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An Investigation on Grade VIII Students' Mathematical Self-Efficacy and Math Anxiety

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This quantitative research study aimed to investigate the mathematical self-efficacy and mathematics anxiety among grade VIII students' of Karachi across gender and school systems. The study explored the subscales of self-efficacy and math anxiety (i.e. general mathematical self-efficacy, test anxiety factor, future anxiety and classroom anxiety). Mathematical Self-Efficacy and Math Anxiety (MSEMA) questionnaire (May, 2009) for finding out various factors which influence mathematical self-efficacy and mathematics anxiety was used. Data from six private community and nine government schools in Karachi were collected and an independent samples t-test was used to compare differences across gender and school systems. On the whole, results revealed that male students showed greater mathematical self-efficacy than female students. The government school students displayed more self-efficacy and less anxiety towards mathematics in comparison to the private community school students. The study recommends a student centred approach which serves the purpose of providing effective classroom activities that encourages students' motivation, interest and added performance. Furthermore, qualitative research studies are needed to identify the reasons for students' mathematical anxiety and address these in order for schools and educators to teach mathematics in an enjoyable manner.

Key words: *Self-efficacy, Performance, Anxiety, Mathematics, Trained Teachers, Professional Development Training, Learning, Motivation, Influence and Teacher Self-efficacy.*

1. INTRODUCTION

Mathematics is a core discipline in the secondary school curriculum, beneficial in practical situations and is obligatory for the progress of all other sciences. Mathematical ability is necessary to think critically, analyse, adapt new situations, solve problems of various kinds of issues, and communicate thinking effectively (Connes, 2007). Mathematical skills are also required for reasoning, justifying and concluding and also help to apply mathematical ability to extend and apply knowledge in other fields as well. Mathematics is the pre-requisite of disciplines such as engineering, accounting and other fields of higher education and useful in real life. Meece, Wigfield and Eccles (1990) state that a strong background in mathematics is critical for many career and job opportunities in today's increasingly technological society.

Mathematics test anxiety is one of the major problems among learners and it is also thought to be one of the biggest hurdles in achieving desirable grades (Butt & Akram, 2013). A study conducted by Nicholson (2009) reveals that anxiety and achievement are related to each other (Rana & Mahmood, 2009). Students' performance is affected by test anxiety and there is a negative association between academic performance and test anxiety (DordiNejad, 2011). Students with higher levels of mathematics self-efficacy are typically more motivated than their peers to work hard in mathematics because they believe that they have the ability to succeed (May, 2009).

Gender differences constitute a potentially important source of variation in students' mathematical performance (Ming, 2007). Men and women are likely to have equal potential to be good or bad at mathematics. This phenomenon of gender differences is common in Pakistan where personal experience suggests that, in general, it is believed that boys/men are better at mathematics than girls. Moreover, mathematics is one of the subjects that is taken very seriously in the school system, irrespective of country or the level of education and has been described as a model of thinking (Akinsola, 2011; Iji, 2008).

It is the perspective of the researcher that mathematical anxiety is rooted in classrooms. That is to say classroom practices, mathematical content and mathematics tests may increase or decrease students' anxiety towards learning mathematics. Teachers' social support can be a significant factor in students' achievement (Sultan, Amin & Naseem, 2015).

1.1 Statement of the Problem

According to the Ministry of Pakistan Curriculum (2006) studying mathematics is compulsory at the secondary school level and a prerequisite for moving from junior to secondary school just as at the tertiary level of education, better grades in mathematics are a necessary requirement for the study of all science, technology and social science based courses. Mathematics self-efficacy and mathematics anxiety can influence a student's motivation to learn mathematics. Students with higher levels of mathematics self-efficacy are typically more motivated than their peers to work hard in mathematics because they believe that they have the ability to succeed (Ajzen & Fishbein, 2005; Eklof, 2006; May, 2009; Wigfield, Tonks & Eccles, 2003). Liu and Koirala (2009) argue that self-efficacy could be increased by using the right instructional strategies such as helping students to set goals, providing timely and explicit feedback, and encouraging students to work harder using high achieving students as models. Teachers' attitudes towards both students and the courses that they are teaching can influence how students respond to the material (Akbar & Ghazanfar, 2014; Wilson & Thorton, 2005). The need arises to investigate grade VIII students' mathematical self-efficacy and mathematical anxiety across gender and school systems.

