



Science Teachers' Perceptions of Students in Mathematics

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Abstract

This article examines the beliefs of teachers who teach at scientific departments about teaching mathematics in schools. In exploring their perceptions about the contributing factors that help kurd students to achieve high-scores in math's subject. Therefore, forty seven teachers (who teach at scientific departs) questionnaire made by the researcher. The data collected was analyzed using descriptive analysis. As a result, it was revealed that the majority of teachers agreed that real life applications, processing skills, using concrete instructional manipulative and conceptual knowledge are very important in teaching mathematics. However, most of the teachers who have participated in this survey was aware of the fact that kurd students have high achievements compared to other students around the world. On the other hand, the results have also shown that kurd students usually concentrate on private tuition to improve their math's skills, as well as, the parent's involvement in stimulating them for better results has an active role in their high achievements.

Keywords : Conceptual knowledge, drill and practice, instructional methods, Kurdish teachers, teacher Beliefs, teacher perceptions and student achievement.

Introduction

The importance of mathematics in all realms of life and the recent debate on the falling standards of students' achievement in mathematics has triggered the growing attention of researchers, parents and education authorities in their quest for the way forward over the last two decades (Blum, 2002). The teaching and learning of mathematics have therefore been an issue of considerable concern for some time now.

There are various studies reporting that teacher beliefs and instructional methods are significant variables in improving students' achievement (Rowan *et al.*, 2002). Teacher beliefs about mathematics play a crucial role in shaping the teacher's instructional choices (Shuhua, 2000) as well as correlating with higher students' achievement (Love and Kruger, 2005). Given

research findings and growing research interest in Asian mathematics education after international comparative studies reported Asian students outperformed their western counterparts in mathematics, this article investigates Korean elementary classroom teachers' perceptions about mathematics education and speculation regarding factors that contribute to Korean students' high achievement scores.

Methodology

The participants of the survey were randomly selected from the Faculty of Science / University of Zakho, which is located in Zakho, Iraq. Among those participants selected there were 13 female and 34 male teachers. In addition to that, the number of the questionnaires distributed was 56, but only 47 were answered

and completed. Nevertheless, the participants in this questionnaire were selected from different departments. Among (83.9%) of the completed questionnaires, there were (17) from math's teachers, (5) from physic's teachers, (13) from computer teachers, (8) from chemistry teachers, and (4) from biology teachers. The mean of their teaching experience was 6.09 years. The mean teachers age was 30.28 years. Twenty four (79.4%) held a bachelor's degree, sixteen (16.3%) held a master's degree and seven (16.3%) held a Ph.D degree. The 35-item 3 part survey instrument entitled "Teachers' Perceptions about Mathematics Education "(TPMC) was developed based on a comprehensive review of the mathematics education and the current mathematics reform movement literature. This process to develop the instrument helped to establish face validity of the questionnaire. The first part contained questions about participants' demographic information, that is, gender, age, and teaching experience. The second part had 10 likert scale questions (agree, not sure, disagree) about their instructional pedagogy in mathematics education. For example, teachers were asked if real life application skills are the most important for the children to learn from their instruction in mathematics class. The Third part consisted of two open-ended questions and a forced-answer question (Yes, No). The open-ended questions were asking their opinion about their instructional pedagogy and the factors they believe contribute to Kurdish students' high scores in mathematics. The survey questionnaire was developed in English first and translated by the researcher into Arabic. With the departments teacher's assistance, the first draft of the questionnaire was given to forty seven teachers at a faculty of science in Zakho-Duhok. Based on the responses of the teachers, the final draft of the questionnaire was established.

The questionnaire along with a letter explaining the purpose of the study and participant

consent form was distributed from 7/6 to 8/6, 2014. The questionnaire went to five departments. The questionnaires, completed anonymously by the department's teachers, were collected by researchers. Excel 2010 for windows was used for data entry and analysis. A descriptive analysis utilizing frequencies and cross tabulation was employed to analyze the data to examine the purposes of this study.

