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PROSPECTIVE SECONDARY TEACHERS' BELIEFS ABOUT MATHEMATICAL PROBLEM SOLVING

Wantrudis Claud Mkomange[1] and Musibau Akintunde Ajagbe[2]

[1]Mzumbe University, Morogoro, Tanzania and[2]Universiti Teknologi Malaysia
81310 Skudai, Johor Bahru Malaysia.

Department of Mathematics and Statistics, Faculty of Science & Technology and Faculty of Management and Human Resource Development

Abstract: The main purpose of this study was to explore prospective teachers' beliefs on mathematical problem solving. This research was a survey study that uses a questionnaire to collect data from prospective secondary teachers at the Faculty of Education. The data was analyzed using Statistical Packages for Social Sciences (SPSS) version 16.0. Findings from this study reveals the following; that majority of prospective mathematics teachers held positive beliefs on the importance of understanding mathematics problems, problems with multiple ways of solution, the kind of mathematics instruction that are emphasized by the principles of new mathematics curriculum. Considering the aforementioned findings from analysis of questionnaires the study concludes that; those prospective mathematics teachers' beliefs about mathematical problem solving have strong connection to their study level and prospective teachers have both traditional and contemporary views about mathematical problem solving. In view of the study findings and conclusions, the researcher advice educational policy makers to ensure that more researches on teacher beliefs are conducted and an ongoing mathematical problem solving beliefs assessment should be a major component at Teacher Training Institutes. Teacher educators should raise student teachers' awareness about mathematical problem solving once they join programs. A revision of teachers' mathematics pedagogical courses and content courses should be a continuous process at Universities of Education.

Keyword: Beliefs, Prospective Teachers, Mathematical Problem solving, Secondary Students, Malaysia.

I.INTRODUCTION

As defined by [1] mathematical problem is a problem that presents an objective which does not have an obvious solution or solution process. However, the National Council of Supervisors of Mathematics [2] asserted that mathematical problems must meet at least three conditions; individuals must accept an engagement with the problem, they must encounter a block and see no immediate solution process, and they must actively explore a variety of approaches to the problem. Teachers' ample knowledge about their students is very important in coordinating real problem solving. Raymond [3] identified that a problem solving means different things to different people, while others have been viewed as a goal; process; basic skill; mode of inquiry; mathematical thinking and teaching approach. Polya [1] further described it as a means of finding a way out of difficulty, a way around an obstacle, attaining an aim which was not immediately attainable and it is on this conception that people focus their work. Students' effective learning depends on teachers beliefs about content, how students learn that leads to better approach of teaching. Currently, the significance of mathematical beliefs has been widely acknowledged. A belief is defined as a "mental constructs that represent the codification of people's experiences and understandings" [4].It is believed that student teachers have already developed a wide range of beliefs about the mathematical content and the nature of mathematics as well as about teaching and learning mathematics before undertaking their first education course. Skott [5] further explained that these beliefs are often based on their own experiences as students of mathematics and, for better or for worse, often form the foundation for their own practice as teachers of mathematics. Lovat and Smith [6] reported that teachers' belief systems reflect individual philosophies about the nature of knowledge and how to acquire it, which in turn, influence teachers' curriculum decision making and teaching approaches [7]. Mathematics teachers' beliefs can be thought of as an individual's perspective on how one engages in mathematical tasks and pedagogical practices. Thompson [8] highlights that a growing body of writing shows that

mathematics teacher's beliefs affect their classroom practices although the nature of the relationship is highly complex and dialectical. There is also an acknowledgement that one of the roles of the teacher education programs is to reshape these beliefs and correct misconceptions that could hinder effectively mathematics teaching. Based on the significance of teachers' beliefs in students learning, the present study aimed to investigate prospective mathematics teachers' mathematical problem solving beliefs by deeply looking into the process and solution of mathematical problem solving in one of Malaysian universities.

