The Role of Metacognition and its Interaction on Students` Negative Academic Emotions towards their Academic Buoyancy and Achievement in Mathematics

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Abstract: The study examines the students` level of metacognition and its interaction on students` negative emotions towards their academic buoyancy and achievement. Furthermore, the data obtained from a sample of 1100 senior high school students in the Division of Pampanga. These students are enrolled from 22 Senior High Schools during the second semester of S.Y. 2018-2019 taking Probability and Statistics. Results showed that students` negative academic emotions of anger, anxiety, shame, hopelessness, and boredom predicts their capacity to cope up with their difficulties in mathematics as well as their achievement in the subject. Metacognition partially mediated the association between students` academic buoyancy and achievement. Further, it moderated the effect of negative academic emotions on students` academic buoyancy and achievement.

INTRODUCTION

Few studies have shown the relationship between negative academic emotions and academic competence of the students particularly in Mathematics. There are no empirical data on when or why these links exist. The few studies of students` negative emotion and its link to achievement have largely focused on anxiety, but there has been adequate theoretical and empirical attention devoted to the study focusing on other negative emotions experienced by learners.

Anxiety is not the only emotion experienced in the classroom. Pekrun et al. [1] stated that emotions such as enjoyment, anger, hope, pride, hopelessness and boredom, can each affect students and learning in a variety of ways. These emotions can be influenced by classroom factors, students` diversity, and external factors [2].Variety of emotions and their causes, teachers should have a knowledge on how to moderate the academic emotions of students especially their negative emotions such as anxiety, anger, hopelessness, shame, and boredom since studies showed that these were negatively correlated to their performance. This implies the higher the level of anxiety, anger, hopelessness, shame, and boredom of the students is the lower their performance in Mathematics wherein according to Pekrun, Elliot, & Maier, [3], negative emotion is a

barrier to achieving goals; it is the low capacity of an individual to be in contact with their own emotions.

Previous studies indicated that students do experience different levels of positive and negative emotions according to their level of achievement in mathematics [1] [4]. Negative emotions like anxiety, anger, and boredom seemed to be found predominantly among students with poor achievement outcomes.

There are many emotions and feelings that can be experienced by the students inside the classroom. Pekrun, Goetz, Titz, and Perry [1], emotions such as anger, boredom, enjoyment, hope, hopelessness, and pride may have an impact to the students and to their acquisition of knowledge.
These emotions can be influenced by classroom factors, students` diversity, and external factors [2]. Variety of emotions and their causes, teachers should have a knowledge on how to moderate the academic emotions of students especially their negative emotions such as anxiety, anger, hopelessness, shame, and boredom since studies showed that these were negatively correlated to their performance. This implies the higher the level of anxiety, anger, hopelessness, shame, and boredom of the students is the lower their performance in Mathematics wherein according to Pekrun, Elliot, &

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Maier, [3], negative emotion is a barrier to achieving goals; it is the low capacity of an individual to be in contact with their own emotions. Students with poor achievement results in mathematics are more likely have negative feelings like anger, boredom, and uneasiness. It was implied in the prior researches that the emotions felt by the students whether it is positive or negative is based on their level of achievement in mathematics [1] [4].

Teachers are aware that some feelings like uneasiness in mathematics may affect the cooperation of the students during discussion. This emotion may also have a negative effect in the performance of the students during examination. However, in the study of Trezise and Reeve [5], it was stated that there are some students who can handle their anxiety in mathematics, others declines their cognitive capability. This means that students are not affected similarly with negative anxiety. Mathematics failure due to uneasiness or worry are eliminated in students who display activation of brain areas connected to cognitive control and motivation as implied by the neuroscience [6]. In order to know more about the learning and feelings of the students, making some research on how they are able to acquire knowledge despite having anxiety and worry may aid.

The control-value theory of Pekrun integrates models involving the effects of emotions on learning and performance [1]. Recently, achievement emotions were found to have a significant impact on students` achievement goals and academic achievement. Additionally, it was learned that negative feeling like anxiety indicated low achievement, while positive feelings like satisfaction, hope, and self-respect indicated high achievement.

