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Exploring The Relationship Of Motivational Beliefs With Students' Mathematical Performance At Primary Level

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Abstract

Literature has indicated that motivational beliefs are very important in academic performance of students at different levels. The study was designed to search the Relationship of Motivational Belief with Students' Mathematical Performance at Primary Level. The study has used quantitative research approach and descriptive research design was used. Students of grade five were the population of current study. Total 300 students from primary schools were the part of the sample of this study. From which 150 students were male and 150 students were female. A questionnaire and a mathematical performance test was used to collect data. The questionnaire was used to collect data about motivational beliefs that was contained information of five graders personal demographics, and statements related to self-efficacy, intrinsic value, and test anxiety. Pearson Correlation, Independent sample t-test were applied to find out the relationships and differences and the results are showing noteworthy relationship and noteworthy gender difference in primary school students' motivational beliefs and mathematical performance.

Key Words: Relationships, Motivational Beliefs, Gender, Students of Grade Five.

Introduction and Literature Review

Motivational beliefs are very important in achievement of mathematics. Motivation is a process that maintain goal oriented behaviour. The importance of students' motivation is mirrored in the various range of related research on classroom teaching and learning (e.g. Pintrich & De Groot, 1990; Friedel, Cortina, Turner & Midgley, 2007; Pantziara & Philippou, 2015). Researchers observed that motivation has a vital role in teaching learning process to understand why some students look to learn and be successful, while others look to do more efforts to get parallel results (Pintrich, 2003). Researchers have highlighted position of the social background in various cognitive and motivational concepts in the development of students 'motivation and the connections with other concepts (Lavasani, Malahmadi & Amani, 2010; Liem, Lau & Nie, 2008; Zusho, Pintrich & Cortina, 2005).

Lee and Stankov, 2018 said that students' perceptions about their own selves and abilities are specifically correlated with their academic achievement. This study has shown that self-efficacy in PISA were the best interpreters of students' mathematical achievement. Group differences with respect to mathematics are being investigated in literature. As, intrinsic motivation in mathematics was recognized as showing the greatest drop from ages nine to seventeen (Gottfried, Fleming, & Gottfried, 2001). Similarly, gender differences in mathematics is

also observed in researches. Early researchers have been shown that female students has deficiency of confidence regarding their mathematical skills and they practice more anxiety in this regard (Aiken, 1970; Fennema, & Sherman, 1976). Gasco, Goñi and Villarroel (2014) has indicated that male students are high achievers in self-efficacy and therefore male students feel good in mathematics learning than female students. Some researchers has shown that gender differences are associated with mathematical self-efficacy in the favor of male students (Gallagher, & Kaufman, 2005).

Vale (2009) has mentioned in research studies a very little differences in achievement in mathematics due to gender among students, however boys obtained comparatively higher mean scores in mathematics achievement. Watt (2004) has shown gender differences were in the favour of male students for mathematics. Brophy, 1987, has claimed that motivational beliefs are opinions and values that students give about objects and learning process. Furthermore, motivational beliefs are opinions that students made about their efficacy of learning. For an instant, students' beliefs about their academic experiences have a vital role for their academic achievement (Wigfield & Eccles, 2002). Likewise, motivational beliefs regarding mathematics regulate students to develop approaches and motivational aims. Meaningfully, students' beliefs offer a positive or negative framework for learning depending upon them, they are either hopeful or doubtful (Skinner, 1995; Vermeer, Boekaerts, & Seegers, 2000). Rosário, Pjsldf, Lourenço, Paiva, Rodrigues, Tuero and Arias (2012) has observed motivational variables and found that self-efficacy is a forecaster of mathematical success and success of school, they also found that prior mathematics success is a forecaster of future success in mathematics.