II. PROBLEM SOLVING IN MALAYSIA

The Ministry of Education (MOE), Malaysia in recognizing the scientific and technology developments achieved in the world, the progress taken in educational sciences, the need for increasing and deepening the quality in national education, the need for providing eight year basic education entirely, the need for providing conceptual understanding not only among different topics in the same courses but also among different subject matters. In reflecting these necessities and according to research studies, national and international reports, experiences of teachers and academicians, curricula of other countries, and the current national curriculum, have made some changes in the mathematics curriculum for schools since 2006 to date [9,10]. Evidence from the educational policy of the Malaysian Ministry of Education (MOE) indicate that human capital development has been pin-pointed as one of the priority areas in the nations' quest for speedy development [11,12]. This the Malaysian government plans to achieve by upgrading the human capital of the citizenry especially those in institutions of learning, and through the introduction of soft skills like the use of technology equipment in addressing problems in various sectors of the economy. This however, cannot be attained unless the mentality and intellectual capacity of the citizenry is highly upgraded. As a result of this the Ministry of Higher Education [13] has mandated Public Universities in the country to incorporate and integrate soft skill elements into undergraduates' curriculum so as to meet up with the current challenges of globalization [14, 15].The new mathematics curriculum is fundamentally based on the idea that students will be provided environments where they can investigate, discover, solve problems, share and discuss their solutions. To do this, teachers are expected to improve their knowledge both in their profession and the subject matter. They need to share their knowledge with their colleagues, use computers and internet as well as calculators in their instruction. The principle of the new mathematics curricula is that every child can learn mathematics, and the aim of the new mathematics curriculum is to raise individuals that are capable of using mathematics in their daily lives, solving mathematical problems, sharing their ideas and solutions with their peers, explaining and defending their ideas, constructing rich mathematical concepts, relating it with other subject matters, enjoying mathematics and having self confidence in mathematical applications [9,10]. The government agency made several suggestions about the role of teachers and students in mathematics teaching and learning. According to these suggestions, teachers should select problems which are interesting and useful for their students, teachers are expected to value different ways of solutions to the same problems, and give more importance to students' solution ways and strategies instead of merely focusing on the right answers [9]. To achieve this, teachers should observe how students solve the problem, which variables are used, how these variables are represented, which strategies are developed and how these strategies help the student while finding the solution[15].

III.MATERIALS AND METHODS

This is a survey study conducted in Universiti Teknologi, Malaysia. The researcher adopted this method because quantitative technique is the most effective way to gather data from a wide sample population. The study adapted Mathematical Problem Solving Survey to measure prospective teachers' beliefs on mathematical problem solving with reliability of 0.87. It includes three sections such as, respondents' background information; beliefs related to mathematical problem solving evaluation; and beliefs survey on mathematical problem solving. A Likert scale 5 was used

and scores were labeled from 1 to 5 as indicated in Table 1. The questionnaire was administered to 76 students in each year of study of chosen participants, using random sampling. The data was then analyzed using the SPSS. The evaluation of participants' beliefs on mathematical problem solving will be based on the Mean Score Evaluation as proposed by [16], as shown in Table 1.

TABLE 1: WIERSMAN'S MEAN SCORING EVALUATION

Score		
	Interpretation	***Level***
1.00 – 2.49	Disagree	Low
2.50 – 3.49	Agree	Average
3.50 – 5.00	Strongly Agree	High

IV. RESULTS AND FINDINGS

Study Question 1: What beliefs about mathematical problem solving do prospective mathematics teachers have?

The study purpose was to investigate prospective mathematics teachers' beliefs on mathematical problem solving. For thorough investigation, the question was sub-divided into six sub-categories about mathematical problem solving beliefs, such as, beliefs about importance of understanding problem, problems solved with no encoded procedures, problems that consume time, problems with multiple ways of solution, the kind of mathematics instruction and interpretation of five non-routine mathematical problems. The study used 1 as minimum possible means score beliefs and 5 as maximum possible mean score beliefs. For positively stated items, a higher mean indicates participants agree with the statements, and a lower mean indicates participants disagree with the statements, whereas, for negatively stated items the scoring was reversed. For further investigation the level of student teachers beliefs on each questionnaire item, frequency of respondents that rated each of descriptors "strongly agree" and "agree" in one side as "positive" and "strongly disagree" and "disagree" on the other side as "negative" were added respectively and then worked out of the percentage of the total respondent.

