Research Article

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The Mediating Role of Emotional Intelligence in Predicting of Self – Efficacy in Mathematical Thinking among Fourth Grade Students in the Sultanate of Oman

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Abstract

This study aimed to investigate the role of emotional intelligence in predicting self-efficacy in mathematical thinking. The sample consisted of 150 students selected by cluster and sample random techniques from Al-Buraimi governorate. The tools of the study were: Mathematical Thinking Scale developed by the researchers, Self-efficacy Scale for Children (SEQ-C), and Bar-On Emotional Intelligence scale. The results showed a statistically significant correlation between mathematical thinking, self-efficacy, and emotional intelligence. The self-efficacy predicted mathematical thinking when emotional intelligence was a mediator. The variables of sex and the type of school had an impact on the prediction of mathematical thinking. Based on the results, the researchers recommended attention to the development of psychological factors that contribute to the development of mathematical thinking, including self-efficacy and emotional intelligence. They also recommended that further studies be carried out to investigate the role of different psychological traits in mathematical thinking.Contribution/Originality: this study is one of very few studies that investigated to how much extent that self-efficacy predicts mathematical thinking when emotional intelligence plays a mediating role. This investigation was conducted in a new environment.

Keywords: *Emotional Intelligence, Self-efficacy, Mathematical Thinking*

1. Introduction

Thinking is one of the concerns that the Ministry of Education in the Sultanate of Oman seeks to develop in various fields, and the ministry attempts to employ it in the best ways possible to develop it among all curricula, and Mathematics and Science in particular. The Ministry of Education adopted a project to harmonize the global mathematics and science (Cambridge) to achieve the desired goals, to meet the requirements of studying in higher educational institutions, and the needs of the labor market locally and globally to promote its rank in economic competency scale (MoE, 2018c).

Mathematics curricula focused on caring for the development of mathematical thinking and providing learners with the methods of mathematical construction and understanding. As a result,

Interest in mathematical thinking doubled to become the most important criterion in mathematics education. Among the goals that the mathematics chains seek to achieve are providing the learners with mathematical thinking skills that enable them to employ mathematics in real-life situations, they practice this through questions and activities in the context of research, and investigation that encourage the application of knowledge and problem solving, in addition to communication, experimentation and interpretation skills, and the use of mathematical terminology correctly (MoE, 2018b).

Behaviourists focus on the measurable features and phenomena, then attention was drawn to feelings separately from thinking, without realizing the importance of the relationship between them; until recent research came to confirm the importance of this relationship to the brain and the body. The process forms a strong unit through the work of thinking and emotion together, and every idea despite its size, is presented with the company of an emotion. Psychological factors such as attitudes, emotions, motivation play a vital role in mathematical thinking.

learning mathematics can't process well based only on cognitive factors, but attitudes towards this subject, level of motivation, inner strength, and perseverance, all these effective factors determine the effectiveness of this process (Villavicencio & Bernardo, 2013). Many studies investigated the role of different personality traits in mathematical achievement such as student's hate or fear of the subject (Karimi & Venkatesan, 2009), students' perseverance, and self-beliefs (Schnell et al. 2015), the interest of studying mathematics (Ganley & Lubienski, 2016).

Self-efficacy is one of the personality traits which enable learners to think mathematically. Bandura (1984) defined self-efficacy as a person's beliefs towards his/her capabilities on achieving desired goals, therefore self-efficacy certainly affects ways of thinking and the level of perseverance and resistance that person-directed towards different tasks.

In the results of the 2012 PISA (Program for International Student Assessment) to measure the learners' abilities in reading skills, mathematics, and science, it was found that the performance of learners in mathematics is influenced by several factors, including their beliefs in performance (OECD, 2012). Prindle (2014) in his qualitative study among grade four students found that self-efficacy related positively with achievement in mathematics, and this trait maintain students' misbehaviours, and increase social relationships.

In recent years, education researchers have highlighted the role of affective factors in shaping differences in students' levels of learning motivations and achievement (Bernardo et al. 2014; Linnenbrink-Garcia & Pekrun 2011; Suarez Alvarez et al. 2014; Tsai et al. 2015). For example, math anxiety has been studied in different environments. Emotions affect students' motivations and cognitive strategies (Frenzel et al. 2007; Pekrun et al. 2009; Villavicencio 2011). Besides, emotions affect self-beliefs such as perceived control and self-efficacy (Ruthig et al. 2018). Learners deal with the complex problem while studying mathematics, therefore, emotional intelligence critically helps students to fulfill difficult tasks.