Motivation is an important tool, which is frequently underused in today's classroom by the teachers. The teachers use different motivational techniques in their classroom to encourage the students to do work and generate good results for education in a productive way. It was assumed that inspiration started from outside, yet what's should be perceived that every individual has their own sparks. It comes from inside, so it is up to each particular student to motivate himself/herself for learning. According to Stevens, Olivarez and Hamman (2006) self-efficacy is a stronger predictor of mathematical achievement. Carmen Perez-Fuentes, Nunez, Molero, Gazquez, Rosario, and Nunez (2020) has explained in their study how anxiety is related to mathematics achievement, they told that perceived mathematics ability is moderated by mathematics anxiety. They found that as we increase perceiver abilities the achievement in mathematics is also increased in the same ratio.

In the same way, mathematical anxiety has considerably mediated the relationship between perceived competence about mathematics and mathematical performance. Several studies have shown that mathematic anxiety is higher in female students than in male students, so gender difference regarding mathematic anxiety exists (Dowker, Bennett, & Smith, 2012; Gunderson, Park, Maloney, Beilock, & Levine, 2018). A meta-analysis by Zhang, Zhao and Kong, (2019) has shown a negative relationship between math anxiety and mathematics performance especially in Asian students. González, Rodríguez, Faílde and Carrera (2016) has shown as anxiety can be predicted by intrinsic value and self-concept. Both self-concept and intrinsic value has predicted mathematical performance.

Motivation is an important tool, which is frequently underused in today's classroom by the teachers. The teachers use different motivational techniques in their classroom to encourage the students to do work and generate good results for education in a productive way. It was assumed that inspiration started from

outside, yet what's should be perceived that every individual has their own sparks. It comes from inside, so it is up to each particular student to motivate himself/herself. This study has explored the students' motivational beliefs and their relation with the students' mathematical performance at primary level.

Objective of the Study

The study expected to explore the relationship of motivational beliefs with students' mathematical performance at primary level.

Research Question

- What is relationship of motivational beliefs with students' mathematical performance at primary level?
- What is relationship of self-efficacy with students' mathematical performance at primary level
- What is relationship of intrinsic value with students' mathematical performance at primary level
- What is relationship of test anxiety with students' mathematical performance at primary level
- What is gender difference in students' mathematical performance at primary level?
- What is gender difference in students' motivational beliefs at primary level?
- What is gender difference in students' self-efficacy at primary level
- What is gender difference in students' intrinsic value at primary level
- What is gender difference in students' test anxiety at primary level

Research Design:

The study was designed to find out quantitative data. Therefore, quantitative research approach was used in this research. Descriptive research design followed by a survey method was applied to collect the data.

Population and Sample

Five grade students in primary schools sited in Lahore city were the population of this study. At stage one a convenient sampling technique was applied to find out 10 schools from which five were boys' schools and five were girls' schools. At stage two from each selected school there were 30 students taken as a sample at random. In this way, total 300 students of grade five participated in this study. There were 150 male students and 150 female students who participated in this research work.

Instrument of the study

A Questionnaire with 24 statements was used to collect data. It was initially used in Pintrich and De Groot (1990). They have explored relationship of motivational beliefs with academic performance in their article. The questionnaire was constructed according to the requirement of present study and it enclosed material regarding demographic variables and statements related to self-efficacy, intrinsic value and test anxiety. Statement 1 to statement 9 in questionnaire are related to self-efficacy, Statement 10 to statement 18 in questionnaire are related to intrinsic values and Statement 19 to statement 24 in questionnaire are related to Test Anxiety. The questionnaire was filled by the five grade students in presence of the researcher to ensure they are clear about the given statements, instructions were given before starting the filling of questionnaire. Similarly, Mathematics performance test was designed by the researcher to gain mathematics performance. Mathematics test was constructed for grade 5 students based on their text book used in Punjab. All the questions were selected from the text book with slight changes, keeping in mind the chronological age of the students. As purpose of the research work was to find out mathematics performance, hence, statements of the questions were changed as in their mathematics text book. Both instruments were piloted and validated.

Data Collection and Data Analysis

Descriptive and inferential statistics were applied and results, means, and standard deviation was found. The data was analysed by SPSS (Statistical Package for Social Science) version 24 on the basis of objectives and research questions of this study. The data was also analysed through inferential statistics and presented in tables, t-test and ccorrelations were used to find out the correlations and differences.

Table 1 Mean distribution of participants' motivational beliefs.