This study also focuses on the association among students` negative emotions, academic buoyancy and achievement. The specific negative emotions stated in this study are anger, anxiety, shame, hopelessness, and boredom as studied to be five of the ten academic emotions of Filipino students [7]. Academic buoyancy as defined by Martin [8] is a capacity to overcome setbacks, challenges, and difficulties that are part of everyday academic life. It is also defined as the capability of the students to face and overcome the challenges and difficulties that usually happened in school (e.g., low grades, meeting deadlines, pressure during examination, difficult schoolwork.) This served as a construct showing the daily academic strength within a positive psychology.

Research has demonstrated that students' ability to be buoyant in the face of academic challenge and setback is associated with important motivational

(e.g., greater persistence; Martin, Colmar, Davey, & Marsh, [9]) and emotional outcomes (e.g., lower anxiety; Martin, Ginns, Brackett, Malmberg, & Hall, [10]; Putwain, Conners, Symes, & Douglas-Osborn [11]; Putwain & Daly [12]). Moreover, buoyancy refers to an appraisal of one's capacity to deal with setback, whereas emotions relate to a set of psychological processes that are experienced in response to an event. Moreover, in the study of Putwain and Daly [12] about the relationship between buoyancy and achievement in association with anxiety, results showed that students with high in buoyancy and low in anxiety evinced high achievement whereas those higher in anxiety scored lower.

In this study, the researcher seeks to increase the buoyancy literature by exploring the roles played by additional factors. This only shows that negative emotion like anxiety may predict students` performance as well as their ability to become buoyant and resilient on their task in Mathematics. It also examines the role of metacognition on students` negative emotions in association to their buoyancy and achievement. Metacognition refers to an array of strategies, knowledge, and processes that appraise, monitor, and control cognition [13] [14].

Research on the use of metacognitive learning techniques in academic environment. However, it was found in the previous studies that the possibility that the student will utilize a type of metacognitive strategies specifically the cognitive strategies that result in deeper, elaborative processing of information was lessen by the negative feeling [15]. Specifically, Turner, Thorpe, and Meyer [16] found that negative emotions were negatively related to deeper strategy use. Therefore, it is anticipated that deeper cognitive techniques are not utilized by students who have negative feelings because these techniques need more concentration and involvement. Contradictory, students who experience positive emotions tended to use deeper strategies and more engagement.

For the role of negative emotions on students` metacognition, studies showed significant relationship between these variables. In the study of Tajrishi et al. [17] about metacognitive beliefs and negative emotions, it was found out that negative feelings such as uneasiness and depression was positively and significantly connected with metacognition (positive beliefs about worry, negative beliefs about worry concerning uncontrollability and danger, cognitive confidence and need to control thought). Furthermore, it was shown that students with higher scores in metacognition scale have more negative feelings similarly with students with lower scores. 12 Furthermore, numerous studies showed causal link between students` metacognition and achievement.

Results also showed that students often struggle when solving with mathematical problems on tests. While students may have content knowledge to solve problems, often they do not have the ability to identify when specific content knowledge should be applied. Also, students make simple computational errors or give up on problem solving because they do not feel that they were on the right path. Students need to be equipped with metacognitive strategies that may help them overcome such issues.

Based on the aforementioned literature and studies, the researcher aims to weaken the effect of students` negative academic emotions towards their ability to overcome minor academic setbacks and achievement in their Mathematics subject. With these purpose, the researcher hypothesized that metacognition may weaken the effect of students` negative academic emotions such as anger, anxiety, shame, hopelessness, and boredom on their academic buoyancy and achievement.