A. Beliefs about The Importance of Understanding Problem Solution

The study examined the participants' responses to the importance of understanding why a mathematical problem solution works. Four positively stated items and two negatively stated items were used. The results reveal that approximately 79% of student teachers (with the mean of 1.84) did not believe that it is not important to understand why a mathematical procedure works as long as it gives a correct answer (Item 1). Forty eight (63.2%) of participants (with the mean of 3.64) believe that an individual really solved a problem if he has good understanding of the obtainable solution (item 6). About 42% of participants (with the mean of 2.96) negatively perceived that it does not really matter if you understand a mathematics problem as long as you get the right answer (Item 12). Likewise, 54 (71.1%) of the participants (with the mean of 3.86) believe that in addition to getting a right answer in mathematics, it is also important to understand why the answer is correct (Item 29). Approximately 70% of student teachers (with the mean of 3.82 and 3.86 respectively) supported the idea of spending time in giving reasons to why the solution works to a particular mathematical problem (Item 18). Most of participants (88.2%) valued a good demonstration of reasons to mathematical solution rather than focusing to a right answer (Item 24). Thus, as it can be observed in figure 1 below, most of participants (66%) have positive believe about the importance of understanding problem solution. This shows that majority of student teachers have positive beliefs about the importance of understanding problem solution.

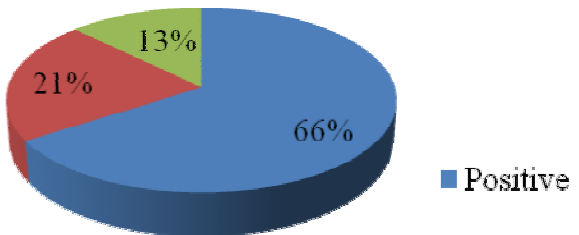

Fig 1 Beliefs on the Importance of understanding solution

B. Beliefs about the Use of Predetermined Sequence Of Steps

The study investigated the participants' responses to questionnaire items related to a thought that there are mathematical problems that can be solved with no encoded procedures. Four positively stated items and four negatively stated items were used. The results shows that, the majority (80.3%) of student teachers (with the mean of 4.29) believe that any problem can be solved if you know the right steps to follow (item 2). About 50% of respondents (with the mean of 3.26) believe that mathematics problems can only be solved using an encoded procedure (Item 34). Thirty three (43.5%) of respondents believe that some problems just can be solved without following encoded procedures (Item 37), whereas 35 (46.1%) of respondents reported indecision. Fifty six (73.7%) of respondents (with the mean of 3.91) believe that mathematicians rarely have step-by-step procedures to solve mathematical problems (Item 7). Though the item is negatively stated, about 79% of student teachers believe (with the mean of 4.04) that students should be taught the correct procedure to solve mathematics problems (item 25). However, only 2 participants show negative believe with this notion and other 14 participants reported indecision. For items 13, and 30, participants' responses indicated no strong belief since their responses were almost evenly distributed showing positive perception, negative perception and being indecision to these ideas. For example, for item 19, about 41% of participants have negative believe about the irrelevance of memorizing formula while solving problems, 28% of participants have positive believe, whereas 32% of participants reported indecision. Likewise, for item 30, about 48% of participants show positive believe on the irrelevance of memorizing steps for learning to solve problems, 26% of participants have negative believe to this notion, whereas 30% of participants reported indecision. Moreover, for item 13 that negatively articulated that learning to solve problem is a matter of memorizing the right steps, 46% of participants (with the mean of 3.43) show positive believe whereas 34.2% of participants reported indecision. Thus, as shown in Figure 2 below, only 31% of participants have positive believe about the application of predetermine sequence of steps in solving mathematical problems. This shows that majority of student teachers have negative beliefs about the use of predetermine sequence of steps in solving mathematical problems.

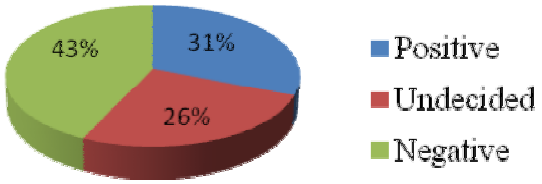

Fig 2 Beliefs on the use of Predetermined Sequence of Steps

C. Beliefs about Time Consuming in solving Mathematics Problems

Time consuming is the crucial notion in mathematical problem solving. The study investigated the participants' responses to the items related to time consuming in solving mathematical problems. There were two positively andtwo negatively stated items related to this category. The result shows that, 50% of participants did not believe (with the mean of 2.54) that mathematics problems that take time to complete cannot be solved (item 8). However, the participants' responses indicated no strong belief to the idea that time consuming problems are not bothering (Item 3). Mostly, the participants' responses were evenly distributed, approximately, 33% of

participants show positive believe, 28% show negative believe and about 40% reported indecision. Furthermore, approximately, 34% of the participants believe (with the mean of 3.14) that a person can solve a difficult mathematical problem if he puts great effort on that, while more than 46% of participants reported indecision (Item 14). On other hand, though the statement is negatively stated, 54% of participants appreciated (with the mean of 3.32) the idea that good mathematics problem solvers are able to solve problems very fast, (Item 20). Hence, as shown in Figure 3 below, only 37% of participants have positive believe about the time consuming in solving mathematical problems. This also shows that majority of student teachers have negative beliefs about the available time in solving mathematical problems.