Statements	SA	A	N	D	SD	Mean	St.D.
1. I can do well as compared to others in my Mathematics class.	41.3	34.3	8.3	13.3	3.0	3.97	1.142
2. Certainly, I am good in understanding idea taught in Mathematics lesson	36.7	35.0	14.0	11.0	3.3	3.91	1.114
3. I think to do better in mathematics class	55.3	33.3	7.0	1.7	2.7	4.37	.892
4. Compared with others in this class, I think I am good in class	423	44.1	8.1	5.0	1.5	4.22	.846
5. I am certain that I am excellent in problem solving and tasks assigned for mathematics class.	47.7	40.4	5.4	5.6	1.0	4.28	.871
6. I believe that I will get good grades in mathematics class	39.0	50.0	7.3	3.3	0.7	4.23	.778
7. I have better study skills in mathematics class.	19.7	36.7	13.3	16.0	14.3	4.20	1.340
8. I am more knowledgeable in mathematics as compared to my class fellows.	46.3	38.0	6.0	9.0	0.7	3.88	.951
9. I believe that I can do mathematics assignment better than my class fellows.	35.3	40.3	6.0	13.3	5.0	4.05	1.177
10. I select challenging class work to learn new knowledge in mathematics class.	36.3	44.7	9.0	7.3	2.7	3.97	.994
11. It is main objective for me to learn that is being taught in the mathematics class.	34.7	43.3	9.3	10.0	2.7	3.23	1.041

12. I like mathematics class work.	39.7	37.7	8.7	9.0	5.0	3.51	1.144
13. I think I can use knowledge that I gained in mathematics class in other classes.	20.0	31.0	11.0	26.0	11.3	3.80	. 861
14. I often select mathematics problems from that I will learn more from even if they involve more hard work.	24.7	40.3	8.0	15.7	11.3	3.05	1.335
15. When I do poorly in mathematical task I always try to learn from my errors.	32.7	39.7	10.7	8.7	8.3	4.08	1.320
16. I believe that what I am learning in mathematics class is valuable knowledge	42.7	35.0	7.0	9.7	5.7	3.20	1.222
17. I consider that learning in mathematics class is interesting	18.0	24.7	17.7	23.3	16.3	3.20	1.286
18. Development of understanding in mathematics is important for me.	43.3	39.0	5.7	6.7	5.3	3.38	1.111
19. My mind goes Blank in mathematics test	17.3	34.3	18.0	21.3	9.0	2.98	1.218
20. I feel during test that how poor I am doing in mathematics test	19.0	34.7	14.0	25.0	7.3	3.18	1.243
21. I have a nervous feeling before a mathematics test	23.7	31.0	10.7	28.7	6.0	3.35	.716
22. I feel difficulty in choosing correct answer	20.7	33.0	14.3	21.7	10.3	3.24	.849
23. The test always is a great burden for me	13.7	35.3	16.0	27.0	8.0	3.12	.812
24. My mind goes blank during a test	17.7	29.0	12.7	31.3	9.3	2.41	1.194

Table 1 presents the results related to self-efficacy, intrinsic value and test anxiety that is a part of motivational beliefs and theses components of motivational beliefs are almost similar to each other. Most of the participants are expressing that they believe that they are good in mathematics because mostly responses are under agree. So, over all motivational belief are fine except test anxiety. This shows that more than 50 % participants believes that they are good in mathematics than their class fellows while more than 50% participants agreed or strongly agreed

that their understanding is very good regarding mathematics. Motivational beliefs are known as important tools in classrooms and more than 50% participants are sure about their positive motivation. It can be concluded from participants' response that participants' thinks that mathematics is important subject and 75% participants think that that they can do mathematics assignment better than their class fellows. It can be said that 86 % respondents are well aware that they are more knowledgeable in mathematics than others in the class.

