

The Mathematics Elementary School Teachers' Perceptions of the Student-Centered Approaches and Professional Learning Experiences

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Abstract *This research explores perceptions of the Pakistani mathematics teachers at secondary level. The study focuses the elementary school teachers' perceptions about student-centered approaches, and their difficulties in using these approaches. The study uses questionnaire and interview to gather data from mathematics teachers at secondary level. The results of this study indicate that the most mathematics teachers are positive about the role and importance of student-centered approaches in their mathematics. The majority of teachers appreciate their role as a facilitator of the learning process using student-centered approaches. Moreover, the majority of teachers reported that continued practice in teaching mathematics courses and/or teaching method courses had contributed to their developing a fair understanding of teaching mathematics. The teachers responded positively regarding the role of student-centered approaches to enhance the procedural understanding of students in mathematics. Most of the findings support student-centered approaches positively. Finally, the study recommends the arrangement of resources, and teachers' professional development.*

Key Words:

Mathematics Teachers, Student-Centered Approaches, Facilitator

Introduction

Although mathematics is the core part of curriculum, it is a reality that students take mathematics a boring and difficult subject. Students believe mathematics as a subject to be endured instead of realizing its real-world importance. The nature of mathematics suggests a trend that many students do not enjoy school mathematics and try to avoid it as well as teachers do (McLeod, 1994; Brown et al, 2008). Also, any studies focus in the students' perceptions and difficulties but there are fewer studies that attempt to explore the teachers' views, perception and difficulties in

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using students-centered approaches in mathematics at school level. Therefore, there is a need to explore what teachers perceive about mathematics, performance, leaning of students when students are engaged in activities and students centered approaches.

Student-centered approaches are used for active-learning and strategies that involve students in learning environment. The relationship between student and approaches is not same but like a bread and butter relationship. Mathematics is the subject that connects many subjects and discourages the rote learning. In Pakistani context mathematics curriculum have a wide range of concepts and plenty of syllabus. So, students and teachers work only to get 100% marks, not for effective learning. Student-centered approaches help students to create, analyse and critique their own work (Khan, 2012). This study may help to remove students 'anxiety about mathematics. Moreover the literature showed that students performed better on the items measuring rote learning and poorly on items requiring comprehension, and problem solving skills (Samo, 2009). Teachers feel difficulty in using Student-Centered Approached to lack of using resources. It is difficult for teacher to create a friendly environment in classroom without resources. There is much more lack of funding in our country for education. Furthermore, the trained teachers practising student-centered approaches are not available due to insufficient training institutes.

This research finds out the perception of Mathematics teachers about student-centered approaches and their difficulties that they face when they used these approaches in schools. My research also explores mathematics teachers 'perceptions and their difficulties that they face when they use these approaches in Pakistani context. It is argued that student-centered teaching is helpful for students' learning in mathematics education but it is difficult to implement in the Pakistani classroom. These perceptions have led me to wish to undertake this research and explore the difficulties of teachers about student-centered approaches. Before these difficulties are addressed, there is a need to know an overview about student-centered approaches that are used in education system at school level in Pakistan.

Review of the Related Literature

Student-Centered Approaches means all approaches and methods that are used for student's benefits and that develop the ability to take control of their own learning. These approaches also help in understanding students' interest, achievements and learning styles. These approaches emphasize on exploration and connect learning to the community and students' construct their knowledge by own (Black, 2007). The student-centered approach refers to a wide variety of educational programs, learning, instructional approaches, and academic-support strategies that are planned to address the separate learning needs, interests, aspirations, or cultural backgrounds of individual students and groups of students (Pedersen, 2003).

Socrates believed that true knowledge is gained through dialogue. Today, education continues to be debated by persons and media that education is in conflict between teachers' approaches and students' approaches. In teachers' approaches, the teacher is the main source of knowledge. The learner is only following the instructions. By contrast, in student-centered approaches education should be centered on the needs and abilities of the learner. The teachers' role is that of the facilitator in education (Weimer, 2012).

