

Original Article

Teachers' Beliefs and Actual Practice of Problem Solving Approach in Teaching Mathematics (With Particular Reference to Grades 9 and 10 in West Gojjam)

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Abstract

The major purpose of this study was to examine teachers' beliefs and actual classroom practices of problem-solving teaching in mathematics at grade nine and ten. More specifically, the study assessed teachers' confessed beliefs about the application of problematic situations, contextualizing of the lesson and application of heuristic method in teaching mathematics and their actual practices in the classroom.

Out of nine high schools found in Awi Zone, five of them were randomly selected. In these schools, there are 26 mathematics teachers teaching at grade nine and ten level and all of them were included in the study. Questionnaire and observation checklist adapted from Hamza (2007) were used to collect data. The questionnaire included both close ended and open ended items. The observation checklist constitutes similar items with that of questionnaire. Percentage, t-test and descriptive statistics were employed to analyze the data.

The results indicated that teachers have low level beliefs regarding the use of problem-solving teaching method. This result has also been ascertained through observation. There exists high correlation between teachers' confessed beliefs and their actual classroom practices in applying problem-solving teaching method.

It is found out that teachers are employing traditional teaching methods in teaching mathematics at grade nine and ten. The responses from open ended questions indicated that they conceived problem solving as the step in teaching mathematics after students have mastered basic facts and concepts.

Key Words: *Problem-solving, Beliefs*

INTRODUCTION

There is a general agreement that the successful implementation of a certain educational innovation is largely affected by teachers' beliefs (Clark and Peterson, 1986). The writers further stated that a better understanding of the content and

structure of teachers' beliefs has paramount importance for the success of the innovation. Similarly, it has been argued that the impact of teachers' beliefs is a critical factor to affect teachers' classroom practice (Thompson, 1992).

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Much of the research in the area of problem solving has focussed on students, how students develop problem-solving skills, and how teachers can enhance these abilities (Schoenfeld, 1992).

Various authors have discussed the interconnection between teachers' beliefs and their actual classroom practices. So far, studies of teachers' beliefs have focussed mainly on aspects of general educational beliefs, such as, beliefs about curriculum goals, teaching, and learners. However, less has been done with the analysis of teachers' domain specific beliefs such as, problem solving teaching approach and actually putting it into practice (Polya, 1995).

There have been lots of studies of teachers' beliefs about teaching and learning with the assumption that beliefs directly or indirectly affect the teaching performance (Rokeach, 1968). A commonly used distinction in the study of beliefs about teaching and learning concerns two prototypic ideologies: (1) teacher or subject-matter oriented beliefs and (2) learner oriented beliefs, that is, beliefs that focus on supporting student learning. As the term implies, the subject matter oriented beliefs place a strong emphasis on teachers' imparting subject-matter knowledge and its reproduction by students. Teachers are largely responsible for the regulation of student learning process.

In contrast, student oriented beliefs involve teaching students how to learn, and the emphasis is on the construction of knowledge. Students are stimulated to take responsibility for their own learning processes and the regulation of these processes. They are also stimulated to work and learn together (Calderhead, 1996). The second type of belief is more important for the implementation of problem solving teaching approach in mathematics.

Logically, it is not difficult to assume that the latter type of teachers' belief is mandatory for problem solving teaching approach.

It is evident that teachers' beliefs about teaching and learning have a powerful effect on teachers' pedagogical decisions. What they think and do is the reflection of their beliefs (Johnson, 1994; Phipps, 2007). In view of this, Green (1971) and Pajares (1992), portrayed that teachers' beliefs exist as a system in which certain beliefs are core and others peripheral. Core beliefs are stable and exert a more powerful influence on behaviour than peripheral beliefs. Thus, to apply problem solving teaching method effecting teachers' inclination towards student oriented belief is a necessary condition. So, what is problem solving teaching?

Teaching Problem Solving: Teachers should play an important role in developing students' problem solving dispositions. In doing so, they must choose problems that engage students to this end (Haftu, 2008). They need to create an environment that encourages students to explore, take risk, share failure and successes, and question one another (Ibid). In such supportive environments students develop the confidence that helps them to explore problems and the ability to make adjustments in their problem solving strategies (NCTM, 2004).