1.2 Research Objectives

- To find out the differences in grade VIII students' mathematics self-efficacy and mathematical anxiety across gender.

- To measure the differences in grade VIII students' mathematics self-efficacy and mathematical anxiety across school systems.

1.3 Research Questions

- Is there any difference in grade VIII students' mathematics self-efficacy and mathematical anxiety across gender?

- Is there any difference in grade VIII students' mathematics self-efficacy and mathematical anxiety across school systems?

1.4 Limitations of the Study

The research explored grade VIII students' mathematical self-efficacy and mathematics anxiety but the researcher could not explore the reasons for students' mathematical self-efficacy and mathematics anxiety. Only two schools were involved for piloting and fifteen schools were engaged in the main study, which included both private and the government set-ups. Convenience sampling was done due to time constraints as several schools were located in different parts of Karachi. Thus, the results are not generalizable to other schools or systems in Karachi.

1.5 Ethical Considerations

The study aimed to protect the participants from any psychological and physiological harm. In addition, the confidentiality of each participant's data was maintained. Furthermore, the research participants were informed that their participation was voluntary and that they had the right to withdraw from the research study at any time.

2. LITERATURE REVIEW

2.1 Importance of Mathematics in Daily Life

Mathematics is significant in our daily lives. Mathematical skills are constantly used in the interpretation and analysis of data and in all forms of problem solving. These have academic purpose and are essential for better careers (Newstead, 2010). Maths necessitates a social demand, sincere and positive attitude among students, teachers and parents (Kalder & Lesik, 2011). Stereotyping and negative attitudes may result in mathematical anxiety and poor mathematical performances among students. Hackett and Betz (1989) as cited in May (2009) apprise us that the mathematical knowledge in students has also been shown to be an interpreter for students' career choices, with higher levels of mathematics self-efficacy being related to more science-based careers.

2.2 Mathematics Self-Efficacy

Self-efficacy is an important concept in social cognitive theory, which has been widely recognised as one of the most prominent theories about human learning (Ormrod, 2008). Stevens, Olivarez and Hamman (2006) stated that self-efficacy is a stronger predictor of mathematics achievement than general mental ability. Zarch and Kadivar (2006) found that mathematics ability had a direct effect on mathematics performance, an individual's own past performance, vicarious experiences of observing the performances of others, verbal persuasion that one possesses certain capabilities, and physiological states (Bandura, 1986).

Stevens, Olivarez, Lan and Tallent-Runnels (2004) found that the relationship between prior mathematics achievement and self-efficacy was a stronger bond to excel in mathematics. An individual's mathematics self-efficacy is his or her confidence about completing a variety of tasks, from understanding concepts to solving problems, in mathematics. Self-efficacy, in general, has been linked with motivation (May, 2009). According to Siegle (2007) self-efficacy judgments are centred on four sources of information: an individual's own past performance; vicarious experiences of observing the performances of others; verbal persuasion that one possesses certain capabilities; and physiological states. Individuals use these four sources of information to judge their capability to complete future tasks. Teachers who capitalise on the influence of the strongest of these sources i.e. past performances, observations of others as models and verbal persuasion - produce more confident students. Researchers (e.g. Liu & Koirala, 2009; May, 2009) argue that students with advanced levels of mathematics self-efficacy are constantly motivated in comparison to their peers to work hard in mathematics for they believe that they have the ability to prosper and self-efficacy can be improved through appropriate instructional techniques, constructive feedback and encouraging students to work well by citing examples of high achieving students as role models.

2.3 Teachers' Self-Efficacy

Siegle and McCoach (2007) confirm that teachers with minimal training and modified pedagogical methods and efficiency can enhance students' self-efficacy. Teachers with great intelligence of self-efficacy about their teaching competencies may have an easier, calmer and cooler time motivating their students and enhancing their cognitive development. Low efficacious teachers may rely more on a controlling teaching style and may be more critical of students. Teachers who use different strategies on a daily basis produce students who are more confident in their academic skills. Kalder and Lesik (2011) confirm that a significant relationship exists between teacher efficacy and students' confidence and beliefs in their ability to do mathematics well. A teacher's social support can be a significant factor of mathematical achievement among elementary students (Sultan & Amin, 2015). Furthermore, the way mathematics was portrayed in the classroom marks the difference in students' motivation and achievement in mathematics. Teachers' attitudes towards both students and the subject matter which they are teaching can impact how students respond to the content which they are learning (Akbar & Ghazanfar, 2014; Wilson & Thorton, 2005).