Similar results can be deduced from the table given above, that is 81% respondents are willing to select challenging class work to learn new knowledge in mathematics class and it is apparent that with most of the statements respondents are agreeing or strongly agreeing. Most of the students are using the motivational strategies because their responses to the statements given in questionnaire are falling in strongly agree or agree, consequently, it looks like they have not lack of motivation. There are 77% respondents in data that were agreed and believe that what they were learning in mathematics class is valuable knowledge, at the same time, 9% respondents disagreed to believe that what they were learning in mathematics class is valuable knowledge. Whereas, 42% students considered mathematics classes as interesting ones.

Similarly, 51% participants agreed that their mind goes blank before starting of mathematics test. It can be concluded that 53% students agreed that they feel during test that how poor they are doing in mathematics test, whereas, 53% five graders feel difficulty in choosing correct answer. Hence, 49 % students feel a great burden for the test.

Table 2 Correlation among different factors of motivational beliefs and mathematical performance at primary level

Motivation	1	2	3	4	5
1. Mathematical Performance	1				
2. Motivational Beliefs	.057	1			
3. Self-efficacy	.401**	.478**	1		
4. Intrinsic Value	.455**	.523**	.191**	1	
5. Test Anxiety	-.564**	.495**	-.263**	-.261**	1

*p< .05. **p< .01

Table 2 shows correlation among mathematical performance, motivational beliefs, self-efficacy, intrinsic value and test anxiety. There was no significant relationship between the mathematical performance and overall motivational beliefs ($r = .057$, $p > .05$). There was significant relationship between mathematical performance and self-efficacy ($r = .401$, $p < .01$). If the involvement of self-efficacy students were increased then the mathematical performance were also increased. There was significant positive relationship between intrinsic value and mathematical performance ($r = .455$, $p < .01$). There was significant moderate negative relationship between mathematical performance and test anxiety ($r = -.564$, $p < .01$). If the students'

anxiety were increased then the mathematical performance of students were also decreased. It means that all three components of motivational beliefs are inter related.

Table 3 Comparison Gender wise (Mathematical Performance Test and motivational beliefs)

	MaleStudents		Female Students			
	M	SD	M	SD	t (298)	p(two-tailed)
Maths Performance	25.41	4.90	24.29	4.53	2.066	.046*
Motivational Beliefs	90.18	6.69	89.22	6.37	1.273	.204
Self-efficacy	36.84	3.70	35.92	3.72	2.113	.035*
Intrinsic Value	33.86	4.53	33.48	3.59	.819	.414
Test Anxiety	19.50	5.75	19.82	4.76	-0.514	.608

*p<.05

An independent samples t-test was conducted to compare the mathematical performance, motivational beliefs, self-efficacy, intrinsic value and test anxiety of male and female students at primary level. Results revealed in analysis of scores that there is a significant difference between the mean gain in mathematical performance of male students (Mean =25.41) and female students (Mean =24.29) having t value (2.066) and p = .046. It indicates that male students have higher gain in marks in mathematical performance test as compare to the female students' gain in marks in mathematical performance test.

Results revealed in analysis of scores that there is no significant difference between the mean gain in motivational beliefs of male students (Mean = 90.18) and female students (Mean = 89.22) having t value (1.273) and p = .204. It indicates that male students have no higher gain motivational beliefs as compare to the female students' gain in motivational beliefs.

Results revealed in analysis of scores that there is a significant difference between the mean gain in self-efficacy of male students (Mean =36.84) and female students (Mean =35.92) having t value (3.70) and p = .035. It indicates that male students have higher gain in self-efficacy as compare to the female students' gain in self-efficacy.

Results revealed in analysis of scores that there is no significant difference between the mean gain in intrinsic value of male students (Mean =33.86) and female students (Mean =33.48) having t value (3.59) and p = 0.414. It indicates that male students have no higher gain in intrinsic value as compare to the female students' gain in intrinsic value.

Results revealed in analysis of scores that there is no significant difference between the mean gain in test anxiety of male students (Mean = 19.50) and female students (Mean = 19.82) having t value (-0.514) and p = .608. It indicates that male students have no higher gain in test anxiety as compare to the female students' gain in test anxiety.

Discussion

The findings of this study show that students are aware of the importance of mathematics.