Lisa et al. (2010) conducted a study among fourth and fifth-grade students who study California standardized mathematics, and they concluded that the level of academic performance is higher for learners who receive appropriate emotional support from their teachers. Moreover, emotional support contributes to building confidence and reducing feelings of anxiety while performing difficult tasks. Garner (2007) explains that teachers notice how their students show features that suggest the inability to carry out a specific activity when they find that the topic they deal with is vague. Some teachers lose their patience after making many attempts to provide different ways to teach the topic, but why does the situation remain the same? This becomes more apparent when learners misunderstand the topic and provide false interpretations that may provoke a negative reaction from the teacher, rather than receiving emotional support, so they feel anxious, frustrated, and find it difficult to control their emotions.

Ainley and Ainley (2011) explained that the positive interaction in the educational situation and the feeling of the enjoyment of learning is positive motivational emotions, which arise when the learner feels the value of the activity and interacts with it with high confidence, and this feeling is a

motivation to create a self-efficacy that predicts the improvement of learner's ability to participate successfully. That is represented in the learner's initiative is to ask questions, to attempt to provide a precise interpretation of the solution, and to expand knowledge. This is confirmed by Rosa and Perez (2015) were the results of their studies indicated that the relationship between feeling shy and social participation was negative, while the relationship between feeling the enjoyment of learning and social participation in different situations was positive.

Feeling the ability or inability to perform, may be governed by the extent to which the learners can control the internal factors affecting their expectations, as explained by Putwain, et al (2013). Moreover, they confirm the existence of a direct relationship between the feeling of control and the ability to control feelings and the rate of self-efficacy in performance. (Aljahwari, 2017) emphasizes that the level of the learner's ability to control his emotions in any situation is affected by the extent of his positive beliefs towards his ability to accomplish.

2. Literature Review

Recent mathematical curricula focused on developing mathematical thinking as a comprehensive ability that enables learners to develop related skills. Mathematical thinking as a sequential cognitive process directed towards associate theoretical concepts and knowledge to the practice based on different psychological factors (Najm, 2012).

Such Personality traits influence thinking and mental processes, and they serve as predictors for many mental skills such as thinking, creativity, problem-solving (Leduc, Feldman, & Bardi, 2015). One of the personality traits that enable the learner to think mathematically is self-efficacy, which is one of the dimensions of the personality of the individual; it represents self-conviction through which he/she can face problems, and the ability to accomplish complex tasks with flexibility and organized behaviors (Steven, 2006). Most studies have shown a positive relationship between self-efficacy and mathematical reasoning. Midoun (2013) explained that learners' awareness and their high beliefs of their own self-efficacy have a positive impact on their performance, as they make them more persistent than others in difficult tasks. Moreover, they possess organized learning and accurate self-evaluation.

Lodewyk and Winnie (2005) confirm that the difference in the degree of the learner's self-efficacy is a critical factor in the process of developing performance; the issue is related to self-direction, governed by a sense of confidence that positively affects the behaviour of the learner. The results of a study by Steven (2006) indicated that the self-efficacy has a significant role in raising the level of performance in mathematics, and the results of Rahmi, Nadia, Hasiba and Hidayat (2017) showed a positive relationship between self-efficacy, mathematics, performance of skills, and mathematical communication. Qitami (2005) asserts that people with high self-efficacy are more able to get a hard job done.

In contrast, the results of several studies have shown that the degree of high self-efficacy may negatively affect the level of the learner's performance. A study conducted by Vancouver and Kendell (2006) showed that learners with high self-efficacy have achieved less in mathematics tests than others; in this aspect the results of the Paglis and Green's (2002) study also showed the same results. Study by June (2019) showed no significant relationship between self- efficacy and mathematics achievement.

The learners' development in self-efficacy as identified by Saloon (2008) is based on four factors such as active experience, social modelling, feedback and verbal persuasion, and physiological and emotional states. Ergun (2016) stated that the emotional intelligence of the learners related to their self-efficacy beliefs. Several phenomena affect the level of the emotional intelligence of the learner, such as anxiety, shame, and poor self-confidence.