2.4 Mathematics Grade Anxiety

Woolfolk (2010) claims that anxiety is a general uneasiness and a feeling of tension. Mathematics anxiety is a state of discomfort that occurs in response to situations relating to maths (Jackson & Leffingwell, 1999). With regard to this, May (2009) affirms that mathematical anxiety is associated with common anxiety and test anxiety, which encompasses a more specific fear of mathematics. Thus, mathematics anxiety comprises feelings of tension and anxiety that hinder with the operation of numbers and the solving of mathematical problems in a wide variety of ordinary life and academic situations (Richardson & Suinn, 1972 as cited in May, 2009).

Whenever students take tests they encounter some level of anxiety which decreases their performance (Butt & Akram, 2013). Test anxiety involves three main factors such as cognitive, affective and behavioural aspects. Students who suffer from test anxiety due to the cognition component are deficient in self-confidence (Sarason & Sarason, 1990). Students with higher levels of mathematics anxiety had significantly lower computational confidence in all areas of mathematical calculations which in turn lowered their levels of mathematical achievement (Cates & Rhymer, 2003). Mathematical anxiety can be found in elementary schools, high schools as well as college (Khatoon et al., 2010).

2.5 Mathematics Classroom and Anxiety

Classrooms are found in every educational institution from the smallest preschools to universities. It is also a place where training is provided. Wenglinksy (2001) notes that teacher quality has three aspects: the teachers' classroom practices; the professional development the teacher receives in support of these practices; and characteristics of the teacher external to the classroom such as educational attainment. Classroom practices will have the greatest impact on students' academic performance, with professional development having the next greater impact, and teacher inputs the least.

Jackson and Leffingwell (1999) strongly believe that teachers who demonstrate gender preferences and those who are hostile and harbour a fear of mathematics themselves are the ones who truly are callous and express a negative attitude towards mathematics teaching and express annoyance and frustration towards students. Such teachers are responsible for developing mathematical anxiety among students in classroom settings. Mathematics anxiety originates from instructional situations. Fiore (1999) believes that "teachers and the teaching of mathematics are known to be the roots of mathematics anxiety" (p. 403).

Greenwood (1984) contends that the primary origin of mathematics anxiety was the teaching methods used in teaching basic mathematical concepts. These teaching methods include assigning the same homework problems for all students, following the textbook exactly, allowing only one method for solving a problem, and assigning mathematical tasks as punishment (Oberlin, 1982). Mathematics anxiety origins include teacher-related behaviours such as "intimidating comments, inability to explain concepts, lack of enthusiasm for subject matter, and lack of patience with students in the classroom [which] may directly affect the interest and learning of mathematics" (Plaisance, 2007, p. 110). Bakal and College (2002) debate that many students who are placed in developmental mathematics display maths anxiety or are frightened of maths. Therefore, it is important to create a nurturing, non-threatening atmosphere where students are not petrified to ask questions or make mistakes.

2.6 Motivation

Motivation is the drive or force which initiates one to continue with the work/activity. Krause, Bouchner, Duchesne and McCaughey (2007) state that motivation is an integral process that energises, directs and maintains one's behaviour. They further claim that each of the components of motivation is very imperative. The first component is energising, the second component is direction and the third is maintenance. 'Energising' is what starts off and gets oneself going; 'direction' determines what one wants to do, like making choices or the interests to pursue; 'maintenance' ensures that this activity continues. However, there are two kinds of motivation, namely intrinsic and extrinsic motivation.

2.6.1 Intrinsic and Extrinsic Motivation

Intrinsic motivation refers to motivation arising from internal factors such as an individual's natural feelings of curiosity, excitement, confidence and satisfaction when performing a task. Ryan and Deci (2000) state that students who enjoy what they are doing and who learn for the sake of learning are said to be intrinsically motivated. A deep approach to learning is associated with intrinsic motivation and a tendency to look for deeper conceptual understanding of a topic.