OBJECTIVES
This present study aims to test the moderated effect of students` metacognitive strategies on the link between negative emotions and academic buoyancy and achievement. Specifically, it aims the following objectives: (1) to assess students` negative academic emotions (anger, anxiety, shame, hopelessness, and boredom) , metacognition (cognition, motivation, and behavior), academic buoyancy, and mathematics achievement, (2) to determine the inter-correlations among the said variables, (3) to investigate the moderating role of metacognition on the relationship of students` negative emotions in their academic buoyancy and mathematics achievement, and (4) to examine the mediating role of students` metacognition on the relationship between their academic buoyancy and achievement,

Research Design

The study adopted the causal research design specifically it employs moderation analysis technique in order to determine the intervening effects of moderating variable in the association of predictor and outcome variables in the study.

Participants

The respondents in this study were 1100 selected senior high school students enrolled from 22 Senior High Schools in the Division of Pampanga during the second semester of S.Y. 2018-2019 taking Probability and Statistics. The sample size was calculated using power analysis with the accepted minimum level of significance (α) of 0.05 and the expected power β of 0.80 which is the accepted minimum level of power for the. The effect size of 0.25 was calculated based on Cohen`s d formula, a common measure of estimating the effect size. Stratified sampling procedure was used for selecting the respondents of the study. This technique was employed to ensure a fairly equal representation for 22 Senior High Schools offering STEM strand.

Procedure

The researcher used the five questionnaires in gathering first-hand information from the respondents. Before the copies of the questionnaires were distributed to the respondents, the researcher sought first the permission of the School Superintendent of the Division of Pampanga. When the letter was approved, the researcher visited the target schools to coordinate with the school heads and teachers. The researcher introduced himself to the respondents and informed them that he had a permission to collect data obtained from the principal and the academic chairman of the Senior High School department of respective schools. Moreover, the researcher explained the purpose of the study. The respondents were informed about their rights to discontinue participation in the study for any reason without fear of any negative consequences. Furthermore, the respondents were informed how to complete the questionnaires and how long it would take them to finish answering. The data were gathered from Sept 10 to Sept 14, 2018.
The data gathered were tallied, tabulated, processed and treated using Statistical Package for Social Sciences (SPSS) with Process Macro v.16 of Andrew F. Hayes.

Instrument

Academic Buoyancy. The Academic Buoyancy Scale (ABS; Martin & Marsh [18]) comprises four items that cover a variety of general schoolwork pressures ("I'm good at dealing with setbacks at school – e.g., negative feedback on my work, poor result"; "I don't let study stress get on top of me"; "I think I'm good at dealing with schoolwork pressures"; "I don't let a bad mark affect my confidence"). Respondents rated items from 1 ('Strongly Disagree') to 7 ('Strongly Agree'). The scale had an adequate internal consistency of Cronbach α of 0.83.

Metacognition.

A 30-item self-report measure that assess metacognitive beliefs designed by Wells & Cartwright-Hatton [19]. The instrument has good reliability and validity for assessing various components of metacognition including planning, monitoring, and comprehension [20]. Factor analysis reveals that the instrument measures the

two domains of metacognition proposed by Schraw and Moshman [21], metacognitive knowledge and regulation of cognition. Moreover, this instrument reached the desired internal consistency of 0.87.

Negative Academic Emotions.

Five emotions (anger, anxiety, boredom, shame, and hopelessness) will be assessed using the Achievement Emotions Questionnaire (AEQ-M) [22]. The items in the AEQ-M referred to emotional experiences such as class-related, learning-related, and test-related emotion items that specifically referred to their probability and statistics class. There are 60 items referring to eight different academic emotions in the AEQ-M, but for this study, only the items in the anger (9 items, e.g., "I get angry because the material in math is so difficult"), anxiety (15 items, e.g., "When taking the math test, I worry I will get a bad grade"), hopelessness (6 items, e.g., "I keep thinking that I will never get good grade in mathematics"), and shame (8 items, e.g., "I am ashamed that I cannot answer my math instructor's question well."), scales were analyzed. Participants were asked to indicate their agreement with each item using a 5-point scale (1=strongly disagree; 5=strongly agree). All scales had adequate internal consistency for the sample (anger: Cronbachα=0.82, anxiety: α=0.87, shame: α=0.75, hopelessness: α=0.80).

