AN INVESTIGATION OF 10th GRADE STUDENTS' SELF-EFFICACY BELIEFS IN MATHEMATICS

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ABSTRACT

The core of the survey was to investigate Mathematics self-efficacy of those students who study at 10th grade. Overall, 245 students of grade 10 were engaged as respondents of this survey. To evoke efficacious inclination of students, a translated version (Urdu) of "Sources of Mathematics self-efficacy Scale" originally developed by Lopez and his associates (1991) was administered which presented the items on five levels based on Likert type entailing 40 statements of efficacy indicating its four emerging dimensions as "Performance Accomplishment, Vicarious Information, Verbal Persuasion and Emotional Arousal". Using SPSS for the analysis of data, both descriptive (mean, standard deviation) and inferential (t-test) statistics were used. It was inferred from the overall analysis that the four self-efficacy sources were positively effecting the self-efficacy beliefs of students in Mathematics. However, boys are more influenced by the knowledge they get on their successful completion of task. They also enjoy comparing themselves with other peers. On the other hand, when girls are verbally encouraged, they feel confident while they also feel more anxiety as compared to boys. Sector was difference was also significant as students of public sector schools feel confident over successful completion of task that they can do well in future because they performed it in past with precision while students of private sector schools were more confident on influential effects by rest of the sources. In

short, students found to be efficacious and all factors or sources contributed in making their mind set to be more efficacious to deal with Mathematics although with varying degree. Now it is the responsibility of teachers of Mathematics to come forward to provide them such activities that may involve them more in advanced level learning of Mathematics and help them in coping this subject in a more successful manner. In this way, self-efficacy can be a strong predictor of their academic gains. Efficacy in Mathematics cannot be differentiated on gender basis as it is a myth that boys always have natural inclination and therefore their self-efficacy beliefs are high than girls.

KEYWORDS
Self-efficacy, Mathematics, Performance Accomplishment, Vicarious Information, Verbal Persuasion and Emotional Arousal

INTRODUCTION

In today's modern world, developed countries focus on outcome-based Education. Therefore it is believed that students' thoughts and self-beliefs play a promising role in their learning and academic gains. Students have various self-beliefs like self-concept, self-esteem and self-efficacy as well. However, out of these self- beliefs, self-efficacy is a key element in student's enhanced learning. Because self-efficacy is the self-belief or personal/ self-judgement of a student regarding his competencies (Dinther.et al., 2011). Self-efficacy is a student's confidence in his abilities for performing any task. Therefore, self-efficacy has always been a significant construct in psychology by various theorists. However, this persuasive construct of self-efficacy was initially originated by Albert Bandura under his approach, the Social Learning Approach which further proceeded as Social Cognitive Theory. Self-efficacy stems from one branch of social cognitive theory working as an offshoot of this theory (Levin et al., 2001).

Social cognitive theory claims that self-efficacy affects students' motivation, persistence, efforts, actions, behavior and achievement (Liu & Koirala, 2009).Social cognitive theory values this self-reflection due to its self-referent properties within which students evaluate and modify their own thoughts and behaviors. These self-referent thoughts are composed of perceptions of self-efficacy. They further conclude that self-efficacy of students affects their on-task behavior while increasing their interest, task persistence, goal setting, use of cognitive, meta-cognitive and opting self-regulatory strategies(Dinther.et al., 2011).

Students' academic self-efficacy is their confidence that they can perform well in their school specific tasks such as mastery in text book for a test and writing an easy. Thus confidence in relevant abilities plays a major role in students' successful negotiation of challenges of life (van Rooij et al; 2017). In view of Suraya and Younus (2017)

academic self-efficacy is students' self-evaluation regarding their abilities for organizing and implementing their learning behavior to achieve their target level of academic achievement for example to pass the exam. They further quote Yousuf's (2011) argument who comments that academic self-efficacy enables students to adopt effective measures to accomplish any task which enhances their confidence level and self-belief to do their best according to their respective capabilities.

