Constructivist Teachers Beliefs, Instructional Practices and Students' Mathematics Performance

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Abstract

This study examined the impact of teachers' constructivist attitudes on mathematics instruction and learning, as well as the usage of instructional techniques, on secondary students' mathematics performance in Grade 7 in the Pacific Towns of Northern Samar during the 2016–2017 school year. The research design used in this study was descriptive-correlational.

This article described the current state of the demographic profile of maths teachers, including constructivist attitudes, practices, and student achievement. The association between students' performance in mathematics and their beliefs about the subject was examined using multiple regression analysis. In a similar vein, statistical analysis was employed to ascertain the connection between students' performance in mathematics and teaching approaches.

The results revealed that over 50% of maths teachers are under 30, indicating that the majority of them are new to the field of teaching. Regarding educational background, the majority of participants are enrolled in master's programmes. Just one-third of them have earned a master's degree thus far. Nearly 50% of the respondents had participated in one or two related trainings.

The majority of educators think that real-world linkages should be incorporated into instruction. Teachers think that real-world settings should be designed with the context of learning in mind. The instructor respondents also expressed beliefs on prioritising knowledge. Encouragement of the use of many modes of representation to assist simple understanding and memory is one of the highly demonstrated beliefs. The learner's prior knowledge structures, beliefs, and attitudes are also

taken into account during the process of creating knowledge. Teachers demonstrated support for cooperative knowledge building through social bargaining in terms of their ideas about social interaction.

The results of the maths test that the researcher administered to the pupils indicated that over half of them performed fairly. Only one gave a good performance. Students' performance in mathematics was significantly predicted by their ideas about social interaction and the importance of prior knowledge. Performance in mathematics was not significantly predicted by real-world connections.

The constructivist teaching methods used by the respondents did not significantly contribute to the students' improvement in mathematics. Instructors did not actively assist students in reconstructing new information and integrating current knowledge into their existing mental models.

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

• Introduction

Ensuring that every Filipino person is literate in mathematics has taken on national importance in the country. Filipino students must possess a wide range of advanced mathematics knowledge and abilities that go well beyond simple computation abilities. Nonetheless, it has been observed that pupils' performance in mathematics is declining in the Philippine educational system [1–5]. The researcher has seen that a large number of pupils in the local context, ranging from elementary school to tertiary education, exhibit a dislike, fear, or aversion towards learning mathematics. Students are more likely to shy away from active participation in maths and frequently accept low academic accomplishment when combined with this negative attitude towards learning the subject [6–9].

Students frequently blame their low performance on their lack of mathematical aptitude or their ignorance of its applications [10,11]. In addition to these assessments of students' ability in mathematics, a number of data findings from tests carried out by various Philippine agencies and institutions provided proof of kids' appalling performance in the subject both domestically and internationally [12–14]. There have been reports that Filipino kids perform less well than their Asian counterparts in mathematics. The International Association for Educational Evaluation's assessment in intermediate algebra and science revealed that Filipino pupils are falling behind the majority of their peers. The mathematics results for both elementary and secondary pupils on the National Achievement Test (NAT) were yet another disheartening finding. Among the five subject areas examined, science (42.12 MPS) and mathematics (46.37 MPS) rank fourth and fifth, respectively, in the NAT results for secondary students for the 2013–2014 school year [15–19]. These topics' Mean Percentage Scores (MPS) are substantially below the 75 MPS national target. In the academic year 2014–2015, the MPS in Mathematics and Science, which were 46.3 and 42.12 in the previous year, dropped to 43.03 and 40.9 in the following year [20–22]. With only 42.03% MPS, the sixth-grade pupils in Region VIII performed lower than those in the previous academic year (44.18% MPS). Results decreased by roughly one to five percentage points across all topic categories, indicating a downward

trend in students' NAT maths problem-solving skills [23, 24]. These numbers demonstrated how difficult it is for public schools both nationally and locally to help pupils become competent academically. Thus, it's critical to comprehend the various elements that influence how well pupils succeed in mathematics. Although cognitive elements have traditionally been linked to student learning outcomes, teachers' attitudes towards mathematics and their methods of instruction have a significant impact on students' mathematical ability.