Achievement.

Achievement will be assessed in terms of students' previous final grade in Mathematics.

RESULTS AND DISCUSSIONS

Descriptive Statistics

The descriptive statistics for students' metacognition, negative academic emotions, academic buoyancy and achievement are shown in Table 1. As can be observed on the table, Students have a high level of metacognitive skills in terms of cognition, motivation, and behavior with a computed mean of 3.80 and both high levels of academic buoyancy and achievement in mathematics having weighted means of 3.86 and 4.07 respectively. For their negative emotions, students have an average level of anxiety and levels for anger, shame, hopelessness, and boredom in the said subject.

Table 1
Descriptive and Inter-correlations

Variables	$\bar{x}$	SD	Correlation Analyses								
			(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)
(a) Cognition	4.05	0.73	0.57*	0.63*	-0.41*	-0.47*	-0.39*	-0.43*	-0.50*	0.57*	0.63**
(b) Motivation	4.00	0.67	-	0.62*	-0.43**	-0.57**	-0.41*	-0.45*	-0.49*	0.72**	0.77**
(c) Behavior	3.36	0.72		-	-0.40*	-0.52**	-0.49*	-0.43*	-0.47*	0.53*	0.60
(d) Anger	2.30	0.68			-	0.67*	0.60*	0.53*	0.57*	-0.43*	-0.47*
(e) Anxiety	2.65	0.75				-	0.63	0.60*	0.62*	-0.67**	-0.72**
(f) Shame	2.33	0.74					-	0.60	0.69*	-0.49*	-0.47*
(g) Hopelessness	2.51	0.63						-	0.57*	-0.57**	-0.60**
(h) Boredom	2.39	0.45							-	-0.63**	-0.57**
(i) A. Buoyancy	3.86	0.89								-	0.78*
(j) M. Achievement	4.07	0.78									-

The expected negative relationship of students' negative academic emotions to their academic buoyancy and achievement in Mathematics was confirmed. Further, positive relationship exists among students' metacognition, academic buoyancy, and achievement. This is in support to the study of Young and Fry [23] in which they reported that metacognition influenced students' academic achievement. Moreover, Nongtodu et al. [24] knowledge of cognition or knowing how we learn deals with all the concepts which are related to the thinking process. Having a high level of metacognitive awareness on how students learn will help them acquire and understand Math concepts and ideas easily. For the relationship of students' academic buoyancy to their academic emotions and achievement, research has demonstrated that students' ability to be buoyant in the face of academic challenge and setback is associated with important motivation such as greater persistence, emotional outcomes, and lower anxiety which in turn affect academic achievement [10]. Lastly, in the study of Villavicencio and Bernardo [25], their results showed that negative emotions influenced Filipino students' achievement in Trigonometry, one of the fields in mathematics. The implication of this results only show that the more the chances that students bounce back amidst all the trials and challenges they face in their mathematics is directly related to their achievement in the subject. Further, the way of controlling their negative academic emotions and enhancing their cognition, motivation and behaviour towards the said subject has something to do with their ability to be academically buoyant which can be associated to their achievement.

Moderating Effects of Students' Metacognition on their Negative Academic Emotions and Academic Buoyancy

Table 2
Academic Buoyancy Predicted from the Interaction of Negative Academic Emotions and Metacognition

Predictor	β	Std. Error	p-value
Anger	-0.16	0.05	0.002
Metacognition**	0.25	0.30	0.000
Anger x Metacognition	**-0.10**	**0.03**	**0.000**
Anxiety	-0.26	0.07	0.000
Metacognition**	0.25	0.30	0.000
Anxiety x Metacognition	**-0.14**	**0.02**	**0.000**
Shame	-0.11	0.07	0.000
Metacognition**	0.25	0.30	0.000
Shame x Metacognition	**0.20**	**0.03**	**0.000**
Hopelessness	-0.20	0.03	0.000
Metacognition**	0.25	0.30	0.000
Hopelessness x Metacognition	**-0.12**	**0.02**	**0.000**
Boredom	-0.32	0.06	0.000
Metacognition**	0.25	0.30	0.000
Boredom x Metacognition	**-0.15**	**0.08**	**0.000**