In this context, academic self-efficacy researchers have always focused on students' self-efficacy in various academic areas and disciplines like languages, social sciences, sciences, writing and Mathematics as well because Mathematics holds a noticeable place in curriculum because academic success of students in Mathematics is imperative in this world of science and technology. In view of Kiamanesh et al. (2013) math self-efficacy is situational assessment of a student's confidence in his ability to successfully perform or accomplish a particular mathematical tasks or problem. Self-efficacy in mathematics helps students to overcome difficulties to solve mathematical problems. Ultimately their self-efficacy is heightened about Math.

However, educational psychologists and mathematics' educators have always been in search of sources of self-efficacy that contribute in academic gains of students in mathematics. To answer this, it is to be said by Bandura (1997) students' self-efficacy in mathematics is inculcated through four sources respectively as "mastery and vicarious experiences, verbal and social persuasion and physiological states". Mastery experiences are the result of student's own success. Because after completing a task when students evaluate and interpret the results obtained, they find they have achieved certain outcome which in turn increases their self-confidence for doing that particular task or studying a particular subject. On the other hand, when they do not get desired outcome they experience lower self-efficacy. Fluctuation in self-efficacy, in form of its rise and fall may predict their upcoming performance to do a task. Mastery Experiences play a powerful role in building strong efficacy because they provide students authentic and reliable evidence that they have capability to succeed at any task (Palmer, 2006).

Students' self-efficacy is also influenced by their vicarious experiences. As observing their peers or class fellows with similar qualities, they assess their own abilities to be successful at the similar task or activity. Ultimately they compare their competence in that task with others which therefore result in increase or decrease of self-efficacy (Britner & Pajares, 2006). Because while observing others they expect for themselves which push them to improve their own performance. When they find others as their class fellows and teachers to solve mathematics easily they imagine themselves to do in the same manner. Other fellows work as a mirror for them in which they see their own reflection performing the same task with same standards and accuracy (Mozahem

et al., 2020).Contrary to it, Loo and Choy (2013) have the view that vicarious experiences have feeble effects on efficacy than mastery experiences. However, if a student faces unfamiliar situation of which he has no prior experience but finds others performing that task without any difficulty, he can generate expectations and this is the time when if he puts effort he can accomplish that task.

Students always need encouragement in form of evaluative feedback from their parents, teachers and peers. This need of encouragement for self-efficacy is termed as verbal and social persuasion. Teachers should not give them a standard that is beyond their capabilities. To boost self-confidence in mathematics students want verbal and written feedback, verbal and social judgements and self-appraisal. Our supportive appraisals raise their self-efficacy especially when accompanied by some conditions, instructions and schedule to complete the task. This information affirms them they are capable of doing any task. These urging remarks work more commendably when provided by those persons whom students think as knowledgeable and reliable and their feedback and appraisals are realistic (Dinther et al., 2011).

Pajares (1997) has not ignored the emotional causes of efficacy as well. In his view, students' emotional conditions, emotional stability and mood states are also integral factors for fluctuating their idea about self. Because anxiety, stress, fear of failure, tension and excitement can cause dropping and raising the levels of self-efficacy. A positive mood heightens self-efficacy while depressed mood weakens it. These affective dimensions of personality help student in making judgements on self-efficacy like hearing an unexpected news may distract a student from exam preparation even when he is well prepared for it which will in turn have negative effects on the performance in exam (Hodges & Murphy, 2009). When students face aversive thoughts they fear about their capabilities which trigger their stress. Therefore, students who experience anxiety or self-doubts for doing any tasks as threatening they interpret their anxiety and tension as weakness. They are less confident in academic capabilities than those who interpret these feelings as positive and their positivity motivates them for achieving something rather quitting or avoiding a task. To conclude Bandura (1997) found that a student's self-efficacy is at optimum level when his affective dimensions are neither too high nor too low.

The cycle of success is completed under aforementioned sources or factors of efficacy in which the mechanism of interpreting and assessing obtained and desired results is termed as mastery experiences and give a sense of performance accomplishment to a student. These experiences support a student to self-appraise his set goals and performance on the basis of these interpretations and if they interpret it wrongly they have to face inferiority complex regarding their lack of skills. It infuses them with bad mood and furthermore depression and inculcating a sense of failure in them. At this

time, supportive messages conveyed by their elders as parents and teachers empower them with self-efficacy (Domenech-Betoret et al., 2017).