Emotional intelligence has a positive role in mathematical thinking, as the agitations and emotional states of the learner such as the general mood or degree of feeling of both motivation and confidence or stress affect the learner's performance. Therefore, when the learner is worried about solving a mathematical problem, this can signal a low level of performance, even if the source of feeling has nothing to do with the task, as Stevens et al. (2004) explained. Study by Ugwuanyi, Keke,

and Asomugha (2020) showed that emotional intelligence and self-efficacy predicted students' achievement in mathematics. The findings of Dacillo's (2018) study found that there was no relationship between emotional intelligence and academic achievement in mathematics. They also added that many factors affect the relationship between emotional intelligence and the degree of self-efficacy of the learner, including the different environments, racial attributes, stage, gender, etc. In terms of ethnic qualities, they assert that they interfere with influencing self-efficacy beliefs, which may have a role in the varying level of emotional intelligence of the learner.

In terms of gender, Study conducted by Dacillo (2018) showed that there were no statistical differences in emotional intelligence concerning gender. The study by Watts (2011) showed that gender was related to math performance but didn't predict it. In contrast, a study by Turgut (2013) showed that there was a statistical interaction between gender and mathematics performance. Regarding school' type, a Study by Recber, Isiksal, and Koc (2018) found a significant main effect of gender on mathematics self-efficacy and mathematical achievement, however, school type wasn't, besides, gender and school type significantly predicted the mathematics achievement. A study by Lubienski, Lubienski (2013) indicated that private schools performed over the public school in mathematics. On the other hand, a study by Sellstrom and Bremberg (2006) showed that students with high socioeconomic status performed better in mathematics than those with low socioeconomic status.

Trends in international mathematics and science study (TIMSS) showed that Oman has outliers in the gap differences in mathematics between male and female, girls outperformed boys. The relationship between socio-economic and educational gender equities and girls' achievement has been negative. In grade four, Oman placed second place worldwide in the gap difference among boys and girls in favor of girls with a difference of 0.43. for grade eight, Oman was titled first place in that gap in favor of females with a difference of 0.21 (Ghasemi & Burley, 2019).

Denise (2010) confirms that highly qualified learners have the ability to perceive situations and suggest solutions to mathematical problems in less time and better way. However, until now there is no agreement among researchers about the stability and development of self-efficacy attributed to the educational stage, school type, and gender; in addition to that, most studies on the relationship of self-efficacy to academic performance have been applied to samples after the first cycle of education. Furthermore, the results of previous studies on the learner's beliefs in the level of self-efficacy for the first educational cycle category are not sufficient if any, as indicated by (Wagner, 2010; Tabone, 2011).

3. Study Design

3.1 Sample

The study population consisted of 1208 students of the fourth-grade students in Al-Buraimi Governorate, distributed over 17 schools. The randomly selected study sample consisted of 150 male and female students in the fourth grade, whose ages range between nine and ten years. The sample represents males and females; part of the sample is in city schools, and the other part in schools outside the city. The study sample was randomly chosen in the following sequence of techniques: stratification, cluster (classes) and simple random.

3.2 Tools

3.2.1 Mathematical reasoning test

To measure the learner's ability to solve questions that measure different mathematical skills: induction, reasoning, guesswork, modelling, symbol expression, and logical reasoning. The researchers prepared the test including various levels of questions, and within the limits of the math curriculum for the fourth grade. The test consisted of 12 questions, distributed among the specific mathematical thinking skills, with two questions for each skill. Questions were marked, one or two

scores for each question according to what was stated in the Mathematics Series Assessment Document (MoE, 2018a), and the total score for the entire test is 19 points.

Psychometric properties of validity, reliability, difficulty index and discrimination index were measured. Content validity was used, 12 specialist judges the appropriateness of the test, they recommended to change the formulation of questions: 1, 2, 5,11, and 12.

Internal consistency method was used to measure the test's reliability using Alpha Cronbach, the result showed that the reliability of general scale **α** =0.83. The difficulty index for the test items ranged from 10% to 64%, and this result called for a review of questions at which the difficulty factor was unacceptable. The questions that showed unacceptable coefficients of difficulty were listed, which were 1, 4, 5, 7, 9, 10, 11, as they were difficult they were modified in their formulation or replaced with other questions, so questions 5, 7, 9, 11 formulations were modified. Questions 1, 4, 10 were replaced by other questions suited to the specific content and skills. After adjusting what is needed in the questions, the researcher applied the test paper to the same sample. The coefficients of discrimination ranged between 30% - 80%, which are good ratios and meet the purpose of the test.