Dependent Variable: Academic Buoyancy

Analysis of data shown in Table 2 only illustrates that metacognition predicted the academic buoyancy of the students (β=0.25, SE= 0.30, p<0.000) and the same is true with all the negative academic emotions: Anger (β=-0.16, SE of β=0.05, p<0.002); Anxiety (β=-0.26, SE= 0.07, p<0.000); Shame (β=-0.11, SE=0.07, p<0.000), Hopelessness (β=-0.20, SE=0.03, p<0.000), and Boredom (β=-0.32, SE = 0.06, p<0.000). The interaction of metacognition to all negative academic emotions predicting academic buoyancy is said to be significant. It can be observed on the table that the effect of negative academic emotions lessened when interacted to metacognition. The interaction is illustrated in Figure 1 below.
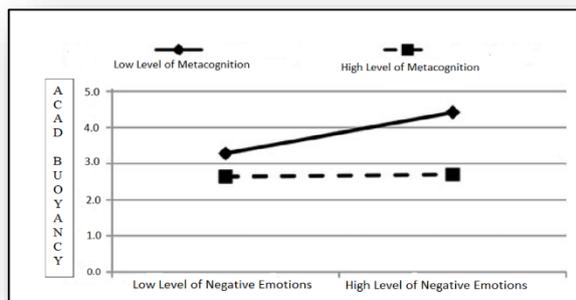

Figure 1. Interaction between Negative Academic Emotions and Metacognition Predicting Academic Buoyancy

For students who reported high levels of negative academic emotions such as anger, anxiety, shame, hopelessness, and boredom, final grades were not affected by their levels of metacognition. In contrast, for students who reported low levels of negative academic emotions, levels of academic buoyancy were higher for those who reported higher levels of metacognition. This only shows that metacognition moderated the effect of negative academic emotions to the ability of the students to face all the challenges, trials, and difficulties in Mathematics.

The result supports the study of Martin and Marsh [26] that negative emotions such as anxiety reduce the ability to cope with daily setbacks within an education setting. Students` academic buoyancy should be viewed as a positive psychology version of resilience. Buoyant individuals do appear to display more positive emotions than less buoyant. Buoyant students tend to have higher achievement. In addition, they are able to utilize positive emotions and avoid negative emotions to bounce back from stressful experiences more quickly and effectively than less buoyant [27].

Results also show how all the negative academic emotions are associated with lower levels of achievement, and with lower levels of an important cognitive-motivation-behavior variable (metacognition), consistent with previous cross-cultural studies [1]. More importantly, our results show that metacognition buffers the negative relationship of students` anger, anxiety, shame, hopelessness, and boredom to their achievement in learning. Moreover, Ruthig et al. [28] as cited in the study of Villavicencio and Bernardo [25] stated that the moderating effect of negative academic emotions provides some elaborations on current theoretical proposals on the inhibiting role of negative academic emotions in students' learning.

Moderating Effects of Students` Metacognition on their Negative Academic Emotions and Achievement

Table 3
Mathematics Achievement Predicted from the Interaction of Negative Academic Emotions and Metacognition

Predictor	β	Std. Error	p-value
Anger	-0.30	0.03	0.000
Metacognition**	0.72	0.05	0.000
Anger x Metacognition	**-0.09**	**0.03**	**0.000**
Anxiety	-0.30	0.02	0.000
Metacognition**	0.72	0.05	0.000
Anxiety x Metacognition	**-0.13**	**0.02**	**0.000**
Shame	-0.23	0.07	0.000
Metacognition**	0.72	0.05	0.000
Shame x Metacognition	**-0.21**	**0.03**	**0.000**
Hopelessness	-0.23	0.03	0.000
Metacognition**	0.72	0.05	0.000
Hopelessness x Metacognition	**-0.11**	**0.02**	**0.000**
Boredom	-0.30	0.04	0.000
Metacognition**	0.72	0.05	0.000
Boredom x Metacognition	**-0.20**	**0.10**	**0.000**