Although researchers have found paramount role of math self-efficacy in improving performance in mathematics like higher the math self-efficacy higher mathematics problem solving competence. Self-efficacious students in mathematics work with accuracy and precision in mathematics related tasks such as computation and determination for approaching difficulty(Ayotola & Adedeji, 2009).Mantilla (2015) determines that although literatures reviews where students' self-efficacy can emerge from but it does not answers how or which of these sources can cause the students' self-efficacy to be increased or decreased. Therefore, Ochieng (2015) stated that there is a need to explore the sources that influence the self-efficacy beliefs. However, Turgut (2013) is of the view that these sources have meaningful impact on academic self-efficacy and even academic achievement of undergraduate mathematic students. Liu and Koirala (2009) also worked with 10th grade students who found self-efficacy as profound determinant of achievement of students as respondents of their study were found to be efficacious having confidence in their excellence in Mathematics. Usher and Pajares (2006) found gender based difference of effect which these sources put on students.Mozahem et al. (2020) did not found significant gender based differences for all sources. Chen (2012) and Loo and Choy (2013) revealed mastery experience as the most powerful determinant of efficacy in mathematics as contrary to Yurt (2014) finding personal experience, social feedback and emotionality being significant dynamics for affecting mathematics.

In Pakistan, mathematics is a compulsory subject from primary level to secondary level keeping in view its usefulness and importance in our daily life. Living in this scientific and technological era, importance of mathematics in academic, employment area and everyday activities cannot be denied. However, in our country, despite its multidimensional nature and importance, many students still find application of mathematics knowledge very difficult even at basic level and therefore they lack the required skills to have a job in mathematics related fields. Undoubtedly, students' performance in Mathematics at the secondary schools in Pakistan has not been impressive very well as compared to other compulsory subjects such as English, Urdu and Islamiat and especially when they are competed internationally they are unable to perform well. Teachers also do not bother self-efficacy beliefs of students as they lack awareness in this field rather only focusing on teaching this subject with stereotyped teaching methodology. They do not play their role to bridge the gap in both genders for self-efficacy as girls are affected more by their emotional states and emotional stability which can be directed by teachers' oral feedback and remarks. Moreover, this construct dealing with self-belief of efficacy is still needed to be explored more in the context of the learners who are studying at secondary levels with reference to their

levels of efficacy beliefs in Mathematics and its effecting sources as sometimes self-efficacy is focused collectively while ignoring influential role of its sources . Each source be dealt as separate determinant of efficacy by the teachers and parents. Nevertheless, not much research work has yet been conducted on exploring the mediating and predictable effects of each source and determinants of students' self-efficacy for mathematics in schools of Southern Punjab, an underdeveloped area of a large province whose students if are trained equally like other subject can contribute in research and development later in life. Therefore, the researcher thought appropriate to highlight the effects of mathematics self-efficacy beliefs of students on gender basis and sector of schools operating as private and public while interpreting ideas of various researchers as well.

Exploring efficacy beliefs of 10^{th} grade students in Mathematics was the primary objective of the study. Therefore, their self-efficacy was focused. Mathematics as a compulsory subject at matric level has utmost importance for students as they cannot get certification of matriculation without passing this subject in secondary school exam. Researchers has worked on those provoking factors which are cause of fluctuation in upsurge and decline of self-efficacy of students. Students portray their tendency of efficacy through their academic behaviors and selection of learning activities. Undoubtedly, when they are self-confident of their mastery in a task especially related to Mathematics, it may certainly have a profound influence on their motivation to work, gain academic outcomes as compared to students with a low self-efficacy who are underachiever because their perceptions of their academic capabilities cause them to have lower aspirations and therefore they are least motivated to act or persevere when faced with challenges.

Ultimately, they prefer to adopt low level approaches of learning. On the other hand, students who have high self-efficacy in academics, always welcome extensive and challenging learning strategies, steadily trying various thought-provoking learning approaches from time to time. Therefore, self-efficacy can be taken as a dependable indicator by teachers that may culminate their students' motivation and performance level in academic subjects.