Although the approval of student-centered approaches by researchers and policy makers, there are many challenges in promoting teachers' use of active learning, student-centered approaches. Teachers feel difficulty in using student-centered approaches due to lack of using resources. It is difficult for teachers to create a friendly environment in classroom without training. There is lack of budget in our country for education. Furthermore, trained teachers are not available due to insufficient institutes of training. The quality and quantity of teachers training which is received by pre-service and in service teachers is not better. The curriculum and examinations are focusing on memorization of information. It is also a major problem for teachers that material conditions like facilities, necessary equipment's and number of students.

Student-centered approaches mean the teaching approaches and methods used to develop their ability to learn independently. These approaches also help to understand students' interest, achievements and learning styles. These approaches emphasize on exploration and connect learning to the community and students' construct their knowledge by own (Black, 2007). The student-centered approach refers to a wide variety of educational programs, learning, instructional approaches, and academic strategies that are planned to address the separate learning needs, interests, aspirations, or cultural backgrounds of individual students and groups of students (Pedersen, 2003)

In the past, Socrates believed that dialogue is the best way to gain true knowledge. Today, education continues to be debated by persons and media that education is in conflict between teachers' approaches and students' approaches. In teachers' approaches, the teacher is the main source of knowledge. The learner remains passive and only follows the instructions. By contrast, in student-centered approaches education should be centered on the needs and abilities of the learner. The teachers' role is that of the facilitator in education (Weimer, 2012). These approaches are difficult to implement in the classrooms in Pakistani context. Teachers want to remain discipline in classrooms but when they used these approaches, it creates much problem for teachers to remain classrooms orderly (Jeanne, 2009). Sometimes, students have weak conceptual understanding. Thus, they create problems for other students and teachers. Some students do not like work in groups. The teacher cannot deliver instructions one by one for these students (Samo, 2009). Thus, using student centered approaches; there are many problems teachers have to face with students in difference circumstances.

The majority of the students think that mathematics is a difficult subject and everybody cannot gain equal understanding in its terms. Such kinds of approaches are not successful in our context, because it is an observation that most of the students fail in mathematics (Sobel & Maletsky, 1999; Vande Walle, 2001). Therefore, the students perceive mathematics to be the most difficult subject (Ali & Reid, 2012). Moreover, the purpose of this research is to improve mathematics learning through student-centered approaches. The teaching role in a student-centered learning environment is, at most, one of the facilitator and guide. The students are in control of their own learning and the power and responsibility are the students concern.

Learning may be independent, collaborative, cooperative and competitive. The utilization and processing of information is more important than the basic content. Learning takes place in relative contexts and students are engaged in constructing their own knowledge (Theroux, 2002).

Research shows that teachers work on only stuffing knowledge in students' mind. They also teach unnecessary material that is not relative to mathematics. Our institutions try to prepare students with high grades. Our examination system is also need to improve its quality. Examination may be in different forms but they must be conducted in such a way full scope is allowed to the student for the free exercise of his originality and independence of thought and judgment and examinations must be such that all pupils should have opportunity for some level of success, there must be chances for those who have acquired more in conceptual understanding to receive the fruits for their progress. It may not be easy until the examinations truly reflect the desired objectives of the courses; teachers and pupils aim totally at recall and use rote learning as their dominant goal (Ahmed, 2008; Mohammed, 2004, 2006).

Significance of the Study

This research would be helpful to find effective work of methodologies that are used in classrooms. The study is used to search the solution of conceptual difficulties which are faced by the teachers when they used student-centered approaches in schools. This study may help teachers to work on subject knowledge and try to remove difficulties. It also enhances students' interest in mathematics. I hope this study would also help teachers to perceive individual differences and solve teachers' difficulties for implementing student-centered approaches. Moreover, this study is significant to explore in terms of it tempts to explore that it is useful to take the combination of traditional methods with student-centered approaches for best learning happens in students.

Objectives of the Study

The aim of this study is to find out the perceptions and difficulties of teachers in using student-centered approaches for teaching mathematics in schools at secondary level.

1. To explore teachers' perception in using student-centered approaches in teaching mathematics
2. to explore the teachers' perceptions of the difficulties in implementing student-centered Approaches in mathematics

Research Questions

The research questions that guided this study are:

- RQ1. How do the teachers perceive the student-centered approaches in teaching mathematics at school level?
- RQ2. How do the teachers perceive the difficulties in implementing student-centered approaches in mathematics?
- RQ3. What are the teachers' perceptions for their teaching of mathematics according to their gender, age and years of experience?

