PSYCHOLOGY AND EDUCATION (2020) 57(4): 274-279
An Interdisciplinary Journal

Review Article

Math Anxiety and Math Achievement: Does Metacognitive Knowledge of Self and Task Determine Them?

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Abstract

This study aimed to determine whether math anxiety influences math achievement through each of three dimensions of metacognitive knowledge (i.e., metacognitive knowledge of self, task, and strategy), as well as through metacognitive knowledge itself. Data were collected from 370 5th graders from five elementary schools in South Jakarta, Indonesia. Results of the parallel multiple mediation analysis showed that math anxiety significantly influenced math achievement through the role of metacognitive knowledge as the mediator. Math anxiety also significantly influenced math achievement both through metacognitive knowledge of self and through metacognitive knowledge of task. However, the effect of math anxiety on math achievement was not significant when mediated by metacognitive knowledge of strategy.

Keywords: math achievement; math anxiety; metacognitive knowledge; fifth grader; Indonesia

Introduction

Mathematics is an essential subject in elementary schools, and many students often achieve unsatisfying grades in mathematics. The difficulties could be seen from national and international assessments, such as the Programme for International Students Assessment (PISA) worldwide ranking. Research on Improving Systems of Education (RISE) towards 18-24 years old students in Indonesia also showed the alarming facts about education in Indonesia: the percentage of correct answers to simple arithmetic questions (for example, 1/3 - 1/6 = ?) presented in the form of multiple choices, only increased by 0,2% in 2014 from 31,2% in 2000 (Pritchett, 2018).

Other sources also showed less encouraging results related to the math achievement of Indonesian students. For example, the result from PISA research, a survey conducted on 15-year-old students, showed that Indonesian students classified as low performers in mathematics (OECD, 2015). The survey also showed that in 2012, Indonesia got 64 rank out of 65 participating countries in PISA (OECD, 2014). In the next survey, in 2015, Indonesia ranked 69 out of 76 participating countries (National Center for Education Statistics, 2015).

A similar thing also happened to younger students. Result of the Trends in International Mathematics and Science Study (TIMSS) survey, a survey conducted for students in grades 4 and 8, showed that Indonesia was ranked 38 out of 42 participating countries in TIMSS in 2011 (Mullis et al., 2012). Meanwhile, in 2015, Indonesia ranked 44 out of 49 countries that participated in the TIMSS survey with a score of 397, an amount of 103 points lower than the average international score (Mullis et al., 2016).

It could be concluded that overall, vexing math achievement problems occur in elementary school students (Mullis et al., 2012; Mullis et al., 2016) to adults (Pritchett, 2018) in Indonesia. This phenomenon needs to be given special attention because mathematics is one of the main subjects in Indonesian education. Math achievement determines the graduation of elementary to high school students in the National Examination (The National Legal Development Agency, 2005). In everyday life, mathematical abilities are also necessary, for doing transactions while shopping to work dealings (Ding, 2016). Math achievement at school even becomes a predictor of the students' success rate in the workforce later (Nguyen et al., 2016). Thus, the math achievement of Indonesian students since elementary school level should be improved so that they could obtain satisfying math achievement at subsequent levels of education with much more sophisticated mathematical materials.

The different results of the research found different factors that could affect an individual's math achievement. Nevertheless, math anxiety known as the most crucial predictor, which makes it difficult for individuals to obtain satisfying math achievement (Ashcraft, 2002; Ramirez et al., 2018). Research also showed that math anxiety is a factor that affects Indonesian students' math achievement at various levels of education with various school characteristics. For example, research on a group of students in a high school in Bangka Island showed that 41% of participants have moderate math anxiety and 29,5% were detected as having high math anxiety (Anugrah et al., 2018). The math anxiety caused students at the school got the lowest exam results in Bangka Regency for two consecutive years, namely the 2015/2016 and 2016/2017 academic years.

