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Constructivist Teachers Beliefs, Instructional Practices and Students' Mathematics Performance

Mary Cris Danes Balanlay[1*]

[1]UEP-Pedro Rebadulla Memorial Campus, Catubig, Northern Samar, Philippines.

Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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Abstract

This study determined the role of teachers' constructivist beliefs in the teaching and learning mathematics and the use of instructional practices in the mathematics performance of Grade 7 secondary students in the Pacific Towns of Northern Samar for the school year 2016-2017. This study utilized the descriptive-correlational research design.

The demographic profile of teachers in mathematics such as constructivist beliefs, constructivist instructional practices and performance of students was described as it exists at the present time. Multiple regression analysis was used to determine the relationship between the beliefs in mathematics and students' mathematics performance. Similarly, statistical analysis was used to determine the relationship between instructional practices and mathematics performance of the students.

The findings showed that more than 50% of the mathematics' teachers are aged less than 30 suggesting that most of the teachers are neophyte in the teaching career. As to educational attainment, most of the respondents are enrolled in master's program. Only one-third have already completed master's degree. In terms of relevant trainings, almost a half of the respondents have attended one to two trainings.

Most of the teachers believe that teaching should involve real world connections. Teachers believe that they should create real-world environments that employ the context in which learning is relevant. Beliefs about emphasizing prior knowledge were also manifested by the teacher-respondents. Highly demonstrated beliefs include encouraging the use of multiple modes of representation to facilitate easy understanding and recall and the learner's previous knowledge constructions, beliefs and attitudes are

E-mail: karina_cui@yahoo.com;

considered in the knowledge construction process. In terms of social interaction beliefs, teachers manifested support for collaborative construction of knowledge through social negotiation.
Result of the test conducted in mathematics by the researcher showed that more than half of the students got fair performance. Only one performed satisfactorily. Beliefs about emphasizing prior knowledge and beliefs in social interaction significantly predicted mathematics performance of students. Real world connection did not significantly predict mathematics performance.
Respondents' constructivist instructional practices did not offer a significant role in developing the mathematics ability of the students. Teachers did not play an active role in assimilating knowledge into students' existing mental framework and reconstructing new knowledge.

Keywords: Constructivist teachers' beliefs; instructional practices; students' mathematics performance.

1 Introduction

In the Philippines, the goal of achieving mathematical literacy for all citizens has become a national priority. Filipino learners need to have a range of sophisticated mathematical knowledge and skills that extends far beyond basic calculation skills. However, deteriorating performance of students in mathematics has been noted in the Philippine educational system [1-5]. In the local setting, the researcher has observed that many students from elementary school through tertiary level display an attitude of dislike, fear or aversion towards learning mathematics. In conjunction with this negative disposition to learning mathematics, students are more inclined to avoid active engagement in math and often concede to poor academic achievement [6-9].

Common reasons that students provide to their poor performance is that they have never been good at math, or don't see its use [10,11]. Along with these perceptions of students in mathematics, several statistical results of examination conducted by different agencies and institutions in the Philippines showed evidences of students' dismal performance in mathematics, locally and even in international setting [12-14]. It had been reported that mathematics performance of Filipino students fall behind students from Asian countries. Assessment in intermediate algebra and science conducted by the International Association for Educational Evaluation showed that Filipino students are lagging behind most of their counterparts. Another disappointing result could be found in the National Achievement Test (NAT) result in Mathematics for both elementary and secondary students. In the school year 2013-2014 NAT results for secondary students, Mathematics with 46.37 MPS and Science with 42.12 MPS are ranked 4th and 5th among the five subject areas tested [15-19]. The Mean Percentage Score (MPS) of these subjects are far from the national target of 75 MPS. The MPS in Science and Mathematics in school year 2013-2014 of 46.3 and 42.12, respectively, decreasedto 43.03 and 40.9 respectively in the school year 2014-2015 [20-22]. The grade six students in Region VIII were worse off with only 42.03% compared to previous school year's 44.18% MPS. Scores in all subject areas went down by about one to five percentage showing a declining trend in mathematics solving problem ability of students in the NAT [23,24]. These figures showed that public schools locally and nationally are struggling to achieve their goal which is enabling academic competence in students. It is therefore important to understand the different factors that help to determine the students' mathematics performance. Though student learning outcomes have typically been associated with cognitive factors, teacher's beliefs about mathematics and instructional practices play important roles in the mathematics achievement of students.