Teachers' perspectives on how kids learn mathematics and how best to instruct them have evolved significantly during the past 20 years. The importance of the student as an active participant in the teaching-learning process has received more attention [25, 26]. Specifically, this perspective implies that the outcomes of mathematics instruction are contingent upon the learner's past knowledge and cognitive processes during the learning process. Learning mathematics is now seen as an active process that takes place inside and is influenced by the learner, as opposed to a passive recording of the stimuli of teachers' presentations [27–29]. Rather than basing learning outcomes exclusively on the information the instructor provides, learning outcomes in mathematics are influenced by both the material that is provided and the learner's processing of it.

In order to develop mathematical knowledge, a number of scholars advise students to solve multi-step, real-world issues. Some scholars propose cooperative learning and concentrate on the social side of knowledge formation. Researchers have more recently proposed combining the two methods. They suggested that solving real-world problems while interacting socially in a cooperative setting is a great way to build knowledge. Research is required to determine how interactions that are cultivated in cooperative environments impact the creation of mathematical knowledge.

The researcher chooses to carry out this study in the secondary schools in Catubig Valley based on the aforementioned concepts. Finding the variables influencing pupils' mathematical performance is the same as examining mathematics performance from the standpoint of constructivist theories.

In general, this study identified the perspectives of secondary teachers in the Pacific Towns of Northern Samar regarding mathematics and the methods used to teach the subject. The specific goals of this study were to: Identify the characteristics of maths teachers in terms of age, educational attainment, and attended relevant trainings; Find out about the constructivist beliefs that teachers have about mathematics, with a focus on prior knowledge, social interaction, and real-world connections. Find out about the constructivist instructional practices that teachers use when teaching mathematics. Find out how well students perform in mathematics. Find out if there is a significant relationship between the teachers' beliefs and the students' performance in mathematics. Understanding where education stands in respect to reform and the direction that education is headed will be made possible by learning about teachers' perspectives on mathematics and the current teaching strategies employed in the classroom.

The Constructivism philosophy, which forms the basis of this study, holds that instructors' primary responsibility is to include their pupils in learning activities that build upon and relate to their prior knowledge and life experiences. It is a crucial component of education, whether it is in elementary, high school, or college. It involves people actively participating in the learning process because, by definition, it deals with the learner's capacity to choose and apply the right learning resources, keep track of their progress, and assess their performance. Using teaching strategies based on brain science research is a popular trend in education these days. This study employs constructivist theory, which emphasises prior knowledge, social interaction, and real-world linkages. Nonetheless, this notion has not been the foundation of many extensive studies. Because the research that have been done are qualitative in nature, there hasn't been much empirical data that can be applied to a wider population. According to Vygotsky's socio-cultural theory, a child's cognitive development is social in nature, involving both other people and society at large. Stated differently, constructivism and the creation of concepts are significantly influenced by social interaction, whether it is through speech, gestures, or hints.

• Materials and Methods

The research design used in this study was descriptive-correlational. This article describes the current state of the teacher demographic profile, their constructivist attitudes about teaching and learning mathematics, their constructivist instructional strategies, and students' math achievement. The correlational section involved establishing the connection between kids' mathematical performance and teachers' constructivist attitudes about mathematics. The relationship between students' performance in mathematics and instructional approaches will also be tested.

Teachers and students of mathematics in Grade 7 in the secondary schools in the Pacific region of Northern Samar make up the study's population. A thorough enumeration will be conducted due to the instructors' restricted population. Still, each mathematics teacher was represented by a mere five Grade 7 students. They were chosen at random using the fishbowl method. Thirty secondary maths instructors teaching seventh grade in Northern Samar's Pacific towns participated in this study as respondents. They completed surveys measuring constructivist attitudes towards mathematics and teaching methods. 150 pupils in Grade 7 made up the total number of responders. Their performance in maths was attained.

using a test created by the researcher. This study's variables are divided into independent and dependent categories. The constructivist beliefs about mathematics, instructional strategies, and the demographic profile of instructors (i.e., age, greatest educational attainment, and relevant trainings attended) make up the independent factors. The dependent variables in this study were the pupils' math scores.

The 42-item questionnaire on mathematical beliefs is based on a study by Sert regarding mathematical beliefs and how they affect students' academic achievement. The three components of the instrument are prior knowledge, social interaction, and real-world linkages. The author established the three subscales' dependability. The three factors' respective Cronbach's alpha coefficients are α=0.78, α=0.77, and α=0.89. The item used to measure instructional practices was taken from Banda's study on the relationship between constructivist instructors' methods in the classroom and their students' mathematical performance. Its dependability has been confirmed by the author at α=0.81. Finally, a test created by the researcher was used to gauge the pupils' performance in mathematics. The third grading period is covered by the 45-item test.