The problem with math anxiety also found at the elementary school level. For example, Nurhayati et al. (2019) in their research of elementary school students in the Indonesia—Malaysia border area, found that although math anxiety in the majority of participants was low, there were 3,33% percent of participants who had high math anxiety and 21,67% had moderate math anxiety. Math anxiety was found to be one of the most significant causes that make students get low math achievement.

Math anxiety is a feeling of tension or fear associated with thinking or when somebody engages in tasks that require mathematical calculations (Legg & Locker, 2009). However, Ashcraft (2002) argues that math anxiety does not directly affect a person's performance in mathematics. Their cognitive processes will block individuals with math anxiety. Therefore he/she is experiencing difficulties in making decisions. Ashcraft (2002) also found that people who have high math anxiety are more burdened with problems that have additional

questions. Individuals with high math anxiety need a longer time to solve such problems. According to Ashcraft, individuals with math anxiety need three times longer than individuals with low math anxiety. This because additional questions problems put a more substantial burden on the performance of working memory, a system in mental processing. The individuals feel that this process is burdensome.

As for the information processing (information-processing approach), it was explained that the process of human thinking simply involves the encoding process, short -term memory (short-term memory), long term memory (long term memory), and response (Ashcraft & Radvansky, 2010). Regarding information processing, metacognition has the role of facilitating effective processing. Metacognition helps individual examine what he knows about the way his mind processes information (Santrock, 2011). The metacognition is knowledge and cognition related to cognitive phenomena (Efklides, 2008; Flavell, 1979). This metacognition consists of metacognitive knowledge, metacognitive experiences, and metacognitive skills (Efklides, 2008).

Metacognitive knowledge defined as the declarative knowledge a person has of a particular task, theory, or belief related to cognition (Flavell, 1979). Metacognitive knowledge provides information about how well the individual or other people, in the individual's view, complete a task, how they feel in completing the task, and also provide information about the task, strategy, and goals. To simply put, Legg and Locker (2009) explain metacognitive knowledge as an individual's awareness of his cognition or thinking.

The metacognitive knowledge consists of three dimensions, i.e: metacognitive knowledge of self, metacognitive knowledge of tasks, and metacognitive knowledge of strategy (Efklides, 2012). Metacognitive knowledge of self consists of an individual's belief that he can do a task well, correctly, and effortlessly. Metacognitive knowledge of tasks talks about task categories and features, relationships between tasks, as well as the processing stages of those tasks. Meanwhile, metacognitive knowledge of strategy includes knowledge of various strategies and conditions that require the use of these strategies, for example, when and why a strategy needs to be used.

In processing information related to the completion of mathematical tasks, the role of metacognitive knowledge is needed, in order to determine the most effective way to solve a problem (metacognitive knowledge of person), a matter of mathematics, in this case. In addition, individuals need to recognize the characteristics of the problems faced (metacognitive knowledge of task), as well as developing appropriate strategies to solve the problems faced (metacognitive knowledge of strategy). However, when an individual experiences high math anxiety, it will be challenging to use metacognitive knowledge effectively (Hoorfar & Taleb, 2015). Thus, it is assumed that these individuals will also find it challenging to obtain satisfying math achievement because they cannot do math-related tasks properly.

The effect of metacognitive knowledge on math achievement is proven in the research conducted by Schneider and Artelt (2010). They found that fifth graders (5th grade of elementary school students) who showed better performance in mathematics tests had better knowledge related to cognitive and metacognitive strategies. Schneider and Artlert (2010) also find that metacognitive knowledge was not just a significant predictor of math achievement, but mastering the metacognitive knowledge would also improve math achievement.

Although it appears that math anxiety affects math achievement through the role of metacognitive knowledge, there were no proves of this assumption. There were also no research results that looked deeper into the role of each dimension of metacognitive knowledge in the influence of math anxiety on math achievement. Whereas, this is important to be known as the basis to design the intervention programs to improve the math achievement of Indonesian students. Therefore, this research aimed to prove the assumption that math achievement is influenced by math anxiety through the mediation of dimensions in metacognitive knowledge or as a whole.