In the last two decades, educators have made significant advances in their thinking about how mathematics students learn and how teachers should teach. Increased attention has focused on the role of the learner as an active participant in the teaching-learning process [25,26]. In particular, this view suggests that the effects of teaching mathematics depend partly on what the learner's prior knowledge and what the learner thinks about during the learning process. Instead of viewing mathematics learning as passively recording the stimuli of teachers' presentations, learning is viewed as an active process that occurs within and that can be influenced by the learner [27-29]. As an alternative of viewing the outcomes of the learning solely on what the teacher presents, the outcome of mathematics learning depends jointly on what information is presented and how the learner processes that information.

To construct mathematical knowledge, several researchers suggest that students become engaged in the solution of multi-step and real world problems. Other researchers focus on the social aspect of knowledge construction and recommend the use of cooperative learning. More recently, researchers have suggested the combination of both approaches. They indicated that engaging socially in a cooperative setting, while solving real world problems, is an excellent means of constructing knowledge. There is a need to study about how interactions, fostered in cooperative settings, influence the construction of mathematical knowledge.

Based on the above-mentioned concepts, the researcher decides to conduct this study in the secondary schools of Catubig Valley. Studying mathematics performance from the perspective of constructivist theories is tantamount to determining the factors that affect students' mathematics performance.

Generally, this study determined secondary teacher's beliefs about mathematics and the instructional practices in teaching the subject in the Pacific Towns of Northern Samar. Specifically, this study tried to: Determine the profile of mathematics teachers in terms of: Age, Educational attainment; Relevant trainings attended; Find out teachers' constructivist beliefs about mathematics in terms of: emphasizing prior knowledge, social interaction, and real world connections; Determine teachers' constructivist instructional practices in mathematics teaching; Determine the mathematics performance of the students; Find out whether there is significant relationship between teachers' beliefs about mathematics and students mathematics performance; Determine whether there is significant relationship between instructional practices and students' mathematics performance. Determining teachers' beliefs about mathematics and current instructional methods used in the classrooms will lead to an understanding of where education stands in relation to reform and will provide increased knowledge of the direction in which education is headed.

This study is anchored on Constructivism theory wherein, the fundamental task of teachers is to engage students in learning activities that build and connect to the students' prior knowledge and real world experiences. It is an important aspect of learning in elementary, high school or college. It involves the active participation of individuals in the learning process because, by its nature, it concerns the learner's ability to select and utilize appropriate learning components, monitor progress, and evaluate performance. The current trend in education is to adopt instructional practices that follow research on how the human brain works. The constructivist theory, emphasizing prior knowledge, social interaction, and real world connections, is used in this research. However, few large scale studies have been based on this theory. The studies that have been conducted were qualitative in nature and therefore have provided little empirical evidence that can be generalized to a larger population. From the perspective of Vygotsky's socio-cultural theory, the cognitive development in a child is social, which involves another person and the society as a whole. In other words, social interaction taking the form of dialogue or cues or gestures, plays an important role in constructivism and concept formation.

2 Materials and Methods

This study utilized the descriptive-correlational research design. The demographic profile of teachers, their constructivist beliefs about mathematics teaching and learning, mathematics teachers' constructivist instructional practices and mathematics performance of students was described as it exists at the present time. The correlational part included the establishment of the relationship between teachers' constructivist beliefs about mathematics and students' mathematics performance. Similar relationship will be tested between instructional practices and students' mathematics performance.

The population of this study consists of Grade 7 mathematics teachers and students in the secondary schools in the Pacific area of Northern Samar. Because of the limited number of population for the teachers, complete enumeration will be made. However, only five Grade 7 students represented each of the mathematics teachers. They were randomly selected using fishbowl technique. Respondents of this study were 30 Grade 7 secondary mathematics teachers in the Pacific towns of Northern Samar. They accomplished questionnaires that measured constructivist beliefs in mathematics and instructional practices. The total number of respondents were 150 Grade 7 students. Their mathematics performance was obtained

using a researcher-made test. The variables of this study consist of independent and dependent variables. The independent variables consist of the demographic profile of teachers (i.e. age, highest educational attainment, and relevant trainings attended) constructivist belief about mathematics, and instructional practices. The mathematics performance of the students served as the dependent variables.