This study has highlighted gender based beliefs of students about their self-efficacy especially in the subject of Mathematics and examined those sources due to which students' self-efficacy in Mathematics is accelerated or inhibit. Keeping in view the above stated scenario, the study sought to answer following questions as

1. What are the beliefs of students regarding each source affecting their self-efficacy in Mathematics?
2. Is there any gender and sector based difference in self-efficacy of students?

LITERATURE REVIEW

The influential construct of self-efficacy has been derived from Albert Bandura's "social cognitive theory" who explains it as," an individual's beliefs in his or her own ability to organize and implement action to produce the desired achievements and results (Bandura,1997,p.3).Self-efficacy stands for students' self-judgment about having required abilities for successful accomplishment of a task and involving in it as more effectively as possible by exerting all personal competencies, capabilities, skills and strengths. Parents, peers and teachers play a vital role in shaping their sense of efficacy. All of them serve as a role model for students whom they observe, compare themselves, receive their feedback over their performance and ultimately shape up personal beliefs regarding their own talents and skills (Bonne & Lawes,2016).Self-efficacy nurtures their view point as behaving optimistic due to which they are self-trusted and self-assured of their abilities to carry out any task. It strengthens their belief that they can achieve targets which have been set for any task, subject or career. Their self-efficacy beliefs enforce them to become effective planner for successful accomplishment of their goal even if this is of advanced level and whether any adverse situation is on their way. They perform beyond their capabilities innovatively and uniquely (Ahmad & Safaria, 2013).

In the same context,Suraya and Yunus (2017) are of the view that higher levels of self-efficacy profoundly affect students while enabling them to enjoy successful completion of tasks on the basis of their self-confidence in their field of work. Their self-efficacy opens doors of success for them which elevates their aspiration level making them challenging who are always ready to accept extensive learning strategies. For this purpose, they self-evaluate themselves as well and if they find their goals and targets unmet they do not lose their confidence because they trust in their abilities that they can do their best. Contrary to it, if students have low self-efficacy they are always doubtful and confused of their abilities. Their approach of learning is useless for them or gives them undesired outcomes. Efficacious students are always desirable by their teachers and parents because self-efficacy works as an indicator of culminating their urge to do something whether for scholastic achievement, studies, sports and career.

When students have strong conviction that they can perform up to the mark in any subject related task; it is termed as their academic self-efficacy that can be domain based specific for English, Science or Mathematics. Therefore, in view of Bandura (1997)self-efficacy is activated for a specific domain rather in all activities. Domain specific self-efficacy is self-confidence of a student in his abilities and proficiencies to perform well in that specific subject. Mathematics has always been considered an interesting although difficult subject by the students for which they have to rely on their heightened belief in their abilities to deal with this subject in a more successful and tricky manner while using their self-confidence in problem-solving approach. Students with lower level self-efficacy have to face set back in mathematics (Yildiz &

Ozdemir,2019).Academic self-efficacy works as a fuel for students which enables them to be motivated especially for a subject (Domenech-Betoret et al., 2017).

However, efficacy beliefs of students in mathematics are surely affected by its fundamental sources in form of having mastery experiences, enjoying vicarious experiences, having verbal and social persuasion and sound emotional state. According to Bandura, (1997, p.115),"efficacy beliefs are the product of cognitive processing of diverse sources of efficacy information conveyed enactively, vicariously, socially and physiologically." Although various research studies have reported their overall impact differently as few interpret mastery experience as more powerful source while others consider emotional state more strong predictor of efficacy (Kolo et al., 2017).According to Gao (2020, p.715), "students not only experience different degrees of exposure to the sources of self-efficacy but also hold diverse viewpoints of influence of each source on their self-efficacy."

When students experience success, it definitely increases their sense of efficacy. It is our natural instinct to always have success in our life as we are afraid of failure. Failure discourages us while hindering our confidence. Students' mastery experiences give them an urge for doing any assigned work while using their maximum capabilities so that that they avoid failure. When they are assured that that they can do any task on the basis of previous success in similar task, then their vicarious experiences come forward to help them more. Because there are more successful peers around them with whom they compare themselves and find they have similar intellectual level or rather more advanced abilities than their peers. Surely, this comparison with others and observation serve as predictor of their increased self-efficacy. At this time verbal and social persuasion ensure them about their abilities. This encouragement paves the way of success for them. If it is not provided they are discouraged and their emotional well-being is affected. Their emotional and physiological state is associated with fruitful outcomes as good results are always encouraging for them and bad results shaken their affective aspects of personality (Kolo et al., 2017).