The research participants were 5th-grade elementary school students. Characteristics of the participants determined by considering metacognitive knowledge as one of the research variables. 5th graders around 10-11 years old are corresponding to these criteria because in cognitive development, they begin to move from the concrete operational stage to formal operational. Thus, they start to think more abstract, idealistic, and logical. At this stage, they also begin to think about the mind itself (Santrock, 2011). Moreover, the development of metacognition also reaches fulfillment at the age of 8 or 9 years old (Kreutzer et al., 1975 in Schneider & Artelt, 2010). Thus, the 5th graders are assumed to have been able to do metacognitive processing well.

Nevertheless, Gascoine (2016) stated that metacognitive skills and metacognitive experiences will develop after individual's metacognitive knowledge well-developed during the school period. Metacognitive skills are assumed to be fully developed at the end of the age of 12 years old (Veenman et al., 2005 in Gascoine, 2016). Therefore, this research only focuses on metacognitive knowledge as one of the metacognition aspects that has developed in middle childhood.

Wigfield and Meece (1998, in Ramirez et al., 2013) also emphasized that math anxiety at an early age has a "snowball" effect. It can lead to increased anxiety, dislike, and avoidance of mathematics in the future. Therefore, researching and dealing with math anxiety in young children would help to gain new perspectives about it. Those perspectives are essential in designing interventions to prevent children from having worse math achievement later in life (Ramirez et al., 2013).

Hypotheses

1. Math anxiety influenced math achievement through metacognitive knowledge of self dimension in 5th graders.
2. Math anxiety influenced math achievement through metacognitive knowledge of task dimension in 5th graders.
3. Math anxiety influenced math achievement through metacognitive knowledge of strategy dimension in 5th graders.
4. Math anxiety influenced math achievement through metacognitive knowledge of self, metacognitive knowledge of task, and metacognitive knowledge of strategy dimensions in 5th graders.

Method

This research used a quantitative approach. As for its purpose, the type of this research was correlational research using the survey method. Data was collected by distributing questionnaires to participants after the research was declared to have passed the research ethics assessment by the Research Ethics Committee of the Faculty of Psychology, Universitas Indonesia, through a certificate numbered 604/FPsi.Komite Etik/ PDP.04.00.00/2019.

Participants

As for the planning, this research intends to use a minimum of 300 5th graders from six elementary schools in the South Jakarta area as the participants. The six elementary schools were consisted of two private elementary schools, two public elementary schools, and two Madrasah

Ibtidayah Negeri (Islamic public school). Meanwhile, the sampling technique used was convenience sampling technique. Parents of the participants signed informed consent to show their children willing to participate in this study.

Descriptive statistical testing was conducted to see the participants' characteristics descriptions. The participants consisted of 5th graders age 9 to 12. There were 163 boys and 207 girls. One hundred fifty-eight participants went to private schools, 126 went to public schools, and the rest of the participants went to MIN.

Instruments

The variables in this research were math achievement, metacognitive knowledge, and math anxiety. Math Achievement was measured using the Math Achievement Test developed by the researcher. The Math Achievement Test contained of 12 essay items with questions originating from the math study materials of the 4th and 5th graders. Each item contained in the Math Achievement Test has been confirmed by several elementary school mathematics teachers to ensure that participants have learned the materials incorporated in it. Besides, the items used have also passed an expert judgment by experts in Educational Psychology. Every wrong answer in this test was given a value of 0, while the correct answer was given a value of 1. The reliability of this measuring instrument is α = 0,72. The instrument also has a good item differentiation (0,10 – 0,77), with 9 items including item discrimination > 0,4.