Woolfolk (2010) argues that extrinsic motivation, on the other hand, arises from external sources that influence the completion of a task. This has emerged as a powerful means for teachers or parents to stimulate learning by using extrinsic motivators. External rewards such as food, praise, free time, money or points towards an activity can certainly enrich the level of extrinsic motivation. Shahid (2006) asserts that students who are extrinsically motivated practice the task as a means to get something they want or avoid something unpleasant such as punishment. Additionally, the learning that results from extrinsic motivation tends to be superficial.

2.7 Gender and Mathematics

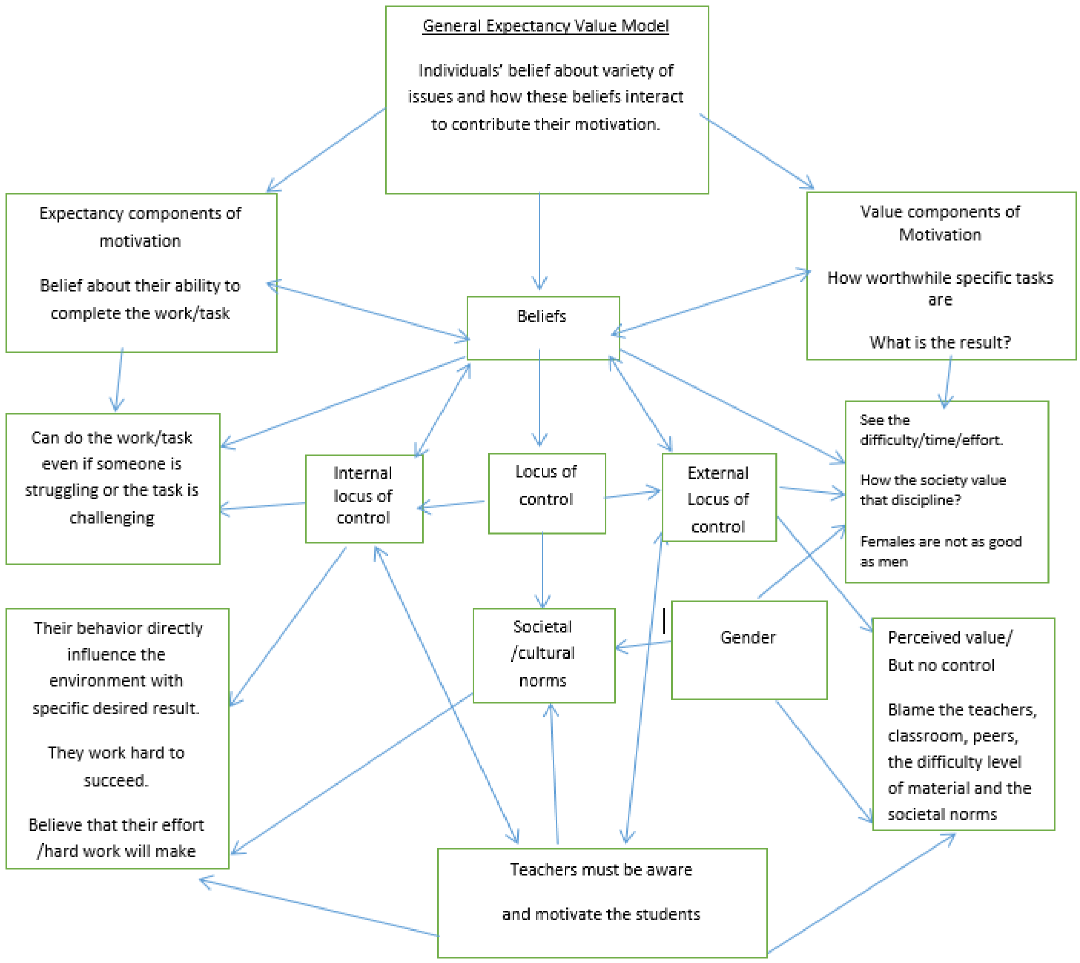
The Gender and Education Association (2013) state that in many nations there is not much difference in the mathematical outcomes of girls and boys. At the same time it is to be noted that less girls study maths-related subjects than boys. Gender inequality is one of the most debated topics in education today. Penner and Paret (2007) contend that gender differences in mathematics achievement have important implications for the underrepresentation of women in science-related fields. Kalder and Lesik (2011) found six factors that affect the learning of mathematics: confidence, anxiety, value, enjoyment, motivation, and parent/teacher expectations. Confidence of the subject matter, the motivational level and the teacher's attitude towards mathematics play a key role in students' mathematical learning.