One strategy to develop problem-solving skill is to provide open-ended problems. In open-ended problem solving, a problem will have multiple possible answers that can be derived by multiple solution and methods. As a result, the focus should not be on the answer to the problem, rather on the methods for arriving at an answer. In this regard, the role of the teacher is crucial. To this point, Azeb cited in Haftu

(2008) emphasized that the role of the instructors in the development of problem solving skills of students is a very critical aspect.

The application of problem solving teaching methods in the classroom needs teachers' to possess the necessary knowledge, skill and beliefs (Krulik and Rudnick 1987). Several studies have pointed out that teachers' beliefs about the importance and the skills of implementing problem solving teaching approaches have significant effect on students' achievement and problem solving behaviour (Polya, 1995 and Thompson, 1992). Similarly, the studies made by Higgeins (1983) and Haftu (2008) have revealed that there exists high relationship between teachers' beliefs towards problem solving teaching methods and their actual classroom practices and thereby students' achievement.

As to Polya (Ibid), the application of problem solving teaching in mathematics mostly relies on two important skills, contextualizing the lesson and the application of heuristics. In the same vein, Kruik and Rudnick (1987) pointed out that teaching heuristics or general strategies of problem solving to students during schooling year enhance their problem solving capacity in their daily life situations.

Johnson (1994) found that seventh grade students, who were taught about problem solving strategies, become better at solving problems and using each strategy. As to aforementioned scholar, students should develop the habit of applying heuristics of problem solving in all problem solving situations. Similarly, Charles and Lester (1984) indicated that students who were taught through heuristics scored better than their peers in problem solving.

Krulik and Rudnik(1987) revealed that applying heuristics of problem solving is difficult skill for the students. For those scholars, the activities of teachers should help students how and when to apply each of the elements of heuristics.

Problem solving is a teachable skill (Mettassebia, 2002). The development of problem solving skill could be promoted by teaching the process of problem solving through heuristics which are general rules of thumb and procedural skill lines that help the problem solver to understand and find solutions for a given problem (Good and Brophy, 1990; Krulik, 1987 cited in Mettassebia, 2002). The point about these scholars is that students should wisely divide the time to: a) understand the problem b) plan the problem c) make a decision on what to do and d) execute solutions within the time frame.

When teachers teach about problem solving (heuristics approach) to students the following points should be taken in to consideration (Downs cited in Higgeins, 1983),

- *Modelling useful problem solving method.* Students should follow some steps that lead them to solutions such as those suggested by Woods (2000) and Polya (1995).
- *Teaching with in specific context.* Teaching problem solving to our students in the context in which they live enhances their problem solving skills.
- *Helping students understand the problem:* For successful problem solving, students should define the initial and final goal of problem solving.
- *Taking enough time:* To understand the problem, plan and

carry out the problem, students should take enough time.

4. Looking Back: Examine the solutions obtained

Problem-Solving Teaching Strategies (heuristics): Problem solving is the process which starts when individuals encounter with problems and end when they obtained answer. Kilparitck cited in Haftu (2008) explained that problem solving ability is enhanced when students have opportunities to solve problems by themselves and to see problems solved. The development of problem solving skill is not secured by providing only frequent opportunities to solve problems for students; but also by giving instructions in problem solving process using heuristics.

Direct teaching of problem solving strategies such as make a list, draw a diagram and make a simple problem should be a day to day practice of teachers so as to develop problem solving skill of students (NCTM, 2004).

Polya (1995), in his book, "How to Solve it", described four steps which are involved in problem solving. They are:

1. *Understand the problem.* In this step, students should define, and know the units, symbols and integrals for the successful problem solving.
2. *Plan a solution.* In this step, students should collect information, collect possible strategies, table, graph, and diagram and choose the best strategies.
3. *Carry out the plan.* Students should be patient because most problems are not solved quickly or on the first attempt. In this case, students are required to try different problems under similar context.

According to Hamza (2000), relating the past experience to students' current situation motivates their creative behaviour and enhances problem solving skill. When assessing students' problem solving abilities, students must be exposed to unfamiliar tasks for which they have not learned or to a predetermined procedure or algorithm. The tasks should be within the ability to solve but difficult and challenging to them (Micintosh, 2000).