The following variables were grouped, scored, or interpreted in the following ways to make presenting and statistical analysis easier:

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

- **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

- **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

- **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.

• Results and Discussion

• Profile of mathematics teachers

Table 1 presents a summary of the findings according to the instructor profile.

The profile of the maths teachers in grade 7 who took part in this study is shown in Table 1. In terms of age, over half are between the ages of 20 and 29, indicating that the majority of instructors have been in the field for less than ten years. According to their credentials, just one-third of the respondents have previously earned a master's degree, while the majority of them are enrolled in master's programmes. Nearly half of the respondents reported having attended one or two trainings on capacity building, which raises questions about the paucity of constructivist teaching professional development for maths instructors.

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

• Teachers' constructivist beliefs about mathematics

This section demonstrates that the majority of educators think that instruction should incorporate real-world applications (Table 2a). Teachers believe that they should design real-world settings that make use of the context in which learning is applicable, offer contextual applications for problem solving and knowledge acquisition, and place an emphasis on deep understanding and higher-order thinking skills when solving real-world issues.

The instructor respondents also disclosed their beliefs towards emphasising prior knowledge. Encouragement of the use of multiple modes of representation to facilitate easy understanding and recall, learner's prior knowledge constructions, awareness of the significance of goals for the learner, and the distinction between learner and teacher goals are some of the highly demonstrated beliefs. This suggests that educators think that the creation of new information depends on the application of past knowledge. The hypothesis put forth by Piaget, according to which students build their knowledge through their schema, is consistent with this finding.

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;		
Provide contextual applications in problem solving andknowledge acquisition.		
Problem-solving, higher-order thinking skills and deep understanding are emphasized in solving real world problems.		
Provide real-world, case-based learning environments, rather thanpre-determined instructional sequences;		

4.67	Highly demonstrated
4.33	Highly demonstrated
3.83	Demonstrated
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 themultiple 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;
The learner's previous knowledge constructions, beliefs and attitudes are considered in the knowledge construction process.awareness of the importance of goals for the learner, and the dichotomy between learner and teacher goals;

4.83	Highly demonstrated
4.50	Highly demonstrated
4.50	Highly demonstrated

Enable context-and content dependent knowledge construction;	4.17	Demonstrated

sensitivity toward and attentiveness to the learner's previousconstructions;

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 andmisconceptions;
awareness of the importance of social contexts, such as the difference between street mathematics and school mathematics Errors provide the opportunity for insight into students' previousknowledge constructions.

2.67	Moderately demonstrated
2.50	Poorly

	demonstrated		
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

Students determine their own goals and objectives, or they are negotiated with the teacher or the system.
This construction happens in personal settings and is facilitated by experience, teamwork, and social negotiation. An emphasis on conceptual interrelatedness and transdisciplinary learning reflects the complexity of knowledge. The usage of primary sources of data ensures authenticity and reflects the complexity of the real world.
A key player in mediating and regulating learning is the student.
The learning challenges, contexts, abilities, knowledge, and scenarios are authentic, realistic, and relevant; they mirror the inherent complexity of the "real world."
Emphasis is placed on the creation of knowledge via collaborative learning.
In order to assist pupils perform just a little bit above their potential, scaffolding is provided.
Metacognition, self-analysis, self-regulation, introspection, and awareness are promoted through a variety of activities, opportunities, resources, and settings.

3.67	Demonstrated
3.20	Moderately demonstrated
3.20	Moderately demonstrated
3.00	Moderately demonstrated
2.83	Moderately demonstrated
2.83	Moderately demonstrated
2.83	Moderately demonstrated
2.67	Moderately demonstrated
2.60	Moderately demonstrated

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

Grand Mean	2.85	Moderately demonstrated

- **Social interaction beliefs**

Regarding social interaction beliefs, educators supported the use of diverse representations of mathematical concepts, encouraged ownership and voice in the learning process, and collaboratively constructed knowledge through social negotiation. These results demonstrate that the majority of educators think that peer learning and group projects are the best ways for pupils to build their knowledge. Moreover, Lave proposed that pupils develop autonomous learning through teamwork (Reference???). This is consistent with Selden's finding that pupils who learn by interacting with their peers remember material better than those who learn by listening to teachers.