3.2.2 Self-efficacy scale

To measure the extent of the learner's beliefs in his/her abilities and capabilities; the researchers used the Self-Efficiency Scale for Children (SEQ-C) (Muris, 2001). The scale included 20 items distributed in three areas: academic, social, and emotional. The Likert scale was also used to measure the responses of the sample individuals (always correct, often correct, sometimes correct, rarely true, incorrect)

Content validity was used to check the appropriateness of the scale, the 11 specialists in educational psychology determined item validity and sampling validity of this scale. Based on their recommendations, the researchers removed items number 3 and 10, besides re-formulating items 2, 12, 21, and 22. Cronbach's Alpha equation to measure the internal consistency of the self-efficacy scale. The results showed that the general scale is **α** =0.78, which is a good reliability coefficient.

3.2.3 Emotional intelligence scale

To measure the level of the learners' ability to perceive and understand their feelings and emotions; the researchers used the Bar-On and Parker scale (Bar-On & Parker, 2000) "Emotional Quotient Inventory" to estimate the level of emotional intelligence of individuals aged 7-18 years. The scale applied in this study consists of 39 items, distributed in the six dimensions according to the scale model. The Likert scale was also used to measure the responses of the sample individuals (always correct, often correct, sometimes correct, rarely true, incorrect).

Content validity was used, and 12 specialists in educational psychology recommended removing items 10, 17, and 17, besides re-formulating items: 1, 4, 8, 13, 23, and 34. Cronbach's alpha coefficient was used to measure the internal consistency of the scale. The results showed that the general scale is **α** =0.78, which is a good reliability coefficient.

4. Results

To find the size of the relationship and its direction among the study variables, Pearson's correlation coefficient was used. The results indicated in table 1.

Table 1: Pearson correlation coefficients

	Emotional intelligence	Mathematical thinking	Self-efficacy
Self-efficacy	.745	.416	1
	.000	.000	
Mathematical thinking	.435	1	
	.000		
Emotional intelligence	1		

Table 1 shows that the size of the relationship between self-efficacy and emotional intelligence reached *r*=0.74, which is a positive direct relationship; at probability level *p*=0.00 that is, the relationship is statistically significant. The common variance reached 52.5%, which means that the relationship type is linear, its regularity between the two variables is good, and the remaining 47.46% express an unsystematic relationship.

The relationship between mathematical thinking and self-efficacy *r*=0.416, which is an intermediate positive direct relationship at the probability level *p*=0.00 that is, the relationship is statistically significant. The common variance was 17.3%, which means that the relationship type is linear. The relationship between the two variables is small, the remaining percentage of 82.7%, is the percentage that expresses an unsystematic relationship. The relationship between mathematical thinking and emotional intelligence was *r*=0.435, which is an intermediate positive direct relationship at a probability level of *p*=0.00. The relationship is statistically significant, while the common variance was 18.92%, which means that the relationship type is linear and the relationship between the two variables is small, and the remaining percentage of 81.08% express an unsystematic relationship. This result confirms that there is a positive relationship between the level of mathematical thinking and the level of emotional intelligence in the sense that the higher the emotional intelligence of the learner, the higher the level of mathematical thinking the learner has.

The second question: Does self-efficacy predict mathematical thinking when emotional intelligence is a mediator?

The direct relationship measures the extent to which the criterion (mathematical thinking) changes when the predictor level (self-efficacy) rises, without emotional intelligence as a mediator variable. The indirect relationship measures the extent to which the variable of mathematical thinking changes when the predictor (self-efficacy) is constant, and the mediator (emotional intelligence) changes by the amount by which it would have changed if the self-efficacy variable had increased.

The correlation coefficient between elf-efficacy and mathematical thinking was *R*=0.41; Corrective determination coefficient value R^2 =0.17, that is, the percentage of the contribution of self-efficacy to predicting mathematical reasoning was 17%. The analysis of variance *F*= 31.021, (d*f*= 1.148), *P*=0.00, which was a statistically significant value, confirms that self-efficacy affects mathematical reasoning. The regression coefficient of self-efficacy reached *B*=2.83, *ß*=0.41. This confirms that there was a direct relationship between the variables of self-efficacy and mathematical reasoning. Besides, the variable of self-efficacy matters in predicting mathematical thinking by 17%. The simple regression equation is as follows:

mathematical reasoning = 0.273 + 2.836 (Self-efficacy).