Results and Discussion

Using the Excel 2010 descriptive analysis and frequency of responses, forty three teachers (91.5%) agreed that teaching children to apply mathematics knowledge and skills to real life is the most important skill. Two teachers (4.25%) said they were not sure or disagree with the statement (Fig.-1).

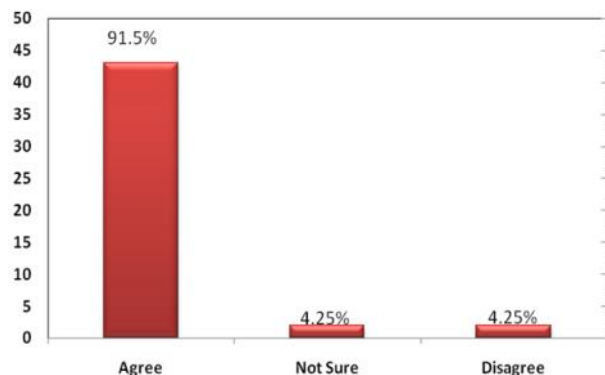


Fig.-1. Real life application is the most important in mathematics education

Forty-two teachers (89.4%) responded that they agree with the statement, "teaching students to see the process while solving the problem is the most import". Three teachers (6.4%) said they were unsure and two teachers (4.2%) disagreed (Fig.- 2).

Regarding the statement "The most important thing is for students to memorize algorithms and use them to solve problems in mathematics education", thirty one teachers (66%) answered "Agree", eleven teachers (23.4 %), "Not sure". and five teachers (10.6 %) answered "Disagree" (Fig.- 3).

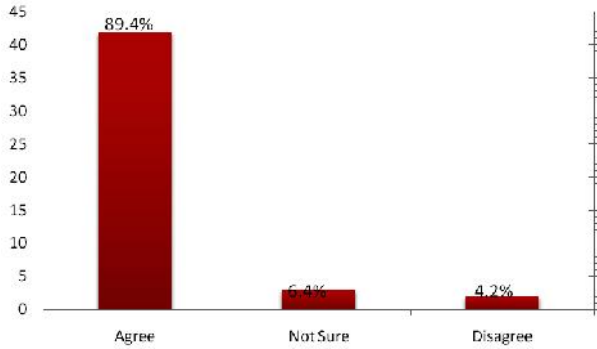


Fig.- 2. Process is very important in teaching mathematics.

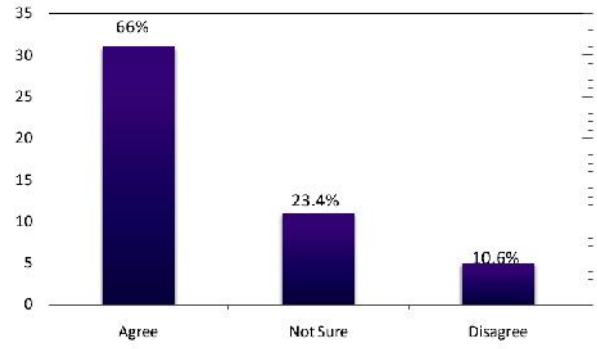


Fig.- 3. It is important to memorize algorithm to solve mathematics problems

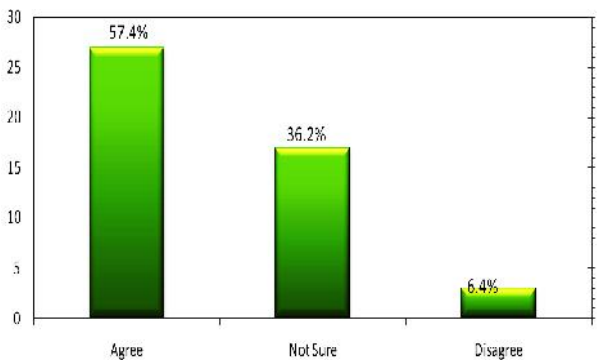


Fig. - 4. To teach mathematics, we need to explain concepts using concrete materials.