In general, these results demonstrate that teachers' attitudes, opinions, and preferences on mathematics were held during the teaching and learning process, whether consciously or unconsciously. These results concur with those of Thomson, who found that these factors had a major influence on the distinctive instructional practice patterns of teachers. One of Thompson's most startling discoveries is that math teachers' practices about the importance of problem solving in math instruction are based on their personal convictions.

Beliefs explain teachers' poor self-confidence in their mathematical abilities as well as their perception of their primary position as content transmitters. According to studies, teachers could fairly accurately estimate each student's performance, but they struggled mightily to forecast each student's preferred methods of solving problems.

- **Constructivist instructional practices in mathematics teaching**

Table 3 displays the instructional approaches of constructivist mathematics teachers. Instructors recognise pupils who struggle to comprehend the lesson's core concepts. The way the sessions are structured enables the professors to keep an eye on each student's progress. These methods of instruction serve as instruments to help students learn. Teachers of mathematics are aware that students can benefit from a variety of alternate teaching methods. The National Council of Teaching Mathematics (NCTM) recommendations were validated by using a range of instructional strategies, such as small and large group exercises, discussion of the findings, manipulatives, calculators, and computers with less focus on paper-and-pencil drills. It is anticipated that by using these constructivist teaching techniques, students will become more engaged learners who can apply mathematics in practical settings. Teachers are therefore urged to use both big and small group work settings in the classroom. For students to use mathematics in both mathematical and real-world contexts, this is a must. With the help of constructivist techniques, students can develop into self-sufficient thinkers who can summarise, analyse, and synthesise their work.

Table 3. Instructional practices in mathematics teaching

Instructional Practices	**Weighted Mean**	**Interpretation**
I identity students who have difficulties in understanding the main ideasof the lesson.	4.75	Very highextent
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. My questioning methods are likely to enhance the development of student's conceptual understanding/ problem solving.	4.50 4.17	Very highextent High extent
My lessons progress are based on students' responses.	4.17	High extent
I give students immediate constructive feedback when they needdirections 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 exten
My instructional methods and activities reflect attention to issues ofaccess, equity and diversity for students.		
The design of my lessons incorporate tasks, roles, and interactionsconsistent with analytical lessons.		
The instructional methods and activities I use reflect attention to students'experiences and readiness.		
3.00	Moderatelyextent	
2.33	Low extent	
1.83	Low extent	
Grand Mean	3.77	High extent

- **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

- **Relationship between teachers' beliefs about mathematics and students mathematics performance**

Table 5 displays the correlation between mathematics teachers' beliefs and students' mathematical achievement. It demonstrates that students' performance in mathematics was substantially predicted by their attitudes about social interaction (β=0.491, $p<0.05$) and prior knowledge emphasis (β=0.711, $p<0.05$). Performance in mathematics was not significantly predicted by real-world connections. These results demonstrate that educators who provide authentic settings that use the context in which learning is applicable or concentrate on

Mathematically proficient pupils are the result of genuine approaches to real-world problem solving. This research suggests that a teacher's attitudes about mathematics might influence a variety of decision-making processes, such as how to approach a problem, which approaches to employ or avoid, how long and how hard to tackle it, and so on. Teachers' beliefs have a significant impact on pupils' performance, willingness to participate in mathematical activities, and overall mathematical disposition. This result supports that of Boekaert, who found that teaching students specific ideas, abilities, and heuristics—like estimate skills—is insufficient. Teachers should help students apply the abilities they have acquired in a variety of circumstances and opportunities. When faced with a learning assignment, teachers' beliefs, according to Boekaert, aid in the development of either a learning or a coping intention, depending on how they perceive the demands of the work and the surrounding circumstances. Teachers require good expectations and attitudes in order to support a learning aim.

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

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

- **Relationship between instructional practices and students' mathematicsperformance**

The correlation between teaching strategies and students' mathematical performance is displayed in Table 6. There was no discernible correlation between the pupils' performance in mathematics and the instructional methods (β=0.1103, p>0.05).

This result shows that the constructivist teaching methods used by the respondents did not significantly contribute to the students' improvement in their mathematical proficiency. It suggests that educators did not use a learner-centered approach to put the student at the centre of the knowledge and abilities that needed to be acquired. The usefulness of pupils' abilities to apply what they learned in school to real-world situations was likely underestimated due to memorization and seemingly irrelevant information. The result suggests that educators did not often review their lesson plans and methods of instruction.