The previous equation indicates that the relationship between mathematical thinking and self-efficacy was a direct relationship; that is, if the level of self-efficacy increases for the fourth-grade students, this leads to an increase in the degree of their mathematical thinking.

Testing the relationship between the predictor (self-efficacy) and mediator (emotional intelligence), the correlation coefficient between self-efficacy and emotional intelligence reached *R*=0.74, which was positive. The value of the corrected determination coefficient was R^2 -=0.55, that is, 55% of the change in the emotional intelligence variable is related to the self-efficacy variable. In the analysis of variance of the regression model, *F*= 184.369, (d*f*= 1.148), *P*=0.00, which was statistically significant.

The regression factor of the self-efficacy variable was *B*=0.54. The simple regression equation here proves that there was a direct relationship between the two variables, and confirms that the self-efficacy variable contributes to affecting the emotional intelligence variable by 55%.

The equation is as follows: Emotional intelligence = 1.685 + 0.543 (Self-efficacy).

The above equation indicates that the relationship between emotional intelligence and self-efficacy was a direct relationship; this result is consistent with the results of Ergun (2016) study and another study of (Alghafriya, 2018).

The correlation coefficient between self-efficacy, emotional intelligence, and mathematical reasoning was *R*=0.45 and the value of the corrected determination coefficient was R^2 =0.19, which means that the contribution rate of the self-efficacy and emotional intelligence variables in the

interpretation of the change in the mathematical thinking variable was 19%, and the rest 81% is attributable to other factors; in other words, 19% of the variance in mathematical reasoning was due to self-efficacy when emotional intelligence is a mediator. In the ANOVA analysis of the regression model, the following results F = 19.317, (df= 2.147), P = 0.0, It was statistically significant and confirms the existence of an effect of self-efficacy and emotional intelligence on mathematical thinking.

Data in table 2 shows regression coefficients of mathematical thinking on self-efficacy and emotional intelligence. The regression coefficient of the self-efficacy variable B = 0.208 and the level of significance was P=0.06, which was the value of P>0.05. This is an indication that the prediction of the efficacy variable has vanished, and confirms that the direct relationship from self-efficacy (predictor) to mathematical reasoning (criterion) statistically insignificant. While the regression coefficient of the emotional intelligence variable was $ß$=0.280, the significance level was P=0.01, which was the value of P<0.05, meaning that the indirect relationship of the role of emotional intelligence as an intermediate variable in predicting self-efficacy with mathematical reasoning was statistically significant. The estimated equation is as follows:

mathematical thinking = -4.130 + 1.417 (self-efficacy) + 2.613 (Emotional Intelligence)

Table 2: Coefficients of mathematical thinking regression on self-efficacy and emotional intelligence

variables	Unstandardized coefficients		Standardized coefficients	t	Statistical significant
	B coefficient	St.E	Beta		
constant	-4.130	2.491		1.658	.099
Self-efficacy	1.417	.749	.208	1.891	.061
EI	2.613	1.027	.208	2.543	.012

The third question: Do the variables: sex and school type predict mathematical reasoning when emotional intelligence is a mediator? To verify the predictions of the sex and school variables of mathematical reasoning, when emotional intelligence was a mediator, multiple regression analysis was used. The coefficient of correlation between mathematical thinking and the variables of sex, and the type of school was R=0.21, which was a positive and direct, but weak correlation; the corrected determination coefficient was R^2 -=0.03, meaning that 3% of the change in the mathematical reasoning variable was due to the set of variables: gender and school type. In the ANOVA variance analysis for the regression model, the following results, F = 3.383, (df= 2), P = 0.03 which was the value of P<0.05 statistically significant, and confirmed the influence of sex and school type on the mathematical reasoning variable. From the regression model coefficients data, the regression coefficient of the school type variable was B=0.058, the regression coefficient of the sex variable B=2.210.

The simple regression equation proves that there was a relationship between the three variables, and confirms that the sex and school type variables contributed to predicting mathematical thinking by 3%. The result means that the sex variable predicted mathematical thinking, and this result was consistent with the result of the Najm study (2012), which found statistically significant differences in mathematical reasoning due to sex. The estimated equation as follows. Mathematical thinking = 9.011 + 0.58 - (School type) + 2. 210 (sex).