Gender-based differences are due to the individual's perception of his/her own abilities and the sex role (Schiefele & Csikszentmihalyli, 1995 as cited in Farooq & Shah, 2008). Goodwin, Olrom and Wilson (2009) affirm that gender did not play a statistically significant role in math self-efficacy and those boys and girls had different strategies in solving mathematical problems. Studies that investigated gender variances with reference to test anxiety found that females have higher levels of overall test anxiety than males (Cassady & Johnson, 2002; Chapell et al., 2005).

Cassady and Johnson (2002) clarify that one explanation for differences in test anxiety on the basis of students' gender is that males and females experience the same levels of test worry but females have higher levels of emotionality (Zeidner, 1990). A study by Farooq and Shah (2008) found that girls everywhere in the world are not inferior at mathematics as compared to boys;

males have a higher confidence level than females, and girls from nations where gender equity is more dominant are more likely to perform better on mathematics assessments/tests. The quality of instruction and curriculum, teachers and families and the value of schools influence children's learning. With correct encouragement girls can perform equally well (Farooq & Shah, 2008).

Fig 2.1: Theoretical Framework - The Exploration of the Relationship Between Mathematics Self-efficacy and Mathematics Anxiety



It is clear how mathematics self-efficacy and mathematics anxiety can influence a student's motivation to learn mathematics. Students with higher levels of mathematics self-efficacy are typically more motivated than their peers to work hard in mathematics because they believe that they have the ability to succeed. Also, students with higher levels of mathematics anxiety are often less likely than their peers to be motivated in their mathematics classes because of their negative beliefs about the subject or their lack of ability.

3. METHODOLOGY

A quantitative descriptive study was conducted using an adapted instrument Mathematical Self-Efficacy and Mathematical Anxiety scale (MSEMA) (May, 2009) which consisted of four subscales, namely: general mathematical self-efficacy, math anxiety, future factor anxiety and classroom anxiety. The research tool included two sections. Section A sought demographic information of the participating students such as their gender, age, grade level and the school system in which they studied. Section B required students to record their opinion about mathematics self-efficacy and math anxiety on a Likert scale (1-5) for thirty-five items distributed across four subscales i.e. general mathematical self-efficacy (n = 9), test anxiety (n = 10), future mathematics factors (n = 8) and classroom anxiety (n = 8).

Table 3.1: Subscales of the Questionnaire

Subscale 1	Items
General Mathematical Self-efficacy	1, 2, 3, 4, 5, 6, 7, 8, 9
Subscale 2	Items
Test Anxiety	10,11,12,13,14,15,15,16,17,18,19
Subscale 3	Items
Future mathematical factors	20,21,22,23,24,25,26,27
Subscale 4	Items
Classroom Anxiety	28,29,30,31,32,33,34,35

Table 3.2: Measure of the Reliability of each Subscale

Subscales	***Cronbach's Alpha***	***No. of Items***
❖ General Mathematical Self-efficacy	0.796	09
❖ Grade Anxiety Factor	0.776	10
❖ Future Anxiety	0.740	08
❖ Classroom Anxiety	0.733	08

3.1 Piloting of the Tool

Sampling

The researcher collected data from fifteen schools (six private community and nine government schools). The sample from these fifteen schools was estimated to be approximately 400. For the piloting process, 20% of the estimated sample was taken from one private community school and one government school. Both selected schools were about 4 to 10 kilometres apart. During the piloting phase, the questionnaire was directly administered to participants (n = 84) of two schools (i.e. a private community and a government school).

Table 3.3: Composition of Sample Population for Piloting

Schools which participated	***No. of Participants***
1. ABC Boys' High School	42
2. DEF Girls' Higher Secondary School	42
Total	**84**

3.2 Administering of the Research Tool for Piloting

A MSEMA questionnaire was used for the piloting process.