Yokoyama (2019, p.2) has similar views as he concludes in his meta-analysis study, "self-efficacy can be strengthened of mastery, observing someone succeed, social persuasion such as direct encouragement. Physiological factors pain, fatigue and fear may have marked, delirious effects on self-efficacy." Gao (2020) also confirms mastery experience as the most leading source of efficacy. However, he further adds that experiencing success or failure is not only sufficient for increased likelihood of self-efficacy rather it is shaped by our personal and contextual experiences as well. In this regard, when there is observation of any model of his abilities and competence who is a peer, it may in turn foster observer's efficacy. Furthermore, students increase or decrease their sense of efficacy by collecting feedback from others who are always

ready to appraise their performance and when students receive such appraisal that can be positive or negative, it can affect their moods and emotions also.

In view of Naz et al. (2016) all school subjects require equal effort and motivation level by the students however, they encounter more problems in mathematics as compared to other subjects for which they need strong self-efficacy; confidence in their potential to deal and approach this discipline as effectively as possible with zeal, concentration and coordination of their all cognitive skills especially problem-solving. Their self-efficacy beliefs serve to accelerate their performance and assist them to have a successful and fruitful future. Self-efficacy especially for mathematics fosters self-assurance in students who are considered to be talented for learning mathematics. They always find math related tasks as enjoyable and fun while involving themselves in learning activities with enhanced level of confidence. If an advanced standard comes their way, they have efficacy to cope with it. They have no doubts of their skills as compared to those who are doubtful of their abilities. They strive to meet the standard and if it is unmet, they know how to fix it and again compile their all energies to restart their work more enthusiastically (Ifdil et al., 2016).

Conversely, students with low self-efficacy blame environmental events and circumstances also which cause their failure because they negate their abilities, natural talents which they have. They avoid to accept any challenging assignment. Therefore, when they are offered any task they are unable to complete it effectively and timely, they linger on it and finally they give up. They lack commitment towards any goals and do not persevere themselves when any adverse situation is encountered (Hayat et al., 2020).Students' self-confidence and self-appraisal for math related problems accelerate their efficacy for mathematics. Therefore, whenever they encounter any math problem or stuck in they believe that they can do it on the basis of their confidence in their math related skills (Yildiz & Ozdemir, 2019).

Self-efficacy has been dealt differently by various researchers as some of them focused on finding gender based differences in self-efficacy of mathematics while remaining worked on sources of self-efficacy and even found association and relationship of self-efficacy with other variables especially with achievement of students.Abtholuddin (2013) exposed a significant difference in self-efficacy of both gender in which female students found to be more efficacious as compared to male students. Suraya and Yunus (2017) also showed similar gender based results on the basis of various sources of self-efficacy. Ifdil et al.(2016) worked on finding gender based differences in level of self-efficacy and found difference in level of male and female students as high and moderate respectively. Furthermore, Gao (2020) examined self-efficacy of high school students regarding its sources and concluded that students had different point of views about possible effect of each source. However, participant girls confirmed more social

persuasion as compared to boys while boys faced less anxiety than girls for mathematics. Perception of both gender was not significantly different for overall sources. Naz et al.(2016) conducted a study with the purpose of exploring efficacy beliefs of students in mathematics to correlate it further with academic performance of students and found that students of high and low self-efficacy had significant difference in their academic gains.Causapin (2012) worked on mathematics self-efficacy of high school students and revealed after analysis that self-efficacy is strongly based on mastery experiences. Researcher further found lower level of efficacy of male students in mathematics. However, self-efficacy was found to be as indicator of academic gains in mathematics.