Math anxiety was measured using a modified Abbreviated Math Anxiety Scale (mAMAS) adjusted by Zirk-Sadowski et al. (2014) for 5th graders in the UK from the original Abbreviated Math Anxiety Scale (AMAS). Translate and back translate process and expert judgment by experts in Educational Psychology conducted in the process of developing mAMAS. Furthermore, an adaptation also made by changing the form of answer choices that initially consisted of a 5-point Likert scale (1 = Low Anxiety; 5 = High Anxiety) into the illustrative symbolic forms as follows: 😊, 😐, and 😣 (😁 = Low Anxiety; 😣 = High Anxiety). Changes in the form of answer choices were made to facilitate participants in determining their anxiety level. The validity test results indicated that the range of correlation coefficient of mAMAS items is 0,22 – 0,58. Meanwhile, the reliability test results showed α = 0,74.

Metacognitive knowledge was measured using the Metacognitive Knowledge in Mathematics Questionnaire (MKMQ) developed by Efklides and Vlachopoulos (2012). In this MKMQ there were three subscales. Each subscale sequentially measured the metacognitive knowledge of self, metacognitive knowledge of task, and metacognitive knowledge of strategy. The development of MKMQ had been through and translate and back translate procedure and also an expert judgment. The MKMQ item correlation coefficient range was 0,32 – 0,50 for the Metacognitive Knowledge of Self subscale; 0,46 – 0,74 for the Metacognitive Knowledge of Task subscale; and 0,13 – 0,53 for the Metacognitive Knowledge of Strategy subscale. Meanwhile, the reliability test results showed α = 0,75 for the Metacognitive Knowledge of Self subscale, 0,87 for the Metacognitive Knowledge of Task subscale, and 0,64 for the Metacognitive Knowledge of Strategy subscale.

Analysis

Research data analysis was carried out through statistical testing using Statistical Package for the Social Sciences (SPSS) software 23.0 version. Descriptive statistical testing also conducted to see the description of each variable in this study based on data obtained from the research participants. Meanwhile, parallel multiple mediation analysis testing was conducted to see whether there is an influence of the independent variable on the dependent variable through the mediator. This test was carried out using PROCESS macro for SPSS software.

Table 1. Data Overview of Research Variables

	N	Min	Max	*Mean*	*SD*	Category
Math. Achievement	370	.00	.00	0.34	0.21	low
Math Anxiety	370	1.00	4.00	2.24	0.55	med
Metacog. Self	370	1.00	4.00	2.66	0.51	low
Metacog. Task	370	1.00	3.60	1.85	0.42	low
Metacog. Strategy	370	1.43	3.86	2.55	0.45	med

Results

Descriptive Statistics of the Research Variables

The table above showed that the average research participant has low math achievement. Meanwhile, the minimum value of the math achievement variable showed that there were participants who did not answer even one Math Achievement Test item correctly. Nevertheless, the maximum value indicates that there were participants who could answer all items correctly in this study.

In the math anxiety variable, the mean of participants was 2.24. Thus, it could be said that participants in this study had moderate anxiety math levels. However, when viewed from the maximum value obtained, which was 4, it was known that there were also participants who have high math anxiety.

Regarding the metacognitive knowledge of self variable, the participants gained an average of 2.66. It indicated that the ability of participants to use knowledge related to themselves in dealing with a task was quite good. Meanwhile, the mean acquisition result of 1.85 on the metacognitive knowledge of task variable showed that the participants had a relatively low ability to use knowledge related to the types and features of tasks related to mathematics. The results of the acquisition of the mean on the metacognitive task of strategy variable indicated that participants had a reasonably good ability to use their knowledge of strategies to deal with types of mathematical tasks in certain conditions.

The minimum value of the metacognitive knowledge dimensions indicated that there were also participants who had a very low mastery of metacognitive knowledge. Nevertheless, the maximum value indicated that there were also participants who mastered the metacognitive knowledge of self, metacognitive knowledge of task, and metacognitive knowledge of strategy. Meanwhile, based on the empirical data collected, it was seen that math anxiety showed more variety of scores (SD = 0.55) than other variables.