3.3 Demographics

This section offers a brief summary of the demographics of the sample. The sample comprised students (n = 377) who were studying in both private community and government schools of Karachi which followed the Sindh Matriculation system of education.

4. RESULTS AND DISCUSSION

Table 4.1: Types of School (Gender)

Types of Schools	No. of Schools
Boys' Schools	9
Girls' Schools	6

Table 4.2: School System of the Population

System of Schools	No. of Schools
Private Community Schools	6
Government Schools	9

4.1 Testing of Hypotheses

Ho^{1}

There is no significant difference in grade VIII students' general mathematics self-efficacy across gender.

Table 4.3: Group Statistics

Subscale	Gender of the participants	N	Mean	Std. Deviation
General Mathematical Self-Efficacy	Male	189	3.8940	0.70172
	Female	188	3.7565	0.58398

Independent Samples t-Test General Mathematical Self-Efficacy and Gender

General Mathematical Self-Efficacy	Levene's Test for Equality of Variances				
	F	Sig.	t	df	Sig. (2-tailed)
Equal variances assumed	3.699	0.055	2.068	375	0.039
Equal variances not assumed			2.069	363.685	0.039

Table 4.3 depicts that there is variation in grade VIII students' general mathematics self-efficacy across gender. Male students displayed greater self-efficacy (M = 3.9, SD = 0.70) in comparison to female students (M = 3.8, SD = 0.58). Since the value of *p* as shown in Table 4.3 is less than 0.05, the result is statistically significant, t (375) = -2.792, $p < 0.05$) with a medium effect size. Hence, the first hypothesis is rejected. Thus, it can be stated that general mathematical self-efficacy is greater among male students than their female counterparts.

Ho[2]

There is no significant difference in grade VIII students' grade anxiety factor across gender.

Table 4.4: Group Statistics

Subscale	Gender of the participants	N	Mean	Std. Deviation
Grade Anxiety Factor	Male	189	2.7560	0.67228
	Female	188	2.9627	0.76281

Independent Samples t-test to Compare the Means of Grade Anxiety Factor and Gender

Grade Anxiety Factor	Levene's Test for Equality of Variances				
	F	Sig.	t	*df*	Sig. (2-tailed)
Equal variances assumed	1.829	0.177	-2.792	375	0.006
Equal variances not assumed			-2.791	368.680	0.006

Table 4.4 shows that there is variation of male and female students' grade anxiety factor. Male students displayed less grade anxiety (M = 2.76, SD = 0.67) in comparison to female students (M = 2.96, SD = 0.76). Since the value of *p* as shown in Table 4.4 is less than 0.01 the result is statistically significant, [t (375) = -2.792, $p < 0.01$)] with a small effect size. Hence, the second hypothesis is rejected. Therefore, it can be stated that grade anxiety factor is reported less among male students than their female counterparts.

Ho[3]

There is no significant difference in grade VIII students' future anxiety factor across gender

Table 4.5: Group Statistics on Future Anxiety

Subscale	Gender of the participants	N	Mean	Std. Deviation
Future Anxiety	Male	189	3.0659	.76227
	Female	188	3.0990	.83373

Independent Samples T-test Future Anxiety Factor and Gender

Future Anxiety	Levene's Test for Equality of Variances				
	F	Sig.	t	*df*	Sig. (2-tailed)
Equal variances assumed	0.858	0.355	-0.401	375	0.688
Equal variances not assumed			-0.401	371.669	0.688

Table 4.5 highlights that there is variation across gender in future anxiety among grade VIII students. Female students exhibited greater future anxiety (M = 3.1, SD = 0.83) in comparison to male students (M = 3.07, SD = 0.76). Since the value of *p* as shown in Table 4.5 is more than 0.05, the result is not statistically significant, t (375) = -0.401, p > 0.05). Hence, the third hypothesis is not rejected.

Ho[4]
There is no significant difference in grade VIII students' classroom anxiety across gender.