According to Micintosh (2000), a good problem is one that is connected to students' interest, and applicable to students' real world problem solving. When the problem is engaging and interesting to the students, it promotes active involvement and intrinsically motivate students in the process of problem solving. In line with this, Dembo (1994) states that intrinsic motivation increases the effectiveness of learning and is therefore more desired.

Similarly, Pajeres (1992) noted that when students are intrinsically motivated they tend to use strategies that require more efforts and involve processing of information on a deeper level. Students who are actively involved in their real world problems tend to apply strategies even in moderately challenging tasks. In contrast to this assumption, students who are involved in the abstract world put minimum energy in less difficult task.

Contemporary and Traditional Approach in Mathematics Problems Solving: According to Thompson (1992), teachers' classroom practice of mathematics problem solving is a critical factor in determining students' problems

solving skill. For him, there are two types of approaches in which mathematics problems solving is practiced in the classroom. They are problems solving as tradition approach and problems solving as cotemporary approach.

He further stated that teachers under traditional approach teach students about facts, procedures and rules viewing mathematics as a final body of facts to be delivered by them and internalized by students. However, teachers under contemporary approach facilitate students learning through inquiry and discovery by presenting curricula materials in the form of problems.

Hussen and Postinwhite cited in Mettassebia (2002) indicated that the traditional approach of problem solving is not considered as a process in which a set of approach can be taught, rather problem solving is considered as providing students with knowledge and skill needed for getting the answer for the subsequent problems.

According to Enrest (1988), there are three approaches of mathematics problem solving: Platonic approach, instrumentalist approach and problem solving approach. Teachers with who favor problem solving approach give an opportunity for students to learn based on inquiry and discovery. He further stated that problem solving approach to teaching mathematics helps to broaden students' skill of mathematics and changes the subject from rule and fact based discipline to one that involves the inquiry and creativity (Micintosh, 2000).

To foster critical thinking and creative mind in the students through problem solving approach, teachers must first make their own paradigm shift (Hamza,, 2000).. As to Hamza, being agents of change,

teachers should not be surrounded deeply in traditionally gained belief about teaching and learning because it has difficulty to perform their role.

As to Micintosh (2000), many teachers are often pressured by policy makers to employ standard based problem solving approach. Similarly, as indicated in an official report of the Ministry of Education of Ethiopia (MOE, 2006) the major cause of the insufficient use of problem solving approach to teaching is either teachers' lack of dedication or lack of awareness.

From the report, teachers are committed more to traditional instructional approach than the contemporary ones. This is mainly because the attempt made by teachers to know contemporary problem solving approach is minimal or they know that the new approach will require lots of preparation from them. Moreover, the report didn't deny the existence of scarcity in providing teachers' professional development programs.

According to Richardson (1990), teachers should practice the inquiry and discovery method (heuristic approach) of problem solving so as to foster the problem solving skills of students. For him, a class that is directed towards inquiry needs a teacher who has a strong belief on problem based teaching and be able to implement innovation and experimentation.

Massialas cited in Polya (1995), pointed out that to apply problem solving teaching method in the classroom teachers are expected to perform the following tasks.

1. Planning carefully the topics, ideas and generalizations that the class may want to explore
2. Organizing time and the spacing, and introduces the initial material

that will serve as a spring board for inquiry and discussion.

3. Changing the tasks continuously, students to explore and test new alternatives.
4. Summarizing, recapitulating, and asking for clarification of points made by the students.
5. Giving an opportunity for students to use different alternatives.
6. Considering students task to be creative and students' role to be actively engaged on task.
7. Giving students an opportunity to learn in discovering ideas and relationships.

According to Polya (1995), the traditional teaching method typically involves providing students with notes, algorithms, definitions, theorems, postulates, etc, which makes them passive recipients of facts. The teacher then instructs students about how to solve some examples of problems and students are then expected to accurately solve a multitude of similar problems.

In traditional approach, students are obliged to memorize the way in which certain problems are solved and then repeat this method on assessments. But to assist students in achieving a more conceptual understanding of topics in mathematics, and allow them to accurately solve problems without computing multitude of examples of problems, incorporating the discovery learning in their lesson is indispensable (Ibid).

Problem solving approach of teaching tends to be more learner-focused, involving students in exploring mathematics concepts and creating solution, strategies and constructing meaning in a problem rich environment (Thompson, 1992).