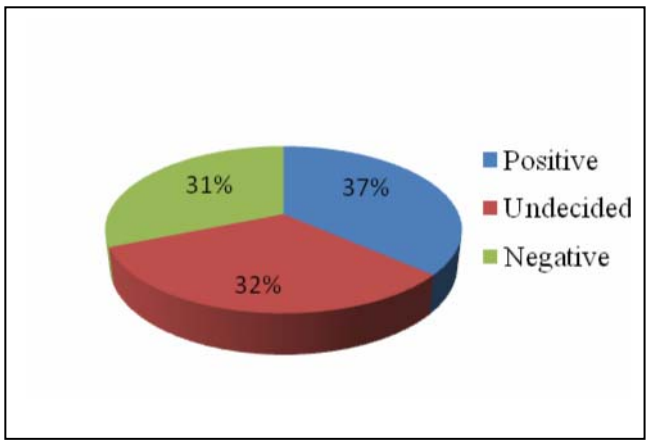

Fig 3 Beliefs about Time Consuming in solving Mathematics Problems

D.*Beliefs about Problems Of Multiple Ways Of Solution*

Problems of multiple ways of solutions are mostly emphasized in learning mathematical problem solving. The study examined the participants' responses to the items related to this category. There were four positively stated items and four negatively stated items. More than 80% of the participants (with a mean of 4.01) firmly believe that good mathematics teachers show students different ways of solving a given problem (Item 35). Likewise, more than 80% of student teachers (with the mean of 1.76) disagree with the statement that each mathematics problem must have one correct way to solve (Item 9). Similarly, about 43% of participants (with the mean of 2.57) disagree that a number of mathematicians would solve a given mathematical problem in the same way, whereas more than 40% of participants reported indecision about this idea (Item 21). About 78% of the participants (with the mean of 3.97) believe that if a student is unable to solve a problem one way, there are usually other ways to get the correct answer (Item 26). Furthermore, about 60% of student teachers (with mean of 3.55) believe that it is possible to solve a problem correctly using different method from textbooks or teacher lessons (Item 4). Likewise, 70% of participants (with the mean of 3.71) supported the idea that if a student forgets how to solve a mathematics problem the way the teacher did, it is possible to develop different methods that will give the correct answer, whereas 30% of participants reported indecision (Item15). Incredibly, more than 72% of student teachers (with the mean of 3.84) strongly believe that good mathematics teachers are the ones who show students the exact way to answer the mathematics questions they will be tested on (Item 31). For item 38, participants' responses were almost evenly distributed such that 33% of participants show positive belief as well as 32% show negative belief and 36% of the participants reported indecision. Therefore, as it can be observed in Figure 4 below, more than half (56%) of participants have positive belief about problems that have multiple ways of solution. This shows that majority of student teachers have positive beliefs about problems that have multiple ways of solution.