Students were asked questions about three components of motivational beliefs namely self-efficacy, intrinsic value and test anxiety related to mathematics and if see at the findings related to descriptive analysis we have observed that mostly the members of sample are agreeing. Motivational belief are opinions that students made about their efficacy of learning. For an instant, students' beliefs about their academic experiences have a vital role for their academic achievement (Wigfield & Eccles, 2002). As correlation among mathematical performance, motivational beliefs, self-efficacy, intrinsic value and test anxiety are discussed in this study. There was no significant relationship between the mathematical performance and overall motivational beliefs but when correlation was measured in components it was found significant. It means that all three components of motivational beliefs are inter related. A study investigated the three component of motivational beliefs by Pintrich and De Groot (1990) indicated the relationships of three components in the same way as concluded in this study. Pantzaira and Philippou (2015) has mentioned self-efficacy and fear of failure has a strong influence on mathematics achievement. There was significant relationship between mathematical performance and self-efficacy. If the involvement of self-efficacy of students were increased then the mathematical performance were also increased. Therefore, this study is in line with Arias (2012), he found that self-efficacy is a forecaster of mathematical success.

There was significant moderate negative relationship between mathematical performance and test anxiety. If the students' anxiety were increased then the mathematical performance of students were also decreased that is in line with the study of Carmen Pérez-Fuentes, Núñez, Molero, Gázquez, Rosário, and Núñez (2020), they found mathematics anxiety is not associated with mathematical performance. There was significant positive relationship between intrinsic value and mathematical performance. Both self-concept and intrinsic value has predicted mathematical performance (González, Rodríguez, Faílde, & Carrera, 2016)

Researchers have constantly shown that male students' performance in mathematics tests as compared to female students is better (Vale, 2009; Aiken, 1970; Fennema, & Sherman, 1976; Gasco, Goñi & Villarroel, 2014) that is in line with this study. It indicates that male students have higher gain in marks in mathematical performance test as compare to the female students' gain in marks in mathematical performance test (e.g. Gasco, Goñi & Villarroel, 2014).This study also indicates that male students have higher gain in self-efficacy as compare to the female students' self-efficacy. Some researchers has shown that gender differences are associated with mathematical self-efficacy in the favor of male students (Gallagher, & Kaufman, 2005). According to this study male students have no higher gain in intrinsic value as compare to the female students' mean scores in intrinsic value (Gonzalez, Rodríguez, Failde, & Carrera, 2016). This study also indicates that male students have no higher gain in test anxiety as compare to the female students' gain in test anxiety. Several studies have told stronger mathematics anxiety in female students than in male students (Dowker, Bennett, & Smith. 2012; Gunderson, Park, Maloney, Beilock, & Levine, 2018). Furthermore, researchers have shown mathematics anxiety is a predictor of mathematical performance for female students not for male students (Devine, Fawcett, Szucs, & Dowker, 2012).

Conclusions and Recommendations

In existing situation students are likely to improve mathematical performance with more advanced skills of motivation or in case of five grade kids a huge tolerance is also vital on a part of educators. Educators should be careful about their students and offer them chances to motivate

them and improve their mathematical performance. We need to solve students' problems related to mathematics, everyone should play their part in improvement of motivation and mathematical performance.

This research shows and emphasis on the significance of promoting motivation regarding mathematics in our society. It will support to know mathematical facts in five grade kids and it will let them to contribute in daily classes of mathematics as an effective member of a mathematics class rather than ignoring them to go to backstreet.

It is an imperative challenge for educators to eliminate the stereo-typical image of gender difference in mathematical performance from our culture or people should know that gender is not an issue, girls and boys can be treated equally to motivate for mathematics classes, rather they have issues regarding test anxiety that need to be understood. The results of this study may contribute to understand educators to reconsider their performs to keep students' motivation up.

There is a shortage of such teacher training programmes for teachers to improve skills, how to motivate students, both intrinsically and extrinsically in mathematics classes. There is a strong requirement to organize such teacher training programs for mathematics teachers in order to meet the more radical challenges like motivating five grade students. When teacher could not tackle with students that are less motivated, as a result, students hate this subject and feel anxiety in exams.

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