Thus, studying the underlying relationships between teachers' beliefs and their actual practices regarding problem solving enables both researchers and teacher educators to better understand the process of teaching.

One of the factors that affect the effective implementation of educational innovations is teacher factor. Especially, teachers' paradigm and beliefs have significant role. Thus, to predict the success of the major objective of the New Education and Training Policy of Ethiopia (1994), (problem solving), knowing teachers' beliefs and the level of their application of problem solving teaching methods helps school principals, educational officers and training institutions design an appropriate intervention that targeted teachers' beliefs and skills of using problem solving teaching methods in mathematics. Thus, the major concern of this study was to examine teachers' beliefs about using problem solving teaching approach in mathematics and their actual practice in the classroom. More specifically, this study focuses on the relationship between teachers' beliefs and their actual practice of problem solving approach in classroom. To achieve these objectives, the following sets of basic questions were formulated.

Basic Questions

1. What is the level of teachers' beliefs towards problem solving teaching method?
2. Do teachers' classroom practices focus on problems that need higher level of problem solving skill?
 - Do teachers practice heuristic approach of problem solving
 - Do teachers contextualize the content to the learners'

real experience during problem solving?

3. Is there any relationship between teachers' beliefs about their application of problem solving approach and their actual practice in the classroom?

The Scope of the Study: The development of problem solving behaviour is rendered through multifaceted approaches, such as the inclusion of meta-cognition, graphic organizing, problem situation and the application of heuristics in mathematics. This study, however, is delimited to only two variables, namely, problem situation and heuristics (general strategies)

METHODS AND MATERIALS

Research Design: The major purpose of this study was to measure teachers' perception and practice of problem solving teaching in the classroom.

Population and Sampling Techniques:

Teachers of the high schools found in Awi Zone were taken as the population of the study. Out of nine general high schools found in the Zone, five general high schools, Addis Kidame, Dangila, Enjibara, Gimijabet and Metekel, were randomly selected. In these schools, there are 26 mathematics teachers teaching at grades 9 and 10. All the 26 Mathematics teachers found in the selected high schools were taken as samples of the study comprehensively. As a result, 26 questionnaires were dispatched to all mathematics teachers. All 26 teachers were observed twice.

Data Collection Instruments: Two data collection instruments namely questionnaire and observation were employed in this study.

Questionnaire: To measure teachers' perception of their use of problem solving approach in the classroom, a questionnaire of 20 items which was adapted from?

Hamza (2007) was employed. The questionnaire was grouped into three major categories. They are problem-based practice, practicing heuristic approach of problem solving, and contextualizing the content to students. Besides, two open ended questions were given.

The first part of teacher's classroom practices (problem based practice) consists of six items (specific descriptors). The second part of teachers' practice (practicing heuristic approach of problem solving) has eight items. The last part (contextualizing the content to students) has six items. Each descriptor (items) was structured in a five point rating scale. Each item requires respondents to indicate their level of agreement (1= strongly disagree 2= disagree, 3= undecided, 4= agree and 5= strongly agree).

In order to investigate the effort made by teachers to practice problem solving approach in mathematics classroom, the researcher added up the number of respondents who rated 1 and 2 in one side and 4 and 5 on the other side. In other words, if frequency of respondents that rated each of the descriptors "strongly disagree and "disagree" in one side and "strongly agree" and "agree" on the other side were added and then worked out of the percentage of the total respondents.

Descriptors rated positively (strongly agree and agree) by greater number of respondents, indicate the presence of the practice of problem solving approach in mathematics class. On the other hand, descriptors rated negatively (disagree and strongly disagree) by greater number of

respondents indicate the absence of problem solving practice in mathematics classroom.

The descriptor undecided does not indicate either presence or absence of the practice of problem solving approach of mathematic. For the response that indicates the presence of problem solving approach, t-test was calculated to determine whether the practice is above or below the expected mean. The expected mean for individual specific descriptors is 3. Consequently, the expected means for the 1st, 2nd and 3rd categories are 18, 24 and 48 respectively, and the descriptor as a whole has expected a mean of 90.

Observation: An observation checklist with four point rating scale (1=hardly ever, 2= sometimes 3=often, 4=almost always) was used to examine teachers practice in promoting problem solving approach of teaching. Classroom observation was used to examine teachers' application of problem solving teaching method. The items in the observation checklist are similar as the items in the questionnaire, which was used to gather data about teachers' perception of the utilization of problem solving approach to teaching mathematics.