Students' strong conviction in their abilities for dealing mathematics infuses them for showing all those behaviors which are prerequisite for mathematics. Their efficacious inclination towards mathematics predicts their improved performance in mathematics

RESEARCH OBJECTIVES

1. To investigate sources of self-efficacy based beliefs of students
2. To explore gender and sector based differences of self-efficacy of students

RESEARCH METHODOLOGY

To examine the beliefs of students about their self-efficacy in Mathematics, a gender based survey was steered for students of public and private schools studying at 10^{th} class. For this survey, all the four hundred and seventeen secondary schools of district Multan including private and public schools and all the students studying at class 10^{th} in these schools were considered as target population of the study.

For the sampling of the survey, a two stage sampling procedure was opted as doing sampling of schools initially and further of students. There were two strata of population also as being private schools and public schools. Out of 349 private secondary level schools, only 10 schools (5 girls, 5 boys) and out of 68 public schools, only 10 secondary level schools (5 girls, 5 boys) were selected by using stratified sampling. Overall, number of enrolled students in grade 10 was 511.Keeping in view the financial and time constraints, overall 300 students were chosen as respondents conveniently. However, at the time of distribution of instrument, due to absent students 131 male and 114 female students(121 private and 124 public school students) were considered as respondents of the present study.

"Sources of Mathematics Self-efficacy Scale" developed by Lopez et al. (1991) was major tool to deduce beliefs of students regarding their efficacy for Mathematics. However, to get true response of respondents, this scale was translated into Urdu. The items of the scale were comprised of four sources of self-efficacy in Mathematics

representing“ performance accomplishments, vicarious information, verbal persuasion and emotional arousal” reporting their reliability as .82,.59,.74 and .90 respectively. The scale was found to be valid as it measured what it was supposed to measure. There were total 40 items in the scale having 20 positive and 20 negative statements. Items were set on five levels ranging from strong agreement to strong disagreement. Mean and standard deviation were major techniques of analysis as descriptive statistics and independent sample t-test as inferential statistics for comparison. All analysis was conducted using SPSS version 15 and MS Excel.

RESULTS

Table 1 shows overall mean score and standard deviation of each source separately. All values of means score are more than 3:00 depicting higher level of agreement of students for the items of scale that all sources affect their self-confidence and judgment in Mathematics.

Table 1: ***Overall Mean Score and SD of Sources of Self-Efficacy***

S.No	Sources	Mean	SD
1	Performance Accomplishment	3.19	0.429
2	Vicarious Information	3.20	0.295
3	Verbal Persuasion	3.03	0.331
4	Emotional Arousal	3.02	0.215

Table 2 indicates gender wise comparison of each source. Overall average for male students on PA was more than female students which indicates that male students were quite confident on previous mastery of experiences which give them feel of accomplishment of any goal. Male students also tend to compare their abilities and capabilities with others. However, female students were found to be less comparative in skills with others. Overall mean for VP, for both gender is slightly different. Mean score for affective aspects of self-efficacy dealing with students’ stress and anxiety levels, moods and emotions for Mathematics indicated greater difference of opinion in both gender. Females are more anxious while dealing with Mathematics and for this they got stressed as well.

Table 2: ***Gender wise Comparison of Sources of Self-Efficacy***

S. No.	Sources	Gender	Mean	SD
1	Performance Accomplishment	M	3.23	0.485
		F	3.16	0.380
2	Vicarious Information	M	3.31	0.319
		F	3.19	0.274
3	Verbal Persuasion	M	3.02	0.398
		F	3.05	0.268

4	Emotional Arousal	M	2.68	0.209
		F	3.47	0.234

Table 3 represents sector wise analysis of each source in which there was slight difference of mean in four sources in students of both sectors except EA which was found less in students of public schools which indicate that sources equally affected efficacy beliefs of both sectors.

Table 3: ***Sector wise Comparison of Sources***

S. No.	Sources	Sector	Mean	SD
1	Performance Accomplishment	Private	3.18	0.374
		Public	3.22	0.486
2	Vicarious Information	Private	3.22	0.277
		Public	3.19	0.319
3	Verbal Persuasion	Private	3.06	0.299
		Public	3.00	0.364
4	Emotional Arousal	Private	3.09	0.220
		Public	2.96	0.222

Table 4 shows Gender wise difference regarding three sources, in which no statistically significant difference ($p>0.05$) was revealed in responses of both genders while emotional dimensions of respondents were found to be, statistically significant different ($p<0.05$).