Table 4.6: Group Statistics for Classroom Anxiety

Subscale	Gender of the participant	N	Mean	Std. Deviation
Classroom Anxiety	Male	189	2.7161	0.73134
	Female	188	2.7945	0.74379

Independent Samples Test Classroom Anxiety Across Gender

Classroom Anxiety	Levene's Test for Equality of Variances				
	F	Sig.	t	*df*	Sig. (2-tailed)
Equal variances assumed	0.055	0.814	-1.031	375	0.303
Equal variances not assumed			-1.031	374.815	0.303

Table 4.6 depicts that there is a difference of male and female students' classroom anxiety among grade VIII students. Male students displayed less classroom anxiety (M = 2.7, SD = 0.73) in comparison to female students (M = 2.8, SD = 0.74). Since the value of *p* as shown in Table 4.6 is greater than 0.05, the result is statistically not significant, [t (375) = -1.031, p> 0.05)]. Hence, the fourth hypothesis is not rejected. As a result, it can be stated that classroom anxiety factor is reported less among male students than their female counterparts.

Ho^5

There is no significant difference in grade VIII students' mathematics self-efficacy across school systems.

Table 4.7: Group Statistics for General Mathematical Self-Efficacy: School System

Subscale	Gender of the participants	N	Mean	Std. Deviation
General Mathematical Self-Efficacy	Private	206	3.7568	0.56795
	Government	171	3.9081	0.72706

Independent Samples Test General Mathematical Self-Efficacy Across System of School

General Mathematical Self-Efficacy	Levene's Test for Equality of Variances				
	F	Sig.	t	df	Sig. (2-tailed)
Equal variances assumed	3.327	.069	-2.267	375	0.024
Equal variances not assumed			-2.217	318.147	0.027

Table 4.7 represents that there is variation in private community and government school students' general mathematical self-efficacy. The government school students exhibited greater general mathematical self-efficacy (M = 3.9, SD = 0.73) in comparison to the private community school students (M = 3.8, SD = 0.57). Since the value of *p* as shown in Table 4.7 is less than 0.05, the result is statistically significant, t (375) = -2.267, $p < 0.05$) with a small effect size. Hence, the fifth hypothesis is rejected.

Ho^6

There is no significant difference in grade VIII students' grade anxiety factor across school systems.

Table 4.8: Group Statistics for Grade Anxiety Factor

Subscale	Gender of the participants	N	Mean	Std. Deviation
Grade Anxiety Factor	Private	206	2.8612	0.76896
	Government	171	2.8565	0.67122

Independent Samples Test Grade Anxiety Factor and School System

Grade Anxiety Factor	Levene's Test for Equality of Variances				
	F	Sig.	t	*df*	Sig. (2-tailed)
Equal variances assumed	3.229	.073	0.062	375	0.951
Equal variances not assumed			0.062	374.036	0.950

Table 4.8 illustrates that there is a slight dissimilarity in both government and private school students' grade anxiety factor. The private school students displayed slim grade anxiety (M = 2.86, SD = 0.77) in comparison to government school students (M = 2.86, SD = 0.67). Since the value of *p* as shown in Table 4.8 is more than 0.05, the result is statistically not significant, [t (375) = 0.062, p > 0.05). Therefore, the sixth hypothesis is not rejected.

Ho[7]

There is no significant difference in grade VIII students' future anxiety factor across school systems.

Table 4.9: Group Statistics for Future Anxiety

Subscale	Gender of the participants	N	Mean	Std. Deviation
Future Anxiety	Private	206	2.9528	0.77165
	Government	171	3.2386	0.80303

Independent Samples Test Future Anxiety and School System

Future Anxiety	Levene's Test for Equality of Variances				
	F	Sig.	t	*df*	Sig. (2-tailed)
Equal variances assumed	0.657	.418	-3.515	375	0.000
Equal variances not assumed			3.502	356.699	0.001

Table 4.9 indicates that there is variation in government and private school students' future anxiety factor. Interestingly, the private school students displayed less future anxiety (M = 2.95, SD = 0.77) in comparison to government school students (M = 3.24, SD = 0.80). Hence, the value of *p* as shown in Table 4.9 is less than 0.001, and the result is statistically significant, t (375) = -3.502, p < 0.001) with a small effect size. Therefore, the seventh hypothesis is rejected. Hence, it can be stated that future anxiety factor is reported less among the private school students than the government school students.

Ho[8]

There is no significant difference in grade VIII students' classroom anxiety across school systems.