In order to detect the efforts made by teachers to practice problem solving approach of teaching in mathematics, the researcher gathered data through the instrument by rating their effort of classroom practice in fostering problem solving skill of students in mathematics. Observation was conducted by two professionals qualified in mathematics and curriculum development and the researcher. When there appears disagreement between the two observers, the researcher decides the scale.

To see whether or not there exists significant difference between the observed mean and the expected mean, One Sample t-test was employed. If the observed mean exceeds the expected mean at significant level of difference, it indicates the presence of problem solving approach to teaching mathematics; where as if the observed mean falls below the expected mean at significant level of difference, it indicates the absence of problem solving approach to teaching mathematics.

The expected mean for individual descriptor is 3. As a result, the expected mean for the 1st, 2nd and 3rd categories of descriptors become 18, 24 and 48 and the expected mean for the descriptor as whole will be 90.

Data Gathering procedure: In the process of testing the instrument and collecting data for the final study the following procedures were followed.

Before the final study was made, a pilot study was conducted to test the reliability of the instruments (questionnaire and observation check list). The pilot study was conducted in one high school found in the zone with 5 teachers. The result indicated that both the questionnaire and the observation checklist had the reliability of 0.85 and 0.76 respectively. Besides, the pilot study, teachers were given an orientation on how to code the questionnaire.

Ethical considerations: Before dispatching the questionnaire and conducting classroom observation, consent was obtained from principals, teachers and students through face to face discussion about the relevance of the study.

RESULTS: This part deals with the analysis of the data gathered through the questionnaire about teachers' beliefs of using problem solving approach in the classroom and observation checklist about their actual practice in the classroom. The items in both the questionnaire and the observation checklist were classified into

three categories. The first part deals with teachers' problems based practices in the classroom, the second part deals with teachers' application of heuristics approaches of problems solving and the third part deals with contextualizing of the contents to the students.

Table 1. Teachers' Beliefs about Problem Based Practice

Practice descriptors	positive	undecided	negative
Encouraged students to practice on skills rather than concepts	5(19.23)	6 (23.07)	15 (57.69)
Provided problems that needed inquiry and discovery rather than activities that need memorization and appreciation of algorithm	5(19.23)	7(26.92)	14(53.84)
Encourage students to practice on unfamiliar and non routine problems rather than routines problems	6(23.07)	7(26.92)	13(50)
Give opportunities for students to explore solutions by their own ways before being shown by the teachers	8(30.76)	6(23.07)	12(46.15)
Encouraged students to learn by exploring, manipulating, experimenting, risking, testing and modifying ideas	6(23.07)	6(23.07)	14(53.84)
Encouraged synthesis and analysis	6(23.07)	6(23.07)	14(53.84)
Total	36(23.07)	38(24.35)	82(52.56)

Teachers as one source of data were asked to confirm whether or not they are practicing problem based instruction. As indicted in Table 1, the majority of teachers have perceived that they are not employing problem based practice as is expected to be.

In all items, the percentage of teachers who believe that they are not applying problem based teaching ranges from 46% to 57%. This shows that the majority of teachers have negative beliefs about their application of problem-solving

Table 2. Teachers' Beliefs on Heuristics Approach

Roll descriptors	positive	undecided	negative
Modelled problem solving process	6(23.07)	12 (46.15)	8 (30.76)
Discussed useful problem solving strategies	7(26.9)	13(50)	6(23.07)
Encouraged application of algorithm before they apply heuristic on non- routine problems	6(23.07)	14 (53.84)	6(23.07)
Helped students to plan for the future in meaningful away to them	6(23.07)	13 (50)	7 (26.9)
Encouraged students to use variety of approach to solve problems	7(26.9)	14 (53.84)	5(19.23)
Encouraged students-centred instruction	6(23.07)	7(26.9)	13 (50)
Encouraged fact findings information gathering and strategy	7(26.9)	6(23.07)	13(50)
Presented tasks or lessons from individual experience	4(15.38)	8(30.76)	14(53.84)
Total	49(23.55)	87(41.82)	72(34.61)

As show in the Table 2, the practice of teachers' heuristic approach of problem solving as rated by teachers themselves illustrated that they are not employing general strategies of problem-solving (heuristics) in their teaching. In all items

teachers reported that they do not frequently apply heuristics in teaching mathematics. Few teachers have indicated that they modelled problem solving, discussed useful problem solving strategies encouraged application of algorithms, etc.