The test of predicting the variables of sex and school type with mathematical thinking when emotional intelligence is a mediator. The coefficient of correlation between mathematical thinking, sex, school type, and emotional intelligence was R=0.46, which is an intermediate positive and direct relationship; corrected determination coefficient value R^2 -=0.19, meaning that 19% of the change in the mathematical reasoning variable is due to sex and school type variables with emotional intelligence. In ANOVA contrast analysis of the regression model, the results shown were F = 13.188, (df= 3), P = 0.0 which was statistically significant, and confirms the presence of an influence of sex, school type, and emotional intelligence on the mathematical thinking.

Table 3 shows the regression coefficients of the variables. From the regression model coefficients data, the regression coefficient of the school type variable was B=-1.433, coefficient of

gender *B*= 1.202, and the regression coefficient of emotional intelligence *B*= 4.064. The significance level was *P*=0.062, which was a *P*>0.05. This is an indication that the effect of the sex and school type variables has vanished, and confirms that the direct relationship of the effect of sex and the type of school on mathematical thinking has become statistically insignificant. While the regression coefficient of the emotional intelligence variable *B*=4.064, the significance level was *P*=0.0 which was the value of *P*<0.05, meaning that there was an indirect relationship with the presence of the emotional intelligence variable as a mediator variable in predicting the variables of sex and the type of school with mathematical thinking when emotional intelligence was statistically significant. The regression equation is mathematical thinking = 4.749 + 1.433 (school type) + 1.202 (sex) + 4.064 (Emotional Intelligence).

Table 3: Regression coefficients of mathematical thinking on gender, school type, and emotional intelligence

variables	Unstandardized coefficients		Standardized coefficients	t	Statistical
	B coefficient	St.E	β		significant
constant	-4.749-	2.527		-1.879	.062
School type	-1.433-	1.007	-.108	-1.424-	.157
Gender	1.202	.794	.114	1.513	.132
EI	4.064	.725	.435	5.603	.000

5. Discussion

The results of the first question showed a direct and positive correlation between the variable of self-efficacy and emotional intelligence, and this result is consistent with the results of the studies (Abdullah & Abdulhadi, 2008; Lisa, et al 2010; Rosas & Perez, 2015; Ruthig et al, 2018). However, the results contradicted with studies (June, 2019; Paglis & Green, 2002; Vancouver & Kendall, 2006). The result reflects what Bandura (1997) stated in his theory that self-awareness and self-regulation of emotions are critical to self-efficacy. Positive emotions of the students such pride, good mood, feelings, and enjoyment directly affect on enhancing self-efficacy of them, and vice versa with negative emotions.

The result showed an intermediate relationship between self-efficacy and mathematical thinking, where the correlation coefficient *r*=0.42 at probability level *P*=0.00. It was also consistent with the Lisa. et al. study (2010) conducted among 1163 students in the elementary stage to reveal the relationship between self-efficacy and performance in mathematics, the relationship between self-efficacy and math test performance was intermediate. The result was also consistent with the results of the International Student Assessment Program. The data showed a direct correlation between the level of self-efficacy and the results of mathematics tests. It also agrees with the results of the studies (Midon, 2013; Prindle, 2014, Steven, 2006). Contradictory, this result opposes the results of (Paglis & Green , 2002; Jones, Harris, Waller & Coggins, 2005; Stagkovic & Luthans,1998) they found an inverse relationship between high expectations of self-efficacy and performance.

Self-efficacy processes are known to be important components of successful learning (Duckworth et al. 2015; McIlroy et al. 2015). Unquestionably, mathematics is one of the difficult areas, which consists of solving ambiguous problems taking some of them a long time and require perseverance and resistance, hence self-efficacy is a crucial trait that evokes students to resist and extend their trials until find answers for that problems. Such positive reinforcement that teachers give to the students is very critical, and lead to enhance students' self-efficacy. High self-efficacy leads to a sense of confidence that enables students to make more effort needed for optimal performance (Bandura, 1998).

There was also a positive and direct intermediate relationship between the variables of mathematical thinking and emotional intelligence. This result was consistent with the findings of Kiss, Kotsis, and Kun (2014). Their study tried to determine the type of relationship between emotional intelligence and academic performance of students. The results indicate that success in

performance was related to emotional intelligence. Evenson (2007) and Lisa et al (2010) also found similar results. On the other hand, the result is inconsistent with Dacillo's (2018).