The questionnaires on beliefs about mathematics is a 42-item instrument patterned from the study of Sert about mathematics beliefs and its effect on students' academic performance. The instrument is divided into three factors, namely: emphasizing prior knowledge, social interaction, and real world connections. The reliability of the three subscales was established by the author. Cronbach's alpha coefficients for the three factors are α=0.78, α=0.77 and α=0.89, respectively. The instrument on the instructional practices was adopted from the study of Banda about constructivist teachers' classroom practices and students' mathematics performance. The author has established its reliability at α=0.81. Lastly, the mathematics performance of the students were measured using a researcher-made test. It is a 45-item test that covers the third grading period.

To facilitate presentation and statistical analyses, the following variables were categorized, scored, or interpreted as follows:

Teacher's Profile: The age of the teacher-respondents was categorized and coded as follows:

41 up	5
36 to 40	4
31 to 35	3
26 to 30	2
25 and below	1

The highest educational attainment of teachers was categorized and coded as follows:

PhD/EdD Graduate	5
With PhD units	4
MA Graduate	3
With MA units	2
College Graduate	1

The number of relevant trainings attended was categorized as follows:

5 trainings and above	4
3-4 trainings	3
1-2 trainings	2
Did not attend	1

2.1 Constructivist beliefs about mathematics

Beliefs about mathematics of teacher-respondents were scored and interpreted as follows:

Rating	Score	Range	Interpretation
Strongly Agree	5	4.20–5.00	Highly Demonstrated
Agree	4	3.40–4.19	Demonstrated
Agree A Little	3	2.60–3.39	Moderately Demonstrated
Disagree	2	1.80–2.59	Poorly Demonstrated
Strongly Disagree	1	1.00–1.79	Not Demonstrated

2.2 Instructional practices

The respondents encircle the appropriate number that corresponds to their answers. The following scale ranges were used in determining the score and interpretation:

Rating	Score	Range	Interpretation
Strongly Agree	5	4.20–5.00	Very High extent
Agree	4	3.40–4.19	High extent
Agree A Little	3	2.60–3.39	Moderate extent
Disagree	2	1.80–2.59	Low extent
Strongly Disagree	1	1.00–1.79	Very Low extent

2.3 Students' mathematics performance

The mathematics performance of the students was measured using a researcher-made test. It was categorized and interpreted as follows:

Score	Interpretation
26 - 30	Outstanding (90%-and above)
21 - 25	Very Satisfactory (85%-89%)
15 - 20	Satisfactory (80%-84%)
10 - 14	Fair (75%-79%)
9 below	Failed (Less than 75%)

The demographic profile of teachers, constructivist beliefs about mathematics and instructional practices, and academic performance of the student-respondents were analyzed and presented using averages, frequency counts, and weighted mean. Multiple regression analysis was used to determine the relationship between the beliefs in mathematics and students' mathematics performance. Similar statistical analysis was used to determine relationship between instructional practices and mathematics performance of the students. A 0.05 margin of error was assumed in hypotheses testing. The Statistical Package for the Social Sciences (SPSS 19) software was used in all the analyses.

3 Results and Discussion

3.1 Profile of mathematics teachers

The results concerning the profile of teachers are summarized in Table 1.

Table 1 presents the profile of the Grade 7 mathematics teachers who participated in this study. Regarding age, more than 50 percent are aged 20 to 29 suggesting that most of the teachers are less than a decade in the service. Based on their qualifications, most of the respondents are enrolled in master's program and only one-third have already completed the master's degree. In terms of capacity building, almost half of the respondents attended one to two trainings suggesting the lack of professional development of mathematics teachers on constructivist teaching.

3.2 Teachers' constructivist beliefs about mathematics

In this section, it is shown that most teachers believe that teaching should involve real world connections (Table 2a). Teachers consider that they should create real-world environments that employ the context in which learning is relevant, provide contextual applications in problem solving and knowledge acquisition, and higher-order thinking skills and deep understanding are emphasized in solving real world problems.