Table 3. Teachers' Beliefs on Contextualizing the Content

Roll descriptors	positive	undecided	negative
Related subject content to real world	8(30.76)	6 (23.07)	12 (46.15)
Gave word problems from real life to be converted to known formulas	6(23.07)	5 (19.23)	15 (57.69)
Allowed students to practice their past experience	4(15.3)	8 (30.76)	14 (53.84)
Asked students the application of the concept in the real life situation	6(23.07)	7 (26.9)	13 (50)
Fostered self initiated learning	7(26.9)	6 (23.07)	13 (50)
Presented tasks or lessons from individual experiences	4(15.3)	8(30.76)	14(53.84)
Total	35(22.43)	40(25.64)	81(51.9)

Note: All numbers in Parenthesis indicate percentage

As shown in Table 3, teachers believed that they do not contextualize the lesson in mathematics content to students' real life to the expected level. This shows that teachers do not allow students to reflect their past

experience, do not appreciate self-initiated activities, individual experiences are not used as illustrations, etc.

Teachers were asked through open ended question about the what of problem solving method in mathematics. Almost all of them replied that it is a step in teaching mathematics whereby the problem is presented to students after they have mastered basic facts and concepts in mathematics. The observation result has

also proved that teachers mostly start a lesson by explaining definitions, theorems, and give sample exercises, give class work and finally end up with giving homework.

To examine the level of teachers' beliefs about the use of problem solving approach one sample t-test was employed. The results are indicated in the table below.

Table 4. One Sample t-test

Source	Expected mean	Observed mean	Std	df	Sig.
Problematic	18	15.26	4.32.	25	.000
Heuristics	24	20.76	4.32	25	.000
Contextualizing	18	15.38	2.22	25	.000

The results in the previous tables indicated that teachers' beliefs were found to be low. To see how low they are compared to the expected level, one sample t-test was employed. Three one sample t-tests were carried out to check whether there exist significant difference between expected means and observed means of three different variables, application of problematic situation in mathematics, teaching heuristics approach and contextualizing of the mathematics lesson. The results in Table 3 indicated that there exist significant mean differences between the expected mean and observed mean in all specified variables in favour of expected means at $p < 0.001$ level of significance.

There exists high consistency between the percentage analysis and the t-test results.

This implies that teachers believed that they are not applying the three domains of application of problem solving teaching methods in mathematics as expected to be. That is, teachers do not apply problematic situation, they do not follow heuristics approach of teaching and they do not relate the lesson to the day to day activities of students and to their real life.

After ascertaining teachers' beliefs about using problem solving teaching, observation was made while teachers were actually teaching mathematics in the classroom. The results of observation are indicated in Table 5.

Table 5. Mean score standard deviation and one sampled t-test of the data drawn from observation (n = 26)

Teachers practice	No of items	Observation mean	Expected mean	SD	T able value	t-critical	DF
Problem based practice	6	15	18	2.13	3.17	2.447	25
Practice of heuristics	8	20	24	2.45	4.32	2.44	25
Contextualizing the content	6	14	18	3.16	4.18	2.447	25
The descriptor as the whole	30	73	90	6.14	5.17	2.447	25

* $p < 0.05$

Observation was conducted to see whether teachers are employing the three domains of problem solving teaching approach in mathematics. The observation result of teachers' actual classroom practice in applying problem solving based teaching indicates that there exists significant difference between the observed and the expected mean in favour of the expected mean. That is, the expected mean (18) is significantly greater than the observed mean (15). The table value (3.17) is greater than t- critical (2.44) which shows that the mean difference between the observed mean and the expected mean is significant. This implies that teachers are not actually

applying problem solving teaching method in the classroom at the expected level. Similar results are obtained for the other two variables, application of general strategies (heuristics) and contextualizing of the lesson.

The third basic question was to see the relationship between teachers' beliefs and their actual practice. In doing so, Pearson-Product Moment coefficient of correlation was employed. The result in Table 6 below shows that there exists relationship between teachers' beliefs about the application of problem solving and their actual practice in the classroom.