Main results

Based on the research results obtained, it appears that there was a significant effect of math anxiety on math achievement through metacognitive knowledge of self and metacognitive knowledge of task. The more anxious an individual was about mathematics (math anxiety), his confidence in his ability to do a mathematical problem (metacognitive knowledge of self) would decrease, and vice versa (a_1 = -0,55, p < 0,001). In turn, the lower the individual's confidence in solving mathematical problems accurately (metacognitive knowledge of self), the lower his competence in mathematics (math achievement) (b_1 = 0,14, p < 0,001).

Based on confidence intervals conducted using 10,000 bootstrap samples, it appeared that when controlling the dimensions of

metacognitive knowledge of task and metacognitive knowledge of strategy, indirect effect of math anxiety on math achievement through metacognitive knowledge of self was significant. This indicates that the Ha_1 of the research was accepted, i.e. math anxiety influenced math achievement through metacognitive knowledge of self dimension in 5th graders.

The result of this research also showed that the more anxious an individual in dealing with math problems (math anxiety), the higher his tendency to state that the mathematical problems he faced were challenging to do (metacognitive knowledge of task) (a_2 = 0,41, p < 0,001). In turn, the assessment that mathematical problems faced tend to be difficult will lead to a lower individual proficiency in dealing with math problems (math achievement) (b_2 = -0.13, p < 0,001). Meanwhile, confidence interval showed that when the metacognitive knowledge of self and metacognitive knowledge of strategy dimensions were controlled, indirect effect of math anxiety on math achievement through metacognitive knowledge of task was significant. Thus, Ha_2 was also accepted, i.e., math anxiety influenced math achievement through metacognitive knowledge of task dimension in 5th graders.

Meanwhile, the result of this parallel multiple mediation analysis showed that Ha_3 was rejected, i.e., math anxiety was not influenced math achievement through metacognitive knowledge of strategy dimension in 5th graders. From Table 2, it appeared that the more anxious individuals were related to math problems, the lower his frequency to use various strategies in solving mathematical problems (metacognitive knowledge of strategy) (a_3 = -0,30, p < 0,001). Nevertheless, the frequency of using various strategies did not significantly affect the individual's math achievement (b_3 = 0,03, p > 0,05). Based on the confidence interval using 10,000 bootstrap samples, it appeared that the indirect effect of math anxiety on math achievement through metacognitive knowledge of strategy was not significant.

The total indirect effect of math anxiety on math achievement through the metacognitive knowledge of self, metacognitive knowledge of task, and metacognitive knowledge of strategy was -0,14 with a confidence interval ranged from -0,18 to -0,10. It indicated that the total indirect effect was significant, so that Ha_4 of the research was accepted, that math anxiety influenced math achievement through metacognitive knowledge of self, metacognitive knowledge of task, and metacognitive knowledge of strategy dimensions in 5th graders. If the metacognitive knowledge of self, metacognitive knowledge of task, and metacognitive knowledge of strategy were controlled, it appeared that the direct effect of math anxiety on math achievement was not significant (c' = 0,04, p > 0,05). Thus, there was no evidence that math anxiety affects math achievement without going through metacognitive knowledge.

Discussion

The result showed that the effect of math anxiety on math achievement was not significant through metacognitive knowledge of strategy. This finding was different from the explanation of Ashcraft and Radvansky (2010): in completing a task, individuals need to think of various ways to answer the problems encountered. When an individual experienced math anxiety, his information processing would not function optimally, so he could not think of various other ways to solve the mathematical problems encountered. Thus, the math achievement of these individuals would tend to be low.

Nevertheless, it was found that math anxiety significantly influenced the metacognitive knowledge of strategy. It could be explained by the discovery of Ashcraft (2002) that when students experience math anxiety, they would state that the math-related tasks they faced were difficult. Then, they would tend to work in a hurry (Ashcraft, 2002). The result of this research indicated that the more anxious a student about math-related assignments, the less he would use various strategies to complete these tasks. It happened because when math anxiety increased, individuals tend to avoid contact with things related to mathematics, making it impossible to explore various ways to complete mathematics-related tasks. However, the low frequency in the use of various strategies did not affect the individual mathematical competence, so the effect of math anxiety on math achievement was not significant through metacognitive knowledge of strategy.