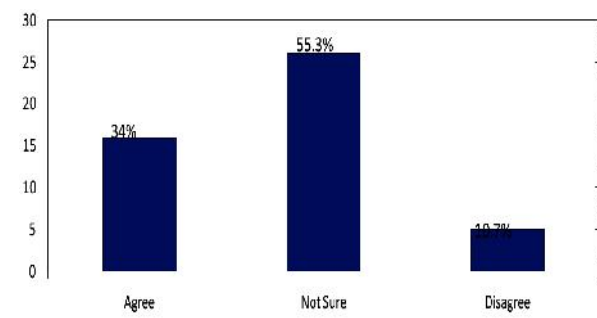


Fig.-5. I am confident explaining mathematics concepts to the students using manipulatives.

When classroom teachers were asked if various concrete manipulative should be used to illustrate mathematical concepts for the students, twenty seven teachers (57.4 %) replied that they agreed, seventeen teachers (36.2 %) were not sure and three teachers (6.4 %) replied “Disagree” (Fig.- 4).

Sixteen teachers (34 %) did feel confident explaining mathematical concepts to the students using various instructional manipulative (i.e., small counters and Base-10 blocks). Twenty-six teachers (55.3 %) were not sure if they were confident or not; and five teachers (10.7%) were not confident in teaching mathematics using different concrete instructional materials (Fig.-5).

Thirty teachers (63.8 %) believed that concrete examples should be demonstrated first and then information related to abstract knowledge added to help students understand

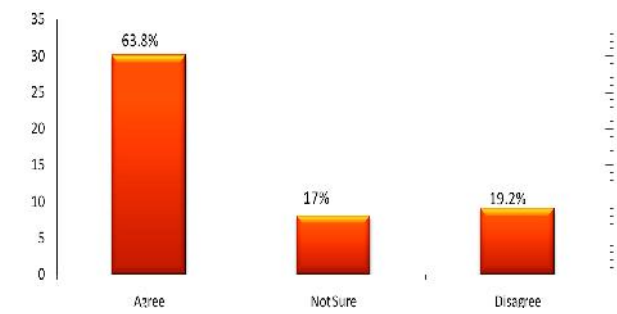


Fig.-6. I need to help children develop abstract knowledge from concrete examples by illustrating the concept using concrete models

concepts. Eight teachers (17 %) were not sure about it and nine teachers (19.2%) disagreed with this statement (Fig.- 6).

In terms of using concrete objects to introduce a new concept, thirty two teachers (68.1%) said that concrete instructional materials must always be used when students learn new concepts. Ten teachers (21.3 %) were not sure

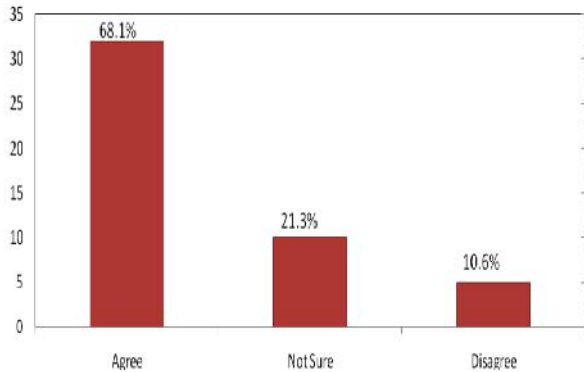


Fig. - 7. When introducing a new concept, we always need to use concrete objects.

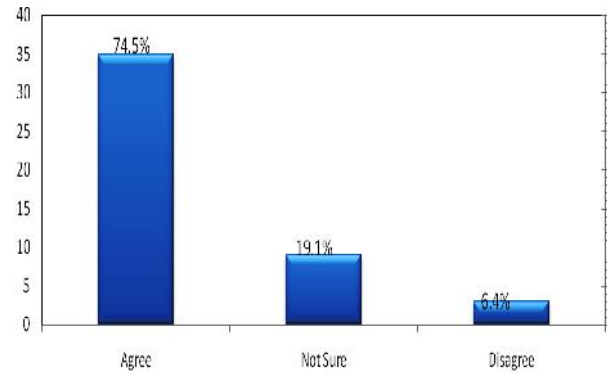


Fig-8. In mathematics education, conceptual knowledge is very important.