Table 6. The Correlation between Teachers' Practices and their Actual Classroom Practice

	Teachers' Belief	Actual classroom practice
Teachers' belief	1.000	.428
Actual classroom practice	.428	1.000

The correlation analysis has portrayed that there is high positive relationship between teachers' professed beliefs of practice and their actual classroom practices. The result in the Table is consistent with the previous findings. That is, the results in Table 1 and Table 2 showed that both teachers' beliefs and their actual classroom practices are lower than the expected level.

To develop students' problem solving skills in mathematics teachers are expected to provide problems such as open-ended, non-routine and challenging. Furthermore, as to NCTM (2000) and Polya (1995), the development of problem solving skills in mathematics require the application of heuristic approach or the use of general strategies for its benefit in fostering problem solving skill.

DISCUSSION

The findings of this study revealed that, teachers' beliefs and practices towards implementing problem solving teaching method are found to be minimal. Generally, one of the role of teachers in promoting problems solving skills of students is engaging students with problematic situations (none routines, open ended challenging problems and problems need persistence) and this was not maintained.

However, the observation of the actual classroom practice showed that teachers emphasised on factual information that encourage memorization. The current finding is not in line with the views of Micintosh (2000) and Thompson (1992) which state that problem solving skill of students mostly depends on looking at different kinds of problems (open ended, non routine...).

Relating the past experiences to students' current situation motivates students' creative behaviours and enhances problem solving skill (ibid). To foster problem solving abilities of students the tasks should be within the scope of students' ability to solve problem but difficult and challenging to them (McIntosh, 2000). To enhance problem solving skill, teachers should connect to students, interest and to their real world of problems. In doing so, problem should be engaging, interesting and intrinsically motivate students (McIntosh, 2000). However, the descriptive study indicated that less emphasis was given in considering students' past experience and relating the lesson to their real world.

The result may be due to many factors. One of the factors may be teachers' beliefs towards the importance of applying problem based teaching maths. To this point, Thompson (1992) stated that teachers' practice of problem solving is influenced by their professed beliefs. In the same vein, Raymond (1997), portrayed that reported classroom practices appear to be influenced by beliefs and opportunities that occur within the school context. The official report of the Ministry of Education of Ethiopia (MOE, 2006), indicated that the major cause of the insufficient use of problem solving approach to teaching in the classroom is due to either teachers' lack of awareness or lack of dedication. Instead, they have been observed while teaching with the assumption to cover the contents in text materials. This report is in accord with the findings of this study. That is, teachers perceived that they are not applying problem solving skills of students.

The study conducted by the same researcher Alemayehu and Assaye (2009), indicates that mathematics textbooks for grades 9 and 10 are not organized in such a way to promote problem solving skills. There fore, one of he factors which hindered teachers from applying problem-solving teaching method might be the nature of the textbook organization.

The response from the open-ended question revealed that teachers view mathematics as an aggregate of contents drawn from the textbook that should be covered within the given time. This implies that their conception is mainly associated with the traditional approach which emphasises lecture method. To this view, Polya (1995) and Ernest (1991) said that when teachers tend towards traditional beliefs they view problem-solving as an end and that problems should be presented to students after they have mastered basic facts and skills.

Teachers were asked about whether or not they have taken training in their college life or short term training about teaching mathematics through problem-solving approach. All of them responded that they didn't get any in-service or pre-service training about heuristics approach in teaching mathematics. There is an evidence from literature that the linear hierarchical model that defines the relationship among knowledge, beliefs and practice. That is, the level of knowledge determines the strength of beliefs and their by influences the level of actual practice. Thus, teachers' low level of belief and practice with regard to applying problem-solving teaching method might have resulted from lack of knowledge to the area of problem-solving.

CONCLUSION

Generally, it was concluded that teachers have low professed beliefs of implementation of problem-solving teaching method and this was proved to be true through observation.

RECOMMENDATION

Thus, it is recommended that Teacher Training Institutes should include the problem-solving teaching method as a major component of the training. Besides, the concerned educational offices should provide short term training to mathematics teachers on how to apply problem-solving method of teaching. Teachers' Continuous Professional Development programs should also address such deficiencies.

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