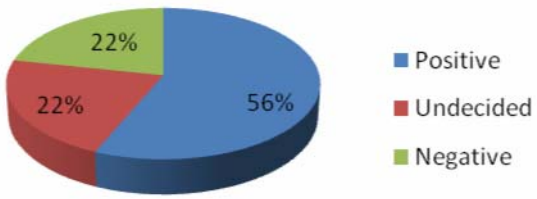

Fig 4 Beliefs about the Problems of Multiple ways of solution

E.Beliefs about The Kind Of Mathematics Instruction

A particular kind of mathematics instruction has been emphasized to align with the whole process of learning mathematical problem solving skills. This study aimed to find out the kind of belief participants held to the items related to the new principle of mathematics curriculum emphasized instruction. There were three positively stated items and two negatively stated items related to this category.The results show that about 91% of student teachers (with the mean of 4.21) believe to the idea of sharing problem solving thinking and approaches among students (item 22). Likewise, 67% of the participants reflected positively to the idea that mathematics lessons should enhance students' ability to write new or similar mathematical problems (Item 32). Though, the statement was negatively stated, about 65% of the participants believe (with the mean of 3.80) that mainly in the field of mathematics education problem solving is based on the application of computational skills (Item 16). Incredibly, about 55% of the participants reported indecision to the idea of completely infusing the process of problem solving in mathematics curriculums, while only 36% of the participants reflected positively. Similarly, 47% of the participants reflected positively to the idea that it is better to tell or show students how to solve problems than to let them discover how on their own, whereas 34% of the participants reported indecision to this idea (Item 27). Thus, as shown in Figure 5 below, 43% of participants have positive belief about mathematics instructions related to principles of new mathematics curriculum. This shows that some of student teachers have positive beliefs about this new notion and they are expected to employ problem based practice as is expected.

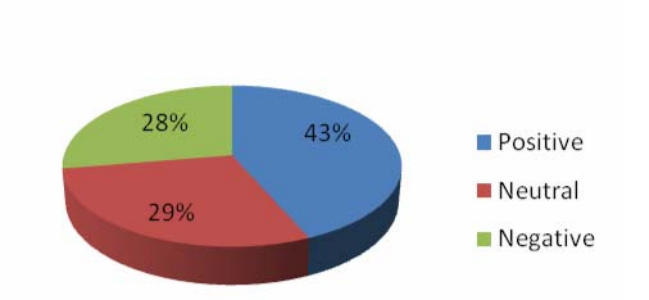

Fig 5 Beliefs about the Kind of Mathematics Instruction

F.Beliefs about Non-Routine Mathematics Problems

The study used five non-routine mathematics problems to investigate student teachers' beliefs on mathematics problems. The problems were different from many ordinary examples in textbooks as well as any materials relating to mathematics education. The participants evaluated the value of these problems as being poor, average or strong, and gave reasons for their evaluation. Summary of descriptive statistics of participants' evaluation of each problem is presented in Table 2. Later on, the analyses of participants' comments based on their evaluation of each problem were reported. Slightly more than 60% of participants evaluated problem 1 as average and problem 2 as poor. Approximately 40% of participants evaluated problem 3 as average and problem 4 as strong. Exactly 50% of participants evaluated problem 5 as average. Generally, approximately 44% of participants of this study evaluated these problems as average, whilst 30% evaluated as strong, and 26% evaluated as poor.

TABLE 2: PROBLEM EVALUATION

	Poor		***Average***		***Strong***	
	f	%	f	%		%
Problem 1	13	17.1	46	60.5	15	19.7
Problem 2	47	61.8	15	19.7	13	17.1
Problem 3	15	19.7	32	42.1	27	35.5
Problem 4	7	9.2	30	39.5	35	46.1
Problem 5	13	17.1	38	50.0	20	26.3
Total	95	26.0	161	44.0	110	30.0