Table 4.10: Group Statistics for Classroom Anxiety

Subscale	Gender of the participants	N	Mean	Std. Deviation
Classroom Anxiety	Private	206	2.9291	0.77865
	Government	171	2.5457	0.62572

Independent Samples Test classroom Anxiety and System of School

Classroom Anxiety	Levene's Test for Equality of Variances				
	F	Sig.	t	df	Sig. (2-tailed)
Equal variances assumed	9.843	.002	5.195	375	0.000
Equal variances not assumed			5.300	374.623	0.000

Table 4.10 represents that there is variation in private and government school students' classroom anxiety. Government school students demonstrated less classroom anxiety (M = 2.9, SD = 0.78) in comparison to the private school students (M = 2.5, SD = 0.63). Since the value of *p* as shown in Table 4.10 is less than 0.001, the result is statistically significant, t (375) = 5.300, p < 0.001) with a large effect size. So, the eighth hypothesis is rejected. Therefore, it can be stated that classroom anxiety factor is reported higher among the private school students than the government school students.

4.2 General Mathematics Self-efficacy Across Gender and School

With regard to general mathematical self-efficacy, the difference across gender was found to be statistically significant with grade VIII male students possessing greater confidence and self-efficacy than their female counterparts. This result resonates with the findings of Ayotola and Adedeji's (2009) study that explores the relationship between gender, age, general mental ability, mathematical self-efficacy and achievement. In comparing school systems, the government school students displayed greater mathematical self-efficacy than the private school students. Another study by Sarmah (2013) confirms that male students possessed a higher mathematical mean attitude score than female students which is a finding that echoes with the result of this research study as well.

In contrast to the above statements, Farooq and Shah's (2008) study which was conducted in Lahore found that there was no significant difference in the confidence level of male and female students towards mathematics at the secondary level. Similar to this, a study conducted in Nigeria by Ajai and Imoko (2015) revealed that male and female students taught algebra using PBL did not significantly differ in achievement and retention scores, thereby revealing the fact that male and female students are capable of competing and collaborating in mathematics. In addition, this finding showed that performance is a function of orientation, and not gender.

4.3 System of School (Private Community School and Government Schools)

The findings of the study highlighted that private community school students displayed a greater anxiety level towards future math anxiety, classroom anxiety and test anxiety, in comparison to the government school students. A study conducted by Khan and Rodrigues (2012) also showed similar findings that students in non-community private schools (i.e. government school system) possessed a higher confidence level when it came to maths subjects. In relation to these findings, Sharma (2013) concludes that the school and home environment have a great impact on students' mathematical confidence and mathematical anxiety. This indicates that educational environments such as schools and homes should be healthy environments for students' learning. Though the private school system displayed a greater anxiety level towards tests and future prospects, it may be due to the societal pressure as most of the parents of the private school students are highly educated and expect their offspring to achieve even greater than them, and the society which they live in also has greater expectation from them to become successful professionals in the society. Moreover, the elite higher educational institutions require higher maths grades as a pre-requisite for pre-engineering and computer science admissions while the government school children do not have any higher educational pressure, as they may or may not continue their study for they belong to the poor socio-economic conditions.

4.4 Overall Results

Male students displayed greater mathematical self-efficacy, showed less grade anxiety, exhibited less future anxiety and less classroom anxiety than the female students. In the school systems, the government school students displayed greater mathematical self-efficacy than the private community students. There were very slight differences of results in grade anxiety between government and private community school students but in future anxiety, the private school students displayed less anxiety than the government school students and in classroom anxiety, the government school students showed less anxiety than the private community school students.

4.5 Recommendations for Future Research

- A qualitative study to find out the in-depth reasons for mathematical self-efficacy and mathematical anxiety is recommended.
- Future research studies are recommended in different educational school systems and also from different cities in Sindh with a greater sample as it would broaden the scope of the study, add more objectivity and accuracy to the design and lead to a more representative generalisation of the results.

Conclusion

This research study indicated that grade VIII male students reported greater general mathematical self-efficacy and showed less mathematical anxiety than the female students. The study highlighted some factors which create both mathematical self-efficacy and maths anxiety among students. Therefore, schools, teachers and parents should make mathematical learning a fresh, healthy and enjoyable discipline right from Kindergarten grade.

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