Dependent Variable: Mathematics Achievement

Data on Table 3 revealed that negative academic emotions significantly correlated and predicted the achievement of the students in terms of their grades. Results for negative academic emotions predicting academic achievement were as follows: Anger (β=-0.30, SE of β=0.03, p<0.000); Anxiety (β=-0.30, SE= 0.02, p<0.000); Shame (β=-0.23, SE=0.07, p<0.000), Hopelessness (β=-0.23, SE=0.03, p<0.000), and Boredom (β=-0.30, SE = 0.04, p<0.000). Students` metacognition in terms of their cognition, motivation, and behavior also predicted

their achievement in mathematics (β=0.72, SE = 0.05, p<0.000). The interaction of metacognition one negative academic emotions such as anger, anxiety, shame, hopelessness, and boredom weakened their effects on students` achievement. This only shows metacognition served as moderator between the relationship of negative academic emotions and achievement. The interaction between the said variable is shown in Figure 2 below.
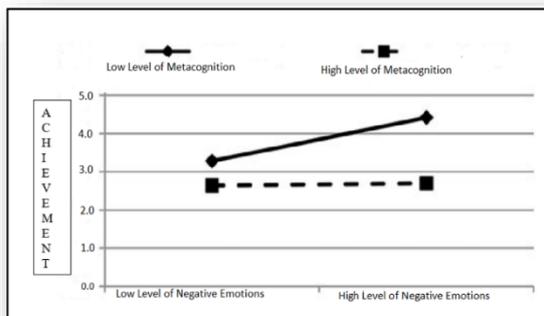

Figure 2. Interaction between Negative Academic Emotions and Metacognition Predicting Achievement

For students who were reported high levels of anger, anxiety, shame, hopelessness and boredom, metacognition had no effect on their achievement in mathematics in terms of their grades. Contrary to the said statement, for students who reported low levels of the said negative academic emotions, grades were higher for those who reported higher levels of metacognition.

The results of the study support the claims of different authors who conducted studies on academic emotions specifically the negative academic emotions. Negative academic emotions have negative academic effects on students` academic performance in terms of their grades [25] [29] [30]. According to Dong and Yu [31], turning negative emotions into positive emotions help students to sustain their interest in learning over time. Thus, teachers` ways of improving metacognition in terms of cognition, motivation, and behavior results to students putting effort for learning, promoting creative learning strategies, and helping students to improve their competence in mathematics. However, Pekrun et.al [1] stated in their study that negative academic emotions like hopelessness and boredom can reduce levels of motivation for and effort put into learning, cause students to use mechanical learning strategies (e.g., repetitive memorizing). This only implies that teachers should find ways of strengthening the level of metacognition of the students in order for them to lessen the effect of negative academic emotions to students` grades.

Mediating Effects of Students` Metacognition in their Academic Buoyancy and Achievement

Table 4 presents the results of the mediation model shown in Figure 3.

Table 4
Parameter Estimates of the Mediation of Students` Metacognition in the Association between Academic Buoyancy and Mathematics Achievement

Path	Path Coefficient	p-value	Effect Size	Remarks
Path a: AB→MC	0.84	0.000	0.02	Significant
Path b: MC →MA	0.51	0.000	0.18	Significant
Path c`: AB→MA	0.83	0.000	0.20	Significant
a*b: AB→MC→MA	0.43	0.000	0.00	Significant
c`+ a*b: Total Effect	1.26	0.000	0.20	Significant