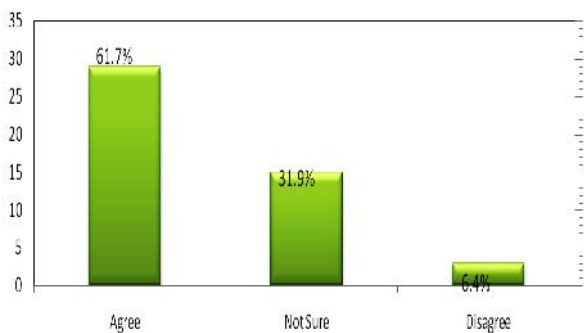


Fig- 9. In mathematics education, procedural knowledge is very important.

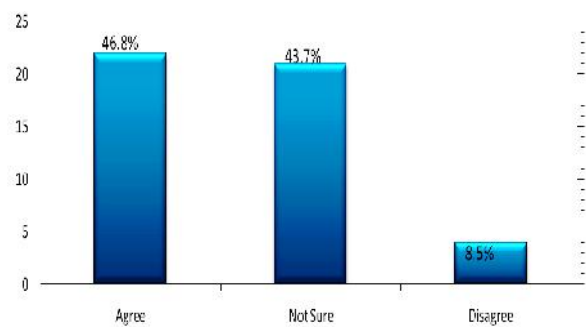


Fig-10. I feel my students learn mathematics well through my instructional methods.

and five teachers (10.6 %) did not think it was an appropriate way to help students build concept (Fig.-7).

Thirty-five teachers (74.5 %) thought both conceptual and procedural knowledge are equally important in teaching students mathematics. Nine teachers (19.1 %) were not sure, and three teachers (6.4 %) disagreed with this statement (Fig.- 8).

Teachers were also asked if the algorithm was very important for mathematics education. Twenty nine teachers (61.7%) agreed, fifteen teachers (31.9%) were not sure, and three teachers (6.4 %) disagreed with the idea (Fig.-9).

Twenty-two teachers (46.8 %) felt the students learn mathematics well through their instructional methods. Twenty one teachers (43.7 %) did not know if their instructional methods were effective and four teachers (8.5 %) replied

they did not feel their instructional methods help students learn mathematics (Fig.-10).

Teachers’ educational pedagogy

In answer to a question regarding what is the most important thing they need to teach students in mathematics education, forty seven (10.6%) of total (444) responses indicated that the concept is the most important for the students to acquire. Forty-six responses (10.4%) indicated that understanding principles is the most important, and forty one response (9.2%) indicated that understanding process was more important. Thirty five (7.8%) responded that helping students have fun with mathematics to increase interest in it, and thirty four (7.7%) said that students should develop problem solving skills. Thirty-three teachers (7.4%) said that students should build logical thinking skills and thirty two (7.2%) said that real life application

Table - 1. What is the most important thing you need to teach mathematics in the classroom

Sl. No.	Items Teachers Think the Most Important in Teaching Math	No. of Response	Percent (%)
1.	Understanding concepts	47	10.6
2.	Understanding principles	46	10.4
3.	Understanding process	41	9.2
4.	Fun math and student's interest	35	7.8
5.	Developing problem solving skills	34	7.7
6.	Building logical thinking skills	33	7.4
7.	Real life application	32	7.2
8.	Basic computational skills	29	6.5
9.	Using concrete manipulative	27	6.1
10..	Student's self-motivation	26	5.9
	Construct algorithm	25	5.6
11.	Investigation skills	24	5.4
12.	Cooperative learning	23	5.2
	Memorizing facts	22	5.0
Total Responses from Teachers		444	

is very important in mathematics education. Other responses (between 5.0 - 6.5%) included that students' basic computational skills, using concrete manipulative in teaching mathematics, allowing students to be self-motivated, helping students construct algorithms on their own, investing skills, cooperative learning skills, and memorizing facts were most important (Table - 1).