The following summary illustrates participants' comments of each problem based on each category (poor, average, and strong). However, the participants' sentences were slightly reworded in order to maintain the originality of their ideas. The results from the analyses conducted show that approximately 61% of participants evaluated problem 1 as average, whereas 20% evaluated as strong, and 17% evaluated as poor (Table 2). The study found that student teachers evaluated problem 1 as being average with the following beliefs; it is not easy to understand the question, it needs thinking skills to solve a problem, it needs deep thinking skills, it needs more creative skills than mathematics skills, it needs mathematics basics to solve the problem, and it will take time to solve the problem. On other hand, student teachers evaluated problem 1 as being strong by indicating the following beliefs; it is difficult to understand and needs deep thinking, it needs mathematics basics to solve the problem, and application of problem solving. They also evaluated problem 1 as being poor with the following beliefs; it is not easy to understand, it is simple, and the problem situation is unfamiliar to students. The results from the analyses conducted show that 47 participants (61.8%) evaluated problem 2 as poor, whereas 15 participants (19.7%) evaluated as average, and 13 participants (17.1%) evaluated as strong (Table 2). The study found that student teachers evaluated problem 2 as being poor with the following beliefs; it is not related to mathematics, the question does not relate with the given information, it is not logic, it is not clear, no clue at all, and information given does not help to answer questions. On other hand, student teachers evaluated problem 2 as being average by indicating the following beliefs; it tries to test students thinking with simple problem, it needs to relate information given to find solution, and it has an abstract connection or relation between the question and mathematics aspects. Lastly, they also evaluated problem 2 as being strong with the following beliefs; it confuses students about the relationship between sheep, goats and captain, and it needs creative and critical thinking to solve problem. The results from the analyses conducted show that 32 participants (42.1%) evaluated problem 3 as average, whereas 27 participants (35.5%) evaluated as strong, and only 15 participants (19.7%) evaluated as poor (Table 2). The study found that student teachers evaluated problem 3 as being average with the following beliefs; it is creative thinking not in mathematics thinking, it needs only thinking skills but not mathematics concepts applied, it challenges students mind, and it is application of real life. However, on other hand, student teachers evaluated problem 3 as strong by indicating the following beliefs; it involve higher order of understanding, it sharpens students mind, it needs creative and critical thinking to solve problem, it encourages students thinking and initiate creativity in students. They also evaluated problem 3 as being poor with the following beliefs; it is hard, it is not related to mathematics, it is so riddle, and it needs more creative thinking than mathematics skills. The results from the analyses indicated that the evaluation of the problem 4 was conducted by 35 participants (46.1%) who evaluated the question as strong, whereas 30 participants (39.5%) evaluated the question as average, and only 7 participants (9.2%) evaluated this question as poor (Table 2). The study found that student teachers evaluated problem 4 as strong with the following beliefs; it requires critical and creative thinking to solve the question, it is related with the daily life activities, it has information that will help students to solve the problem, it encourages students to take careful judgments, and it opens up students mind. On other hand, student teachers evaluated problem 4 as average by indicating the following beliefs; it is not complicated enough, it just needs the application of mathematics concepts, it needs visualization to make it easy to solve, it has many clues and it is confusing. They also evaluated problem 4 as being poor with the following beliefs; it require critical thinking, it does not state the time of each person, it is very simple and straight question. The results from the analyses conducted show that exactly half of participants (50%) evaluated the problem 5 as average, whilst 20 participants (26.3%) evaluated as strong, and other 13

participants (17.1%) judged the problem as poor (Table 2). Student teachers evaluated problem 5 as average by indicating the following beliefs; it just needs the application of formula, it contains all required information, it needs mathematics basics to answer question, it has too many decimal points and hard to calculate, and it can need guessing to obtain the answer. On other hand, student teachers evaluated problem 5 as strong by indicating the following beliefs; it just needs application of formula, it is too straight, it is related to mathematics, it is interesting question, and information is directly found in the question. Lastly, they also evaluated problem 5 as being poor with the following beliefs; it needs low mathematical concepts, it can be answered directly without critical thinking, it does not require higher order thinking skills, it is simple, it has many possibilities to solve, and it is too straight.

V. DISCUSSION OF FINDINGS

This section presents the discussion in relation to the study findings and previous research related findings based on the proposed category of mathematical problem solving. The summary of the main findings and discussions related to the chosen research questions.

Study Question 1: What beliefs about mathematical problem solving do prospective mathematics teachers have?

A. Beliefs about the Importance of Understanding Problem Solution

The results from analyses conducted show that student teachers have strong positive beliefs about the importance of understanding problem solution. The majority of student teachers disagreed with the negative statements about the importance of understanding problem solution when solving mathematical problems. As it was noted that most of student teachers appreciated a demonstration of good reasoning should be regarded even more than students' ability to find correct answers, and they believed that it is important to understand why a mathematical procedure works than focusing on the correct answer. The findings of this research is similar to the findings obtained by [17], who emphasized the importance of understanding by declaring that memorization or making note would not allow students to see the mathematical patterns in the world that means they cannot be able to identify the existing connection in different things and how it is connected.

B.Beliefs about the Use of Predetermined Sequence of Steps

The findings revealed that majority of student teachers have high negative beliefs about the use of predetermined sequence of steps in solving mathematical problems. They mostly appreciated that any problem can be solved if you know the right steps to follow. They also believed that mostly students must be taught the correct way of solving mathematics problems. The findings of this research revealed that student teachers still have traditional view in mathematics education, which opposes the current view of mathematics education. The finding of this research is inconsistent with the findings obtained by [18] , who emphasized that the current problem must not be solved in the same way by only applying the previous ideas or procedures. For the current mathematics education, which is based on problem solving, students need to understand problem, develop conjectures, test them, and discard if they are not consistent.

