.

Acknowledgments:-

Thanks to Allah for his blessings to me to till this day. To both my parents thanks for the support and love for me. To both my lecturers mr. tarman and open, to my friends. I also say thanks to IJAR for giving me permission to publish my article

References:-

1. Ball, D. L., & Hill, H. C. (2008). Mathematical knowledge for teaching (PMM) measures - Mathematics released items 2008. Ann Arbor: University of Michigan.
2. Ball, D. L., Thames, M. H., & Phelps, G. (2008). Content knowledge for teaching: What makes it special? Journal of Teacher Education, 59(5), 389–407.
3. Bendixen, L. D., & Feucht, F. C. (2010). Personal epistemology in the classroom: theory, research, and implications for practice. Cambridge: Cambridge University Press.
4. Beswick, K. (2011). Knowledge/beliefs and their relationship to emotion. In K. Kislenko (Ed.), Current state of research on mathematical beliefs XVI: Proceedings of the MAVI57 R.
5. Beswick, K. (2012). Teachers' beliefs about school mathematics and mathematicians' mathematics and their relationship to practice. Educational Studies in Mathematics, 79(1), 127–147.
6. Blömeke, S., & Delaney, S. (2012). Assessment of teacher knowledge across countries: a review of the state of research. *ZDM – The International Journal on Mathematics Education, 44*(3), 223–247
7. Delaney, S. F. (2008). Adapting and using U.S. measures to study Irish teachers' mathematical knowledge for teaching. Unpublished doctoral dissertation, University of Michigan, Ann Arbor.
8. Fauskanger, J., & Mosvold, R. (2010). Undervisningskunnskap i matematikk: Tilpasning av en amerikansk undersøkelse til norsk, og læreres opplevelse av undersøkelsen [Mathematical knowledge for teaching: Adaptation of an American instrument into Norwegian, and teachers' experience of the instrument]. *Norsk Pedagogisk Tidsskrift*, *94*(2), 112–123.
9. Graeber, A., & Tirosh, D. (2008). Pedagogical content knowledge. Useful concept or elusive notion. In P. Sullivan & T. Wood (Eds.), *The international handbook of mathematics teacher education* (Vol. 1 - Knowledge and beliefs in mathematics teaching and teaching development, pp. 117–132). Rotterdam/Taipei: Sense Publishers.
10. Mosvold & J. Fauskanger 16 conference June 26-29, 2010 (pp. 43–59). Tallinn, Estonia: Institute of Mathematics and Natural Sciences, Tallinn University.
11. Mosvold, R., Fauskanger, J., Jakobsen, A., & Melhus, K. (2009). Translating test items into Norwegian – without getting lost in translation? *Nordic Studies in Mathematics Education, 14*(4), 101–123.
12. Ng, D. (2012). Using the PMM measures to reveal Indonesian teachers' mathematical knowledge: challenges and potentials. *ZDM – The International Journal on Mathematics Education, 44*(3), 401–413.
13. Zazkis, R., & Leikin, R. (2008). Exemplifying definitions: A case of a square. *Educational Studies in Mathematics, 69*(2), 131–14.