Beliefs about highlighting prior knowledge were also revealed by the teacher-respondents. Some of the highly demonstrated beliefs include encouraging the use of multiple modes of representation to facilitate easy understanding and recall, learner's previous knowledge constructions, and awareness of the importance of goals for the learner, and the dichotomy between learner and teacher goals. This indicates that teachers believe in the importance of prior knowledge in the generation of the new knowledge. This finding is supported by the proposed theory of Piaget that student's construct knowledge through his schema.

Table 1. Profile of mathematics teachers

AGE	**Frequency**	**Percent**
40-49	7	23.33
30-39	6	20.00
20-29	17	56.67
Total	30	100.00
Educational Attainment	**Frequency**	**Percent**
Master's Degree with Doctoral units	3	10.00
Master's Degree	7	23.33
BS Degree with MA units	12	40.00
Bachelor's Degree	8	26.67
Total	30	100.00
Relevant Trainings	**Frequency**	**Percent**
5 or more	1	3.33
3 to 4	7	23.33
1 to 2	14	46.67
None	8	26.67
Total	30	100.00

Table 2a. Teachers' constructivist beliefs about mathematics – Real World Connections

Real World Connections	**Weighted Mean**	**Interpretation**
Create real-world environments that employ the context in which learning is relevant;	4.67	Highly demonstrated
Provide contextual applications in problem solving and knowledge acquisition.	4.33	Highly demonstrated
Problem-solving, higher-order thinking skills and deep understanding are emphasized in solving real world problems.	3.83	Demonstrated
Provide real-world, case-based learning environments, rather than pre-determined instructional sequences;	3.67	Demonstrated
Provide for authentic versus academic contexts for learning;	3.67	Demonstrated
Represent the natural complexity of the real world;	3.50	Demonstrated
Embed learning in a rich authentic problem-solving environment;	3.33	Moderately demonstrated
Embed learning in realistic and relevant contexts;	3.33	Moderately demonstrated
Provide multiple representations of reality;	3.00	Moderately demonstrated
Focus on realistic approaches to solving real-world problems;	2.83	Moderately demonstrated
Provide tools and environments that help learners interpret the multiple perspectives of the world;	2.83	Moderately demonstrated
Embed learning in social experiences;	2.33	Poorly demonstrated
Grand Mean	3.44	Demonstrated

Table 2b. Teachers' constructivist beliefs about mathematics – Emphasizing Prior Knowledge

Emphasizing Prior Knowledge	Weighted Mean	Interpretation
Encourage the use of multiple modes of representation to facilitate easy understanding and recall;	4.83	Highly demonstrated
The learner's previous knowledge constructions, beliefs and attitudes are considered in the knowledge construction process.	4.50	Highly demonstrated
awareness of the importance of goals for the learner, and the dichotomy between learner and teacher goals;	4.50	Highly demonstrated
Enable context-and content dependent knowledge construction;	4.17	Demonstrated
sensitivity toward and attentiveness to the learner's previous constructions;	4.17	Demonstrated
attention to metacognition and strategic self-regulation by learners;	4.17	Demonstrated
Provide experience with the knowledge construction process;	4.17	Demonstrated
Foster reflective practice;	3.50	Demonstrated
Encourage self-awareness in the knowledge construction process.	3.20	Moderately demonstrated
Provide experience in and appreciation for multiple perspectives;	3.00	Moderately demonstrated
diagnostic teaching attempting to remedy learner errors and misconceptions;	2.67	Moderately demonstrated
awareness of the importance of social contexts, such as the difference between street mathematics and school mathematics	2.50	Poorly demonstrated
Errors provide the opportunity for insight into students' previous knowledge constructions.	2.50	Poorly demonstrated
Mean	3.68	Demonstrated

Table 2c. Teachers' constructivist beliefs about mathematics – Emphasizing Prior Knowledge