This result contradicts the findings of Boekaerts research, which demonstrated that instructional practices are instruments to support the acquisition of knowledge, and that the teachers in the current study were unaware of the different advantages that alternative instructional practices could provide to their pupils.

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

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

• Conclusion and Implications

According to the study's findings, over half of the respondents were between the ages of 20 and 29, indicating that the majority of teachers are new to the field. The majority of those surveyed are

registered for a master's degree. Merely 33% of them have completed their master's degree thus far. Nearly half of the respondents reported having attended one or two related trainings, which may indicate that maths instructors are not receiving enough professional development in constructivist teaching.

The majority of educators think that learning should have linkages to the outside world. In order to foster deeper understanding and higher-order thinking skills in their students, teachers should design real-world environments that use the context in which learning is relevant and offer contextual applications in problem solving and knowledge acquisition.

The instructor respondents also expressed beliefs on prioritising knowledge. It is claimed by educators that using a variety of representational modalities will aid in comprehension and memory. They contend that the process of creating knowledge takes the learner's prior knowledge structures, attitudes, and beliefs into account. Instructors also demonstrated ideas about using diverse representations of mathematical concepts and supporting collaborative knowledge production through social bargaining. These results generally demonstrate that teachers' opinions, preferences, and ideas regarding mathematics and its instruction were retained, whether consciously or unconsciously. These results support Thomson's study, which found that teachers' distinctive patterns of instructional practice are significantly shaped by their beliefs. One of Thompson's most startling discoveries is that math teachers' practices about the importance of problem solving in math instruction are based on their personal convictions. Beliefs explain the teacher's conception of her primary responsibility, which is to impart knowledge, as well as her low self-esteem regarding her aptitude for mathematics. According to studies, teachers could fairly accurately estimate each student's performance, but they struggled greatly to forecast each student's preferred method of solving problems.

Most educators are able to detect students who struggle to comprehend the lesson's core topics. To enable them to keep an eye on the student programme, they create lessons. They also consider what their students already know. These are just a handful of the teaching techniques that the maths teachers in this study used. These teaching

strategies are instruments to help students learn. Teachers of mathematics are aware that students can benefit from a variety of alternate teaching methods. The National Council on Teaching Mathematics' guidelines were validated by using a range of instructional strategies, such as small- and large-group exercises, discussion of the findings, manipulatives, calculators, and computers with less focus on paper-and-pencil drills. It is anticipated that by using these constructivist teaching techniques, students will become engaged learners who can use mathematics in everyday situations. These techniques will motivate educators to use both big and small group work settings in the classroom. In order to actively engage pupils in applying mathematics in mathematical and real-world situations, this is important. With the help of constructivist techniques, students can develop into self-sufficient thinkers who can summarise, analyse, and synthesise their work. In mathematics, more than half of the kids perform fairly. This result implies that the majority of pupils did not score highly on the researcher's maths exam.

Students' arithmetic performance was significantly predicted by teachers' views on social interaction and prior knowledge emphasis. Performance in mathematics was not significantly predicted by real-world connections. These results demonstrate that arithmetic proficiency is produced in students by teachers who provide authentic learning settings that use the context in which learning is relevant or who emphasise practical approaches to tackling real-world problems. This study implies that a teacher's attitudes towards mathematics can influence how he or she approaches a problem, what strategies are employed or not, how long and how hard they work on it, and other factors. The opinions of these professors have a significant impact on pupils' performance, willingness to participate in mathematical activities, and overall disposition towards mathematics. This result suggests that learning specific ideas, abilities, and heuristics—like estimate skills—is not enough for pupils. Teachers should encourage students to apply those abilities in suitable contexts and give them the support they need to do so. This teaching disposition must be acquired by experience activities over a long period of time, as it cannot be taught directly.

Students' arithmetic skills did not significantly improve as a result of constructivist teaching methods. It indicates that educators did not actively contribute to pupils' assimilation of knowledge.

reassembling new knowledge inside the preexisting conceptual framework. The value placed on pupils' capacity to apply what they learnt in school to real-world situations was likely underestimated in favour of memorization of seemingly irrelevant facts. This result suggests that educators did not regularly evaluate their lesson plans and methods of instruction.

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