The insignificant influence assumed to occur also because of the general teaching patterns in mathematics in Indonesia. Tanujaya, Prahmana, and Mumu (2017) stated that in Indonesia, teachers accustomed to explain ways or formulas to solve a mathematical problem following what is printed in the book. Thus, students in Indonesia are not used to implement various other methods in completing their assignments, other than those taught by the teachers.

Table 2. Results of Parallel Multiple Mediation Analysis

	Consequent															
		M_1 (Self)				***M_2 (Task)***				***M_3 (Strategy)***				***Y (Achievement)***		
Antec		***Coeff***	***SE***	***p***		***Coeff***	***SE***	***p***		***Coeff***	***SE***	***p***		***Coeff***	***SE***	***p***
X (Anx)	a_1	-0.55	0.04	0.00	a_2	0.41	0.03	0.00	a_3	-0.30	0.04	0.00	c'	0.04	0.02	0.06
M_1		-	-	-		-	-	-		-	-	-	b_1	0.14	0.03	<0.001
M_2		-	-	-		-	-	-		-	-	-	b_2	-0.13	0.03	<0.001
M_3		-	-	-		-	-	-		-	-	-	b_3	0.03	0.02	0.26
Const	i_{M1}	3.90	0.09	<0.001	i_{M2}	0.94	0.08	<0.001	i_{M2}	3.22	0.09	<0.001	i_y	0.04	0.14	0.78
		R^2 = 0.35				R^2 = 0.28				R^2 = 0.14				R^2 = 0.23		
		F(1.368) = 195.38 p <0.001				F(1.368) = 141.10 p <0.001				F(1.368) = 58.05 p <0.001				F(4.365) = 27.32 p <0.001		

Table 3. Effect Size of the Result of Parallel Multiple Mediation Analysis

	Effect	***Boot SE***	***Boot LLCI***	***Boot ULCI***
Total Effect	-0.09	0.02	-0.13	-0.05
Direct Effect	0.04	0.02	-0.00	0.09
Total Indirect Effect	-0.14	0.02	-0.18	-0.10
Indirect Effect through *Metacog. Knowledge of Self*	-0.08	0.02	-0.11	-0.05
Indirect Effect through *Metacog. Knowledge of Task*	-0.05	0.01	-0.08	-0.03
Indirect Effect through *Metacog. Knowledge of Strategy*	-0.01	0.01	-0.02	0.01

If examined from the characteristics of the majority of participants who were 10-11 years old, it also assumed that perhaps the metacognitive knowledge of strategy features had not been fully developed in 5th graders. However, based on the scores obtained, it appeared that there were participants who had high scores in the dimensions of metacognitive knowledge. It confirmed the theory that most of the metacognitive functions reached their developmental fulfillment when individuals are at the age of 8-9 years old (Kreutzer et al., 1975 in Schneider & Artelt, 2010).

At the age of 10-11 years old, individual cognitive development shifts from the concrete operational to formal operational stage (Santrock, 2011). It might cause most participants not to be too mature in abstract thinking. Thus, they were limited in the flexibility of thinking in order to find practical solutions related to other strategies that could be used in assignments, especially those related to mathematics.

On the other hand, even though these students used variety of strategies in dealing with mathematical problems, they would still find it challenging to obtain a satisfying math achievement because of their limited mastery of mathematics. Based on the criteria set by PISA, the mathematical competence of Indonesian students, even at the junior level, were still limited to answering questions that contain all relevant information and clearly-defined questions (OECD, 2009; OECD, 2013). Meanwhile, some of the questions in the Math Achievement Test used in this research, which represent mathematics of the 5th graders, demand more complex mathematical logic because these questions do not define proper questions and complete information, furthermore, a more complicated reasoning process is needed. Thus, even if students try to use specific strategies, for example, to re-check whether the answers they gave are correct or to read questions repeatedly to be able to understand, it is unlikely that the concerned students will succeed in working on these math problems.