Social Interaction	Weighted Mean	Interpretation
Support collaborative construction of knowledge through social negotiation.	4.50	Highly demonstrated
The use of multiple representations of mathematical concepts;	4.33	Highly demonstrated
Encourage ownership and voice in the learning process;	3.83	Demonstrated
Goals and objectives are derived by the student or in negotiation with the teacher or system.	3.67	Demonstrated
This construction takes place in individual contexts and through social negotiation, collaboration and experience.	3.20	Moderately demonstrated
Knowledge complexity is reflected in an emphasis on conceptual interrelatedness and interdisciplinary learning.	3.20	Moderately demonstrated
Primary sources of data are used in order to ensure authenticity and real-world complexity.	3.00	Moderately demonstrated
The student plays a central role in mediating and controlling learning.	2.83	Moderately demonstrated
Learning situations, environments, skills, content and tasks are relevant, realistic, authentic and represent the natural complexities of the 'real world'.	2.83	Moderately demonstrated
Knowledge construction through collaborative learning is emphasized.	2.83	Moderately demonstrated
Scaffolding is facilitated to help students perform just beyond the limits of their ability.	2.67	Moderately demonstrated
Activities, opportunities, tools and environments are provided to encourage metacognition, self-analysis -regulation, -reflection & -awareness.	2.60	Moderately demonstrated

Social Interaction	Weighted Mean	Interpretation
Multiple perspectives and representations of concepts and content are presented and encouraged.	2.50	Poorly demonstrated
Collaborative exploration is a favored approach in order to encourage students to seek knowledge on their own and to manage the pursuit of their goals.	2.33	Poorly demonstrated
Learners are provided with the opportunity for apprenticeship learning in which there is an increasing complexity of tasks, skills and knowledge acquisition.	1.50	Not demonstrated
Teachers serve in the role of guides, monitors, coaches, tutors and facilitators.	1.33	Not demonstrated
Collaborative and cooperative learning are favored in order to expose the learner to alternative viewpoints.	1.33	Not demonstrated
Grand Mean	2.85	Moderately demonstrated

3.3 Social interaction beliefs

In terms of social interaction beliefs, teachers exhibited support for collaborative construction of knowledge through social negotiation, the use of multiple representations of mathematical concepts, and encourage ownership and voice in the learning process. These findings show that most of the teachers believe that students learn best by constructing their knowledge through peer learning or collaborative works. Furthermore Lave suggested that a collaborative effort among students create independent learning (Reference???). This is in line of Selden who concluded that students learning through interaction with peers retain more knowledge compared to students who retain information by listening to teachers.

Generally, these findings show that teachers consciously or unconsciously held beliefs, views, and preferences about mathematics in the teaching and learning process. These findings are in agreement with that of Thomson that play a significant role in shaping teachers' characteristic patterns of instructional practice. This is also one of the most striking findings observed by Thompson that mathematics teachers' practices regarding the role of problem solving in mathematics teaching is grounded on their beliefs.

Beliefs account for teacher's view of its major role, which is to transmit content, as well as by its limited self-confidence with respect to its mathematical ability. Studies found that although teachers were quite good in predicting the performance of individual students, they had great difficulty in anticipating an individual student's preferred solution practices.

3.4 Constructivist instructional practices in mathematics teaching

Constructivist mathematics teachers have instructional practices as reflected in Table 3. Teachers identify students who have difficulties to understandthe main ideas of the lesson. The lessons are designed or shaped to allow the teachers to monitor the student's program. These instructional practices are tools used to facilitate the knowledge acquisition. Mathematics educators recognize that alternative instructional practices offer various benefits to students. Using of a variety of instructional approaches, including small and large group activities, discussion of the results, manipulative, calculators, and computers with decreased attention to paper-and-pencil drills confirmed the recommendations of the National Council of Teaching mathematics (NCTM). These constructivist instructional strategies are expected to lead students to be more active learners capable of applying mathematics in real life situations. For this reason, teachers are encouraged to utilize small and large group working arrangements in the classrooms. This is necessary to involve students in using mathematics in both mathematical and real world contexts. Constructivist strategies empower students to become independent thinkers, capable of synthesizing, critiquing, and summarizing their products.