This result confirms the salient role of emotional intelligence on mathematical thinking. The level of mathematical thinking isn't based only on cognitive abilities, instead, positive emotions are the fuel of academic attainment especially in mathematic because that the content-based heavily on abstract and complexity, therefore the emotional intelligence providing students with the power to sustain their cognitive effort, and resist such difficulties and obstacles that may face (Bar On, 2006). Positive emotions provided by the teachers and the class environment influence the students' motivations, engagement, and cognitive strategies while engaging in a mathematical problem's solving.

The results of the second question showed that self-efficacy predicts mathematical thinking when emotional intelligence was a mediator. This result is consistent with the study's findings by Ugwuanyi, Keke, and Asomugha (2020).

A person's beliefs towards his ability to succeed are changeable by various elements such as reinforcement, encouraged feedback (Steven, 2006). Bandura (1998) also stated that self-beliefs are affected by three elements that are: behaviour, environment, and internal elements which impact the perceptions. He asserted that self-awareness and self-regulation of emotions are critical to self-efficacy. Emotional intelligence evokes the self-efficacy of learners by controlling the negative effect when students start to do a new task and enhance the commitment towards that task.

Positive emotions engender thoughts and behaviours such as self-regulatory and cognitive strategies, so students with high emotions use flexible strategies that relate with great confidence and more effort in learning (Ruthigh et al, 2018). Bechara, Tranel, and Damasio (2000) indicated that emotional' control can stimulate neurological reactions that promote learning and affect performance positively.

In the study context, grade four students in the sultanate of Oman are taught by female teachers who are abler to develop students' positive emotions. While students learn complex content in mathematics and work with such problems, the beliefs towards their efficacy of accomplishing that task are critical. Their beliefs towards their ability are promoted by the emotions that experience. Teachers, class environment, school disciplines, and students' age are all elements that lead to positive emotions, and therefore these emotions heighten the level of self–efficacy that students have.

The researchers attribute the indirect relationship represented by the role of emotional intelligence in predicting self-efficacy in mathematical thinking to several reasons, including, clarification of the test objectives. It is necessary to prepare learners before the performance to ensure that anxiety is reduced (control of emotions) for some, as (Aljabali, 2000) made clear, that it is necessary to raise the learner's self-efficacy in performing tasks and face challenges and the development of their willingness. Another reason is that the students of the first cycle have the capabilities of enthusiasm and perseverance more than others, especially in mathematics classes. Enthusiasm and perseverance are among the capabilities of emotional intelligence, as indicated by Golman (1997) within the emotional and social capabilities of children up to the age of 12 years. This confirms the positive role played by emotional intelligence as it helps to explain the relationship of mathematical thinking to self-efficacy. Besides, this result may have explained due that emotional intelligence and self-efficacy are positively related, the students with a high level of emotional intelligence have a high level of self-efficacy as self-efficacy is a psychological trait that reflects emotions.

The results of the third question showed that sex and school type variables predicted mathematical thinking when emotional intelligence was the mediator. The researchers attribute this result to the fact that with different sexes, the ways to confront different situations and to deal with complex tasks differ, and this is due to the difference between the ability of males and the ability of females to understand the feelings of others and to manage and control self-emotions. Besides, the students in the rural and urban environment are differing on their emotional intelligence, generally, the students in urban schools face the most difficult problems which enable them to enhance their emotional intelligence, instead of students in the rural environment who live in a very simple lifestyle and social relationship, therefore the level of emotional intelligence is affected negatively.

6. Conclusion

In general, the study's findings articulated that emotional intelligence as a mediator variable facilitates the prediction of self-efficacy in mathematics. Apparently, the study's findings support the Bar-On theory of emotional intelligence which concentrates on the principle that EI enables persons to control their emotions and directed it to work for them and enhance their self-motivation. Feelings to be self-efficacy during tackling complex mathematical tasks based on the emotions that drive students to feel that they can accomplish the task, and persist against any negative feelings. Emotional intelligence played a vital role on give the students psychological power while learning mathematics and tackle varied tasks.

Positive emotions are derived from the school environment that facilitates students' learning, besides the role of female teachers who are capable of dealing with such students 'emotions. The power of emotions that students have to affect directly to their internal sense and thoughts, and acquire their beliefs on them and formulate positive images of their selves. Therefore, this belief affects directly their performance.

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