Suggestion for further researches and practitioners

Further research is suggested to conduct a more in-depth analysis of participants' thinking processes using metacognitive knowledge. One of the ways that could be done, for example, is through measurement using thinking aloud techniques (Efklides, 2008). Thinking aloud techniques let the participants say aloud what they are thinking while solving a problem. Thus, it can be seen more in-depth regarding the factors that cause the insignificance of the relationship of metacognitive knowledge of strategy to math achievement.

Also, further research could control various factors that affect each research variable. For example, it is necessary first to ascertain the participant's intellectual capacity. It would help researchers to make sure that math achievement is affected by math anxiety through metacognitive knowledge, not by the participants' intellectual qualities. Besides, researchers have to make sure that there are no participants who experience math difficulty and others. It needs to be done to obtain more precise results.

Future studies also need to look deeper at external factors that can affect the state of participants, especially related to research variables. For example, it can be seen regarding the level of teachers' math anxiety, teaching techniques, and others. It would be useful to strengthen the foundation in the design of intervention programs to improve students' math achievement. Characteristics of participants can also be enriched, for example, in terms of age, level of parental education, and many more. With more diverse characteristics, the results of further research will be more easily generalized and can be used to explain the phenomena in the broader scope.

Practitioners in the field of Educational Psychology also expected to be able to use the findings of this research to arrange various intervention programs by paying attention to the role of metacognitive knowledge of self and metacognitive knowledge of task in the influence of math anxiety on math achievement. These intervention programs are expected to be a solution for the level of math achievement of Indonesian students who are still unsatisfying in terms of results. One of the intervention programs that could be done is to overcome math anxiety experienced by students. By reducing anxiety, individuals would be better able to use their metacognitive knowledge so that their math achievement will increase as well. Besides, other interventions can take the form of psychoeducation related to metacognitive knowledge and ways to use it.

Considering the effect of math anxiety on math achievement, teachers or practitioners of education also need to prevent students from experiencing math anxiety. One way that can be done, for example, is to make sure not to convey stigmas like male students are better in mathematics, and so on (Beilock & Maloney, 2005). Also, when students made mistakes in math assignments, they could be led appropriately and allowed to try to work on their assignments again to minimize the possibility of the emergence of math anxiety in subsequent math tasks.

Educational psychologists could also use the results of this research as a consideration when dealing with clients' unsatisfying math achievements. Instead of directly focusing on the intervention of the client's math achievement, it could be seen in advance whether the client has math anxiety or not. If the client turned out to have math anxiety, an intervention could be given in advance about it. Besides, if it turned out that there is no math anxiety, the client could be taught various ways to improve the use of his metacognitive knowledge.

Conclusion

The results of this research showed that 5th graders' use of metacognitive knowledge of strategy would not affect their math achievement. It happened because they did not have adequate skills to think flexibly. Teachers, in this case, played a critical role because they facilitated students to develop their cognitive flexibility. Therefore, in the future, teachers have to familiarize students with more varied strategies and let them use diverse methods in solving problems, especially mathematics questions.

On the other hand, the influence of 5th graders math anxiety on math achievement determined by metacognitive knowledge of self and task. It suspected that metacognitive knowledge of self mediates the relationship of math anxiety and math achievement because math anxiety decreased students' self-efficacy in solving mathematics problems. In turn, those beliefs would reduce student math achievement. Meanwhile, metacognitive knowledge of task also became a significant mediator because students who thought that a math task was difficult would more likely to finish the assignment in a hurry. It would also later reduce their math achievement.

Acknowledgement

This work was funded by Universitas Indonesia through "Hibah Riset Publikasi Internasional Terindeks Mahasiswa Magister (PITMA B)" programme under grant NKB-1013/UN2.R3.1/HKP.05.00/2019.

Conflict of interest

There was no conflict of interest in this work.

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