Table 3. Instructional practices in mathematics teaching

Instructional Practices	Weighted Mean	Interpretation
I identity students who have difficulties in understanding the main ideas of the lesson.	4.75	Very high extent
I design my lessons to allow the monitoring of student progress.	4.67	Very high extent
I take into account of prior knowledge of my students.	4.50	Very high extent
I make sure that he pace of the lesson is appropriate for the developmental level/needs of the students and the purpose of the lesson.	4.50	Very high extent
My questioning methods are likely to enhance the development of student's conceptual understanding/ problem solving.	4.17	High extent
My lessons progress are based on students' responses.	4.17	High extent
I give students immediate constructive feedback when they need directions to proceed.	4.00	High extent
The class activities consolidate the main ideas of the lesson.	4.00	High extent
I probe students' reasoning.	3.83	High extent
I provide adequate time and structure for reflection.	3.83	High extent
I encourage my students to talk and share ideas.	3.50	High extent
I interact with my students.	3.17	Moderately extent
My instructional methods and activities reflect attention to issues of access, equity and diversity for students.	3.00	Moderately extent
The design of my lessons incorporate tasks, roles, and interactions consistent with analytical lessons.	2.33	Low extent
The instructional methods and activities I use reflect attention to students' experiences and readiness.	1.83	Low extent
Grand Mean	3.77	High extent

3.5 Mathematics performance of the students

Table 4 shows the mathematics performance of student-respondents in the mathematics test given by the researcher. It shows that more than 50 percent of the students have fair performance with 96 or 64 percent. Only 27 or 18 percent performed satisfactorily. This finding suggests that most of the students did not perform well in the mathematics test given by the researcher (Table 4).

Table 4. Mathematics performance of the students

Mathematics Performance	Frequency	Percent
Satisfactory (16-20)	27	18.00
Fair (10-15)	96	64.00
Failed (9 below)	27	18.00
Total	150	100.00

3.6 Relationship between teachers' beliefs about mathematics and students mathematics performance

Table 5 shows the relationship between teachers' beliefs about mathematics and students mathematics performance. It shows that beliefs about emphasizing prior knowledge (β=0.711, $p<0.05$) and beliefs in social interaction (β=0.491, $p<0.05$) significantly predicted mathematics performance of students. Real world connection did not significantly predict mathematics performance. These findings show that teachers who create real-world environments that employ the context in which learning is relevant or focus on

realistic approaches to solving real-world problems produce students who are good in math. This finding means that teacher's beliefs about mathematics can determine how s/he chooses to approach a problem, which techniques to be used or avoided, how long and how hard one will attempt it, and so on. The teachers' beliefs exert a powerful influence on students' performance, on their willingness to engage in mathematical tasks, and on their own ultimate mathematical disposition. This finding confirms that of Boekaert which revealed that it is not sufficient for students to acquire certain concepts, skills, and heuristics, such as estimation skills. Students should get support from teachers to apply the learned skills when different situations and opportunities occur. According to Boekaert, confronted with a learning task, teacher's beliefs help to develop either a learning or a coping intention, depending on their perception of the task demands and the context. To encourage a learning intention, teachers need positive expectations and feelings.

Table 5. Relationship between teachers' beliefs about mathematics and students' performance

Teachers' beliefs about mathematics	Parameters	Mathematics Performance
Emphasizing prior knowledge	Beta	**0.711**
	Significance	**0.002**
	Interpretation	**Significant**
Social Interaction	Beta	**0.491**
	Significance	**0.394**
	Interpretation	**Significant**
Real world connection	Beta	0.128
	Significance	0.235
	Interpretation	Not significant

3.7 Relationship between instructional practices and students' mathematics performance

Table 6 shows the relationship between instructional practices and students' mathematics performance. No significant relationship was found between instructional practices and mathematics performance of the students (β=0.1103, $p>0.05$).

This finding displays that the respondents' constructivist instructional practices did not offer a significant role in evolving the mathematics ability of the students. It indicates that teachers did not apply a leaner centred approach to engage a learner at the centre of the knowledge and skills to be developed. The ability of students to apply their school learned knowledge to the real world was probably undervalued through memorization and pieces of knowledge that may seem unrelated to them. The finding implies that teachers did not continually analyze his or her curriculum planning and instructional practices.

This finding disconfirms Boekaerts research who has shown that instructional practices are tools to facilitate knowledge acquisition and that teachers in the current study did not recognize that alternative instructional practices offer various benefits to students.