Table 4: ***Gender based Difference Through t-test***

		Gender		t-test for Equality of Means				
Sources		Male	Female	t-value	Df	Sig. (2-tailed)	Gender Male	Female
PA	Equal variances assumed	114	131	.445	243	.656	3.23	3.16
	Equal variances not assumed			.446	238.988	.656	3.31	3.19
VI	Equal variances assumed	114	131	.292	243	.771		

	Equal variances not assumed			.292	239.328	.770	3.02	3.05
VP	Equal variances assumed	114	131	-.610	243	.542		
	Equal variances not assumed			-.610	237.793	.543	2.68	3.47
EA	Equal variances assumed	114	131	-1.778	243	.077		
	Equal variances not assumed			-1.779	239.113	.076		

Table 5 depicts that no statistically significant difference was found in responses of students of both sectors except emotional factors as stress anxiety showed significant differences in students of public and private schools

Table 5: ***Sector based Difference Through t -test***

Sources		**Sector**		**t-test for Equality of Means**				
		Private	**Public**	**T Lower**	**Df Upper**	**Sig. (2-tailed) Lower**	**Sector Private**	**Public**
PA	Equal variances assumed	121	124	-.452	243	.652	3.18	3.22
	Equal variances not assumed			-.452	242.131	.652		
VI	Equal variances assumed	121	124	.518	243	.605	3.22	3.19

	Equal variances not assumed			.518	242.057	.605		
VP	Equal variances assumed	121	124	1.194	243	.234	3.06	3.00
	Equal variances not assumed			1.193	240.059	.234		
EA	Equal variances assumed	121	124	2.168	243	.031	3.09	2.96
	Equal variances not assumed			2.166	241.863	.031		

DISCUSSION AND CONCLUSION

In this study, a single variable, self-efficacy was investigated under its four sources by using a scale to get students' opinions about their self-efficacy which uplift or lower their self-efficacy in Mathematics. However, not substantial variance rather slight difference was appeared in contributing effects of all sources. Hasan et al. (2014) also revealed synchronized influence of these sources on students. However, Chen (2012) reported a substantial intensity of effect of efficacy sources. A comparative effect of sources in this study evoked that when students have tendency towards comparing themselves with other peers on basis of similarity of abilities was found to be a significant source of effect for the respondents of this survey just as result by Gafoor (2012) while Mantilla (2015) considered mastery experience as important sources as compared to other sources. Gender based diversity of opinions also emerged through data analysis of this study as boys outperformed girls in their efficacy beliefs and reported having more Mathematics self-efficacy for "performance accomplishment and vicarious information". Although they did not bother emotional factors and spoken inducement by others. Girls showed their inclination towards having a tendency of wanting verbal feedback for their encouragement and if they do not find it they feel anxiety. They also feel more anxiety as compared to their counterparts as results are in line with Joet et al. (2011).Suraya and Yunus (2017) also found mean variation of self-efficacy on gender basis as females were found to be more efficacious in all sources. This could be happen as girls are more anxious for doing any task seriously for which they show seriousness towards goal accomplishment while having self-confidence.

To foster and boost self-efficacy of students in mathematics, teacher can play his prime and key role as through his innovative methodology with the efficient utilization of the four factors of self-efficacy by various activities. Teachers will have to develop in students an intense interest for mathematics. Positive feedback from parents, teachers is always welcomed by students which should be provided to them especially to girls. There should be special arrangement for Mathematical games to strengthen concepts like problem solving, reasoning, judgment and computation about mathematics. Inter school competitions be held and rewards should be awarded in form of certificates to those who perform better in mathematics. Self-efficacious teachers also can serve as a role model for students whom students will get vicarious experiences. Teachers should also aware students regarding job market of math related fields to join in future.

RECOMMENDATIONS

1. Self-efficacy of both genders be focused in teaching of mathematics while emphasizing reducing anxiety, stress of the students for this subject
2. Self-efficacious teachers are highly recommended to devote themselves for mathematics whom students may observe as a role model for showing their best in future and selecting fields related to this subject

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