Research Method and Sample

The questionnaire was developed by the researcher in the light of the latest themes from the literatures such as mathematics teachers' perceptions, student-centered approaches and challenges that teachers face in their teaching. The 560 teachers participated in this study. The demographic makeup of the sample is summarized as:

Demographic Description of Data (N=560)

Table 1: Demographic Makeup

Gender		School		Age		Residential Area		Qualification		Years of Experience	
Gender	%	School	%	Year	%	Area	%	Qualification	%	experience	%
Male	47	Public	79	21-25	24	Urban	55	B.A, B.Ed.	13	5 year	45
Female	53	private	21	26-30	23	Rural	45	B.Sc., B.Ed.	24	10 year	35
				31-35	28			M.Sc., M.Ed.	53	15 year or more	20
				35-40	25			M.Phil.	10		

The Table (on previous page) shows that the majority of teachers fell in the elder age group and belongs to the urban areas. This indicates that the teachers coming from urban areas are dominated. The ratio of the female teachers exceeded from the male teachers mainly because of the new trends of doing job. The majority of teachers are with a minimum year of experience. The majority of them belong to public sector.

The overall picture gained by considering the response data is now presented. The data explores the teachers' perceptions about school mathematics teachings in using the student-centered approaches.

Table 2: Perceptions of Mathematics Teachers about Student-Centered Approaches

	Items	SA	A	N	D	SD
	N = 560	%	%	%	%	%
A	I enjoy when I used student-centered approaches	57	37	4	1	1
B	I am pleased with the progress my students make in mathematics	45	46	7	1	1
C	I understand my method of teaching completely	39	47	10	3	1
D	I like the way to explain students-centered approaches	35	47	14	3	1
E	Students like to learn with greater autonomy	24	46	45	4	2
F	I want my students to be able to recall formulas accurately	43	43	11	2	1
G	I like to raise students curiosity by giving them time to explore the explanations of real life phenomenon	33	42	21	2	1
H	My aim is to make my students question what they learn	63	26	7	2	2

The above table indicates that the majority of teachers agree or strongly agree that they enjoy using student centered approaches. In this approach students work in small or large groups and help each other with the guidance of teachers. The majority of teachers are pleased with their student progress and are satisfied with their method of teaching they adopt in the mathematics classrooms to teach the mathematics students. However, the majority of teachers are neutral that their students learn with greater independence or with their teacher centered style. The minorities of teachers are less likely disagreed to use the student centered approaches mainly because they think that students do not learn with autonomy their students need extra care, time and guidance. Further on the data explores the opinions of the teachers thinking about student centered approaches to learning.

Table 3. Opinions of Teachers about Student-Centered Approaches

	Items	AA	VO	O	R	N
	N = 560	%	%	%	%	%
A	I use problem solving methods in everyday teachings	41	39	17	3	0
B	I use inquiry based methods in everyday teachings	30	43	21	5	2
C	I focus on drill and practice in everyday teachings	41	37	18	3	1
D	I feel good about my mathematics teachings and strategies	48	31	17	3	1
E	I evaluate the success of the teaching strategies I use	30	47	20	3	0
F	I regularly share my teaching ideas with other teachers	42	31	20	5	2
G	I often feel satisfied with my job in teaching mathematics	43	36	16	4	1
H	My students appreciate my mathematics teaching	50	28	13	5	4

The above table shows that the majority of students are agreed or strongly agreed that they appreciate their teachers teaching or the ways, strategies they adapt to taught their students and provide ease to their students in learning mathematics mainly because the teachers are not only play the role of instructor but also managed all their works routines, classes and tasks. The majority of teachers are of the viewed that they share their ideas with other peers, colleagues to enhance their progress. The students construct their new ideas. So, that they felt satisfaction in doing their mathematics teaching job. Minority of the teachers gives the negative opinions. The teachers are not agreed with that. The teachers taught their students with old traditional methods using the teacher centered approach.

The data explores the thinking of teachers' about the difficulties which they faced in mathematics teaching.