Table 6. Relationship between instructional practices and students' mathematics performance

Instructional practices	Parameters	Mathematics Performance
Instructional practices	Beta	**0.1103**
	Significance	**0.323**
	Interpretation	**Not significant**

4 Conclusion and Implications

Based on the results from this study, it shows that more than half of the respondents are aged between 20 and 29 suggesting that most of the teachers are neophyte in the teaching career. most of the respondents are

enrolled in master's program. Only one-third have already finished master's degree. In terms of relevant trainings, almost half of the respondents have one to two trainings attended suggesting the lack of professional development of mathematics teachers on constructivist teaching.

Most teachers believe that teaching should involve real world connections. Teachers believe that they should create real-world environments that employ the context in which learning is relevant, provide contextual applications in problem solving and knowledge acquisition, and problem-solving, and higher-order thinking skills and deep understanding are emphasized in solving real world problems.

Beliefs about emphasizing prior knowledge were also manifested by the teacher-respondents. Teachers believed to encourage the use of multiple modes of representation to facilitate easy understanding and recall. They believe that the learner's previous knowledge constructions, beliefs and attitudes are considered in the knowledge construction process. Teachers also manifested beliefs about support in collaborative construction of knowledge through social negotiation, and the use of multiple representations of mathematical concepts. Generally, these findings show that teachers consciously or unconsciously held beliefs, views, and preferences about mathematics and its teaching. These findings confirm the study of Thomson that beliefs play a significant role in shaping teachers' characteristic patterns of instructional practice. This is also one of the most striking findings observed by Thompson that mathematics teachers' practices regarding the role of problem solving in mathematics teaching is grounded on their beliefs. Beliefs account for teacher's view of her major role, which is to transmit content, as well as by her limited self-confidence with respect to her mathematical ability. Studies found that although teachers were quite good in predicting the performance of individual students, they had great difficulty in anticipating an individual student's preferred solution practices

Most teachers identify students who have difficulties in understanding the main ideas of the lesson. They design lessons to allow them to monitor student program. They also take into account prior knowledge of their students. These are just few of instructional strategies employed by mathematics teachers in this study. These instructional practices are tools to facilitate knowledge acquisition. Mathematics educators recognize that alternative instructional practices offer various benefits to students. Using of a variety of instructional approaches, including small and large group activities, discussion of the results, manipulative, calculators, and computers with decreased attention to paper-and-pencil drills confirmed the recommendations of the National Council of Teaching mathematics. These constructivist instructional strategies are expected to lead students to be active learners capable of applying mathematics in real life. These strategies will encourage teachers to utilize small and large group working arrangements in the classrooms. This is necessary to actively involve students in using mathematics in both mathematical and real world contexts. Constructivist strategies empower students to become independent thinkers, capable of synthesizing, critiquing, and summarizing their products. More than half of the students have fair mathematics performance. This finding suggests that most of the students did not perform well in the mathematics test given by the researcher.

Teachers' beliefs about emphasizing prior knowledge and beliefs in social interaction significantly predicted mathematics performance of students. Real world connection did not significantly predict mathematics performance. These findings show that teachers who create real-world environments that employ the context in which learning is relevant or focus on realistic approaches to solving real-world problems produce students who are good in math. This finding means that teacher's beliefs about mathematics can determine how s/he chooses to approach a problem, which techniques will be used or avoided, how long and how hard one will work on it, and so on. These teachers' beliefs exert a powerful influence on students' performance, on their willingness to engage in mathematical tasks, and on their own ultimate mathematical disposition. This finding implies that it is not sufficient for students to acquire certain concepts, skills, and heuristics, such as estimation skills. They should get support from teachers for situations and opportunities to use those skills, and should be inclined to do so whenever appropriate. This teacher disposition cannot be directly taught but has to be developed over an extended period of time through experiential activities.

Constructivist instructional practices did not offer a significant role in developing the mathematics ability of the students. It means that teachers did not play a dynamic role in assimilating knowledge into students'

existing mental framework and reconstructing new knowledge. The ability of students to apply their school learned knowledge to the real world was probably undervalued under memorizing bits and pieces of knowledge that may seem unrelated to them. This finding implies that teachers did not continually analyze his or her curriculum planning and instructional practices.

Competing Interests

Author has declared that no competing interests exist.

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