The illustration of the mediation analysis is shown in Figure 3 which is based on the fourth model of Baron and Kenny (1986) in mediation.
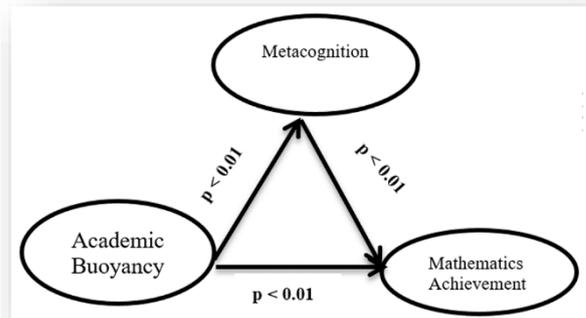

Figure 3. Mediating Role of Students` Metacognition on the link between their Academic Buoyancy and Achievement

Analysis of data revealed that students` metacognition significantly mediates the relationship between academic buoyancy and achievement (a*b=0.43, p < .01). This finding indicates that students` academic buoyancy affects their metacognition in mathematics (a = 0.84, p<.01) which in turn affect their mathematics achievement (b = 0.51, p<.01). The table shows also the effect size in each path. It shows that the given paths were computed considering normal effect sizes. Moreover, students` metacognition partially mediated the association between their academic buoyancy and achievement since the relationship between the said variables is still significant after including the effect of the mediating variable. This only means that students` capacity to bounce back in their subject which causes their achievement because of their academic cognition, motivation, behavior and some other external factors. The partial

mediation indicating that the relationship between academic buoyancy and achievement is significant even their metacognition was introduced is said to be also significant considering the Sobel test value (t=3.75, SE=o.35, p<0,01).

The result of the study is consistent to the results obtained by You et al [32] that prior experiences of buoyancy and achievement may not be enough to predict subsequent achievement and buoyancy respectively. Perhaps this occurs because control explains a large amount of the variance in achievement leaving little to be explained by buoyancy. Indeed, research has shown that control and achievement are quite highly related. Moreover, Martin [33] suggests that the association between buoyancy and achievement is relatively weak to begin with (i.e., without the inclusion of control). Thus, another possible explanation is that prior achievement or success in navigating a setback may or may not activate the necessary adaptive actions that are required for future success. The extent to which these adaptive actions are taken may hinge on other processes. For example, buoyancy may help to activate other processes that are more closely associated with achievement. This interpretation is consistent with prior research showing that buoyancy is relevant to successfully dealing with social-emotional and motivation factors that are known to predict achievement [8] [11].

CONCLUSION AND RECOMMENDATION

The present findings provide insight into the sometimes modest relationships that are found between academic buoyancy and student achievement. The findings also speak to issues of academic buoyancy more generally as they highlight the potential role of metacognition of academic cognition, motivation and behavior in helping student setback to be transformed into subsequent positive outcomes. More broadly, the findings speak to the issue of negative academic emotions on their mathematics achievement. In particular, the findings add weight to calls by various stakeholders about the importance of students` emotional well-being and development in schooling for academic achievement. This research showed that the learners` negative academic emotions has something to do with the way they bounce back after they`ve experienced poor grades and difficulties in mathematics. Teacher should consider metacognitive strategies to weaken the effect of negative emotions like anxiety and hopelessness on achievement in order for their students to be buoyant and finally increase the chances to achieve academic success.

Parents and teachers should work hand in hand in order for the students` develop their ability to be both resilient and buoyant in facing their mathematics subject, turn negative academic emotions into positive, and improve their performance in the said subject.

Mathematics educators, researchers, and psychologists may give at least as much attention to the studied negative academic emotions as well as well as academic buoyancy. More precise psychological models and theories about how these other negative emotions influence students' metacognitive dimensions and learning outcomes.

To enrich these findings, future researchers may consider longitudinal studies and other programs to elucidate more clearly the roles of negative academic emotions, metacognition, academic buoyancy to mathematical performance of the students. These results would encourage other psychological researchers to give at least as much attention to academic anger, shame, and hopelessness as with anxiety. More precise psychological models and theories about how these other negative emotions influence students' motivations, cognitions, and learning outcomes. More precise theoretical constructions can serve as more useful guides for educators who aim to create the best possible learning environments within which students can attain the highest possible levels of learning.

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