Table 4: Exploration of Mathematics Teachers Difficulties about Student-Centered Approaches

	N = 560	Yes	No
	Main Difficulties in Your Teaching	%	%
Preparation Time	Too many demands on my time to allow clear thoughts	37	63
Difficult Course	The mathematics curriculum is too difficult for my students	53	47
Preparation Time	Lack of preparation time prevents me using students-centered approaches	39	61
My Students	My students are often very unenthusiastic learners	41	59

Examinations	The mathematics assessment system is inappropriate	39	61
Interference	Other outside school dictate what I have to do	28	72
Classroom time	Lack of classroom time hinders the development of student-centered learning	39	61
Guidance	There is a lack of direction in what is expected of me	30	70

The table indicates that the teachers' views are highly negative. The majority of teachers are of the view that they cannot take time to their class mainly because they have lack of classroom time and face the difficulties. Un-sufficient time create hindrance in rising the student centered learning because mathematics is time taken subject. The students need time to understand and handled it.

Additionally, by running the chi-square tests, the majority of female teachers were higher in number than the male teachers belongs to the urban areas. The majority of teachers are exceedingly agreed that they used student centered approaches and are stress-free to explain these approaches because in this approach student feel ease to complete their work and having no burden and overload. The teachers only play a role of mentor. Moreover, Chi square results of mathematics teachings regarding age difference showed that majority of young teacher response rate shows that they are satisfied with their job in teaching mathematics and also with the progress of students that their students showed in mathematics subject. Many of the response rate shows that teachers used the inquiry based teachings and evaluate their strategies, share their ideas with other fellows, colleagues and other people to improve their strategies to get the new ideas. Also, Chi square results of mathematics teachings regarding area difference show that majority of teachers from urban areas have positive perceptions. Regarding some points they expressed positive views and about some points they expressed negative views.

The Qualitative Data Emerged the Following Themes

Further to the questionnaire used in this study, a semi structured interview was used with the 10 elementary school maths teachers to explore their in-depth views of the issue. The qualitative data emerged the following themes.

- The perceptions of students-centered approaches in mathematics
- Difficulties faced in student-centered teaching

The Perceptions of Students Centered Approaches in Mathematics

The majority of the teachers' perceptions show that they are enabled in using SCA

in their teaching of mathematics. In analysing their expression, teachers are coded as T1, T2, and T3

Mainly majority of the teacher believe that these methods enable the teacher to move towards more students-centered learning.

First of all, majority of teachers think that for teaching mathematics time must be increased. Teachers think that proper use of A.V aids increase the effectiveness of teaching. For example, T2 said:

In allocated time for teaching, there should be separate time for preparation.

Thus, the teachers see a little opportunity to use SCA because they have little or no time. Still teaching load is high. Moreover, teachers think that incentives play a big role in the motivation of teachers. For example, T7 said:

More incentive should be given because teachers are not motivated when there is no incentive.

Thus, the teachers understand a little chance to use SCA because they have little pay packages and no other extra benefits. Moreover, teachers are of viewed that use of different approaches increase the interest of students towards student centered learning. For example, T9 said:

Activity based teaching and practice of mathematics makes student centered learning that produce interest in students.

Thus, the teachers use the SCA with great pleasure because they use different approaches to create the interest of students towards student centered learning. The majority, of teachers think that basic concept formation in mathematics is important for better learning. For example, T8 said:

Basic concepts of mathematics should be clear for better learning.

Thus, the teachers in using the SCA tell that basic mathematics learning and its clearness are very important. Without basics concept formation SCA not working well.

Difficulties Faced in Student-Centered Teaching

The majority of the teachers perceived the difficulties in using SCA in their teaching of mathematics. In analysing teachers' expression, teachers are coded as T1, T2, and T3

First of all, the majority of the teachers expressed that they have lack of proper time to prepare using student centered method. For example, one expressed: Lack of preparation time prevents me using student centered approach. Moreover, the teachers said that they teach math according to mental level of students to clear their perceptions and ideas. For example, T4 said:

To teach maths according to mental level of students and primary and middle level their concepts should clear.