C.*Beliefs about Time Consuming In Solving Mathematical Problems*

The research findings reveal that the belief of student teachers about the available time in solving mathematical problems is low, since the majority of student teachers reported indecision to this category of belief. It is found that student teachers slightly disagreed that mathematics problems that take a long time to complete cannot be solved. However, many of them supported that good problem solvers are able to solve problems very fast. In negative way, this research finding is parallel to the findings obtained by [19] who found that mathematics teachers believed that any problem has only one way to be solved and completed in a short time. The study findings reveals that student teachers mostly prefer routine problems in their classroom practices, the problems that could take short time to complete and no need of application of critical thinking.

D.Beliefs about Problems of Multiple Ways of Solution

The results from analyses conducted show that majority of student teachers have high positive beliefs about problems that have multiple ways of solution. They believe that there are multiple ways to solve a mathematics problem and good mathematics teachers show students lots of ways to look at the same questions. They also believe that if a student is unable to solve a problem in one way, there are usually other ways to get the correct answer. The research findings is similar to the findings obtained by [20], who declared that an individual has no readily available procedures for finding a problem solution and he emphasized that a good problem solver must be motivated to solve many problems for which there are no memorized rules to follow. The research findings reveal that student teachers have good knowledge about the mathematical problems of multiple ways of solution.

E.Beliefs about the Kind Of Mathematics Instruction

The result from analyses conducted show that student teachers indicated high positive belief on the current mathematics instructions related to principles of new mathematics curriculum. On the other hand, the majority of student teachers believe to the idea of sharing problem solving thinking and approaches among students, and mathematics lessons should enhance students' ability to write new or similar mathematical problems. The research findings is parallel with the recommendation of National Council of Teachers of Mathematics [21] that problem solving should be the focal point in teaching and learning mathematics for students to construct, evaluate, and refine the emerging theories about the subject matter and experience the power of mathematics in the real world. However, this study found that student teachers reflected positively to the idea that it is better to tell or show students how to solve problems than to let them discover how on their own. The possible reasons of these inconsistent results could be mathematics lessons are still being traditionally oriented, that means, schools and colleges are still insisting on traditional classroom approaches and assessments.

F. Beliefs about Non-Routine Mathematical Problems

The results from analyses reveal that student teachers beliefs on problem evaluations fairly complied with their beliefs about problem solving. For example, student teachers evaluated these problems as strong with the following main beliefs; they need higher order of understanding, they need critical and creative thinking, they related with the daily life, they encourage student judgment. The research findings is similar with the findings obtained by [22] who found that, non-routine problems require higher order thinking skills and investment of time. Similarly, the results from analyses of questionnaire items revealed that student teachers have strong beliefs on the importance of understanding problem solution and a demonstration of good reasoning should be regarded even more than students' ability to find correct answers.

VI. CONCLUSIONS AND RECOMMENDATIONS

The result of this investigative research confirmed the existence and influence of each of the earlier mentioned factors on teachers' beliefs as have been researched and reported by several previous authors. This finding generally l acknowledges the importance of teachers' beliefs in classroom practices and student learning outcomes, as well as the dominant impact on the nature of mathematical problem solving on teachers knowledge and understanding of the learning and teaching of mathematics. Mainly, the study purpose was to explore Malaysian student mathematics teachers' beliefs about mathematical problem solving and an examination of student teachers beliefs indicated that the nature of mathematical problem solving, and mathematical problem solving beliefs held by student teachers were a significant aspect to be studied. The results of the present study may reinforce the need of mathematical problem solving, more specifically, encouraging mathematics educators to employ problem solving instructional strategies in all courses pursued under mathematics education program. This study concludes by recommending that more research on teacher beliefs are needed and ongoing mathematical problem solving beliefs assessment should be a major component at Universities of Education. Teacher educators should raise student teachers' awareness about mathematical problem solving once they join programs. A revision of teachers' mathematics pedagogical courses and content courses should be a continuous process at Universities of Education.

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[1]Corresponding Author: (wantru@yahoo.co.uk) article should be cited as Mkomange et al. +255754818897

Author's Profile:
W. C. Mkomange is an Assistant Lecturer at Mzumbe University, Tanzania. She has a Bachelor Degree of Education in Mathematics from Tumaini University, Iringa University College, Tanzania and Master of Education Degree in Mathematics from Universiti Tecknologi Malaysia. She teaches mathematics and statistics. Her research interest is on potential teachers beliefs on mathematical problem solving and mathematics curriculum.