The last open-ended question examined the teachers' speculations about why Kurdish students rank high in studies in mathematics. Thirty-one responses from teachers (6.4%) indicated that Kurdish students practice computational skills through repeatedly solving various mathematics problems. Twenty nine responses from teachers (5.9%) said private lessons at the after school program made students' gain high achievement scores because many Kurdish students take private lessons or tutoring sessions for mathematics. These private programs teach students mathematics at a higher grade level than the students are taught in school. These students who receive these special lessons demonstrate higher mathematical academic skills than those who did not attend private program Twenty six

responses from teachers (5.3%) claimed parents' high expectation of their child's education resulted in students putting more effort into getting a higher grade in mathematics. Twenty-five responses from teachers (5.1 %) alleged that students think mathematics is very important for their success in school and focus on the study of it. Twenty-four of the responses from teachers (4.9 %) indicated that parents' active involvement in their child's education attributed to Kurdish students' high achievement scores. Twenty-three responses (4.7%) stated that the zeal of education and competitive college entrance exams generated students' high scores. Other responses (between 5.1 % - 7.8 %) included that students' hard work; that success results from mathematics skills taught in early childhood settings; that well developed mathematics curriculum; and that students were inherently smart and tested-wise. Teacher and parents' perception about math as an important subject, as well as the teacher's hard work were also cited (Table - 2).

Conclusions

This study has revealed that teachers were well aware of the current mathematics reform

Table - 2. Why do you think Kurdish students achieved high scores in mathematics assessment?

Sl. No.	Factors contributing to students' high achievement	No. of Response	Percent (%)
1.	Focus on practice and drill in solving problems	31	6.4
2.	Private lessons at the after school programs	29	5.9
3.	Parent's high expectation on child's education	26	5.3
4.	Think math is very important and focus on it	25	5.1
5.	Parent active involvement in child's education	24	4.9
6.	Zeal of education in the society	23	4.7
	Preparing for college entrance exam	23	4.7
7.	Student's hard work	32	6.5
8.	Math taught in early childhood setting	31	6.3
9.	Well developed math curriculum	30	6.1
10.	Students are smart	25	5.1
11.	Students are test-wise	30	6.1
	Various competitive math contests	35	7.1
12.	Curriculum is difficult in content	27	5.5
13.	Teacher & parent think math is important	38	7.8
	Teacher's hard work	29	5.9
14.	Test result is only from upper academic level students	31	6.3
	Competitive society	29	5.9
Total Responses from Teachers		487	

movement based on Constructivism. They used Constructivist theory to influence their educational pedagogy. However, interestingly, these teachers identified that the first factor contributing to students' high mathematics achievement is emphasized computational skills in mathematics education. This implies that Kurdish classrooms, teachers use traditional instructional methods in their actual classrooms that focus on computational skills, even though the majority of teachers' educational pedagogy in this study was found Constructivist approach. Also, student performance and concluded that student characteristics, family backgrounds, home inputs, resources and teachers, and institutions all contribute significantly to differences in students' educational achievement.

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References

Blum, M.K. 2002. Enhancement of students learning and attitudes towards mathematics through authentic learning experiences, Unpublished Dissertation, Curtin University of Technology, Australia.

Rowan, B., Correnti, R. and Miller, R.J. 2002. What large-scale survey research tells us about teacher effects on student achievement: Insights from the Prospects study of elementary schools. *Teachers College Record*, 104 : 1525-1567.

Love, A. and Kruger, A.C. 2005. Teacher beliefs and student achievement in urban schools serving African American students.

Journal of Educational Research, 99(2) :
87 - 98.

Shuhua, A. 2000. Mathematics teachers' beliefs and their impact on the practice of teaching in China (ERIC Document Reproduction Service No.ED 442 669).