The majority of teachers expressed that mathematics is a difficult subject and not handled easily but some areas of mathematics are easy because basic concept are clear. For example, T3 expressed:

Course is difficult; to some extent it must be easy and short. Basic mathematics concept of students should be very clear.

The majority of teachers said that teachers only teach the relevant subject. For example, T1 said:

One teacher should teach one subject.

Thus the data indicates that the majority of teachers expressed that their students are unenthusiastic learners even though they could use the approaches a little with them.

Discussions

This study was intended to explore teachers' perceptions of the mathematic teachings and difficulties. Firstly, the research question inquired about the teachers' perception of using the student centered approaches.

The teachers appreciated the value of student's centered approach. This finding is similar with (Theroux, 2002). In student centered approaches both teachers and students work together. Teacher facilitates and guides their students and student understands the methods to solve the difficult mathematics problems actively participating in creating their own learning (Mahendra et al., 2005). Moreover, the majority of teachers agreed or strongly agreed to use the problem solving methods mainly because of mathematics is a difficult subject and is difficult to teach for this teachers used the problem solving methods they usually concentrated on instructional techniques such as understanding the problem. Methods and techniques are very important to teach the mathematics subject. This finding is similar with (Pólya, 1962, Frank, 1988).

The study shows that the majority of teachers agreed that they feel happy to teach mathematics. The students well perceived their learning and are efficient in completing their work. This finding is contradicted to (Brown *et al.*, 2008). The study shows that satisfaction levels of teachers are very high towards teaching in mathematics classroom and also with the job. Teachers are satisfied with their job. In student centered learning they only facilitate their students and help them in doing different tasks in mathematics classrooms. This finding is similar with (Lester, 1980).

The majority of teachers are agreed to do evaluation of their strategies which they used in their classes to improve the students learning and apply the students' centered approach in their classes. This result is alike with (Weimer, 2002) mainly

because teachers want their student should be able to learn the real mathematics problems. The majority of teachers are strongly agreed that they share their ideas with colleagues, peers and others. The teachers construct their new ideas and share with others. This outcome is identical with (Zemelman, Daniels & Hyde, 2005).

The majority of the teachers showed that they seem a high value of using student centered approaches mathematics curriculum. In learner centered teachers and students both work together to create an interactive environment (Mahindra *et al.*, 2005). Simply, the students are appreciated and rewarded on their good works. The insufficiency of programmes of development and lack of resources caused difficulties to the teachers as well as to students similar with (Memon, 2007; Halai, 1998).

Conclusions

The majority of teachers enjoy elaborating the student centered approach and satisfied with their job in teaching mathematics and also with the progress of students that their students showed in mathematics subject. Teachers expressed students learn with greater autonomy. Students are free to learn by their own so, teachers are pleased with the progress of students that their students make in mathematics learning. Elementary schools mathematics teachers use problem solving methods in their mathematics classrooms and help the students to solve the different mathematics problems using the drill and practice techniques. For this the teachers feel satisfied with their strategies and job in teaching mathematics and regularly share their ideas with peers, colleagues and other peoples to enhance the teaching strategies to make mathematics easier, understandable for their student.

By looking at the views of the teachers from questionnaire and interview data, their teachings of mathematics, and their difficulties were explored. It is found from the study, the teachers feel ease to explain the student centered approaches and using the problem solving, drill and practice methods of teachings so, the students are enthusiastic in their learning in mathematics. They found mathematics interesting and valuable. Although very few found teaching mathematics boring and tough. The young teachers mostly belonging to the urban areas in this study expressed positive views regarding mathematics; with most articulating that they feel happy to teach mathematics. The majority of the teachers were of the view that mathematics is an interesting, useful and self-doing subject. The teachers are satisfied with their job in teaching mathematics.

By observing at the opinions of teachers, there are following recommendations as:

- It is recommended that change assessment goals to minimize emphasis on recall. Use the student centered approach in much a better ways, explain and explore more to the students that students work independently
- Introduce students' centered approaches to the wide range available.

- Use better formats in assessments to elementary school teachers. The elementary school teachers should be evaluated by themselves evaluates their teachings and improve them using the new resources.
- Training should be given to the teachers rendering to the new teaching styles, introduced new techniques and methods according to the mathematics subject curriculum.

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