The Relationship Between Achievement Goal Orientation and Academic Buoyancy in Mathematics among Secondary School Students in FELDA Areas, Malaysia

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ABSTRACT

Multiple studies have found a correlation between achievement goal orientation and academic buoyancy, which is the ability of students to overcome academic setbacks. Nevertheless, there is a lack of reference on achievement goal orientation for academic buoyancy among students in Federal Land Development Authority (FELDA) areas of Malaysia, especially for future workforce development. Hence, this study aims to examine the relationship between achievement goal orientation and academic buoyancy in mathematics achievement among FELDA students. This study employed a correlational research design to collect quantitative data via questionnaires from 462 students. The descriptive statistics indicated that the average academic buoyancy value was moderate. In addition, avoidance of mastery and performance had higher descriptive mean values than mastery approach and performance approach. Academic buoyancy was also found to be moderately positively associated with the mastery approach ($r = 0.538$), the performance approach ($r = 0.411$), and the performance avoidance orientation ($r = 0.381$). Mastery avoidance orientation exhibited the weakest positive relationship ($r = 0.184$). These findings shed light on how to foster students' achievement goal orientation in their ability to overcome academic setbacks. A sign of mastery avoidance had informed a need to focus on mastery of content for increasing academic buoyancy.

1. Introduction

In meeting 21st-century challenges, the younger generation is expected to be creative. Nevertheless, the rapid advancements in technology during the digital transformation era and abrupt life changes, such as adjusting to COVID-19, have distorted the learning process to involve creativity. Recent studies have related the process of learning to learning outcomes such as academic

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achievement [1], psychological well-being [2], and cognitive development [3]. The increasing challenges have put much stress on young people and resulted in academic and personal development obstacles, which can lead to stress and burnout [4]. In particular, stress reduction may improve the capacity to handle educational transitions, namely academic buoyancy [5].

Academic buoyancy is a critical skill that can help the younger generation cope with the challenges of the 21st century [3]. It refers to the ability to bounce back from setbacks, stay motivated, and remain focused on academic goals despite stress and adversity [6]. To help students cope with these challenges, it is essential to cultivate high academic buoyancy. This skill is closely linked to critical thinking and adaptability, which are highly valued today. Students with high buoyancy can handle sudden changes and setbacks creatively and innovatively, which is essential in today's rapidly changing world [7].

It is necessary to create a younger generation with high buoyancy. This is informed by the need to produce highly skilled, critical-thinking workers. High buoyancy provides opportunities to form individuals who can demonstrate critical thinking. Hence, teachers who are heavily responsible for education are recommended to support the students' learning. So that every student can manage their academic work, which highlights the value of buoyancy [8].

Previous studies have shown a correlation between achievement goal orientation and academic buoyancy. However, there is a knowledge gap regarding how these constructs relate to the learning of a specific learning subject, especially in mathematics achievement among FELDA secondary school students. Investigating the relationship between academic buoyancy and achievement goal orientation in this population is essential, as it has significant implications for developing workforce skills. As a result, this study aims to investigate the relationship between academic buoyancy and achievement goal orientation in mathematics among FELDA secondary school students, as well as justify its implications for the development of workforce skills. Specifically, this study aims to answer two research questions, namely:

i. What are the FELDA's secondary school students' levels of academic buoyancy in mathematics and achievement of goal orientation?
ii. Is there any relationship between the achievement of goal orientation and academic buoyancy in mathematics?

2. Literature Review
2.1 Academic Buoyancy

Academic buoyancy is used to describe students' ability to overcome school-life challenges. Among the obstacles are difficulties in learning and coping with multiple tasks in school. Students with high academic buoyancy have the potential to meet the school's academic target. They have the flexibility to respond to any issue. This has been observed among Gen Z's responses to their responsibility in coping with various aspects of academic life [9]. Their exhibits of buoyancy enable them to go to a higher level of learning. Therefore, academic buoyancy results in proactive students. Research has also shown that cultivating academic buoyancy can positively affect mental health and well-being. For example, a recent study found that higher levels of academic buoyancy were associated with lower levels of anxiety and depression among high school students [10]. Another study showed that academic buoyancy can buffer the negative effects of academic stress on students' psychological well-being [11]. On the other hand, it has been observed as a significant factor in explaining why low achievers exhibit undesirable behaviours, including anxiety [12]. Strengthening academic buoyancy may be crucial since unstable educational development, such as math anxiety,

should be avoided to overcome academic adversities [9]. Therefore, all educators must consider academic buoyancy when conducting their teaching, especially in a challenging subject like mathematics.

2.2 Learning Mathematics and Academic Buoyancy

Mathematics is challenging since it requires reasoning to learn. When involving oneself in reasoning, one may need to make a connection to a related procedure with an apparent reason. The reasons are justifications for working through any mathematics questions. Hence, learning mathematics calls for positive attributes that enable learners to engage in all their hard work [13].

To learn mathematics, one must have conceptual comprehension and values-based beliefs. One may need to maintain their abilities by adhering to positive attitudes about learning mathematics, such as its value in the world, as well as knowing strategies to solve complex questions. Given the wide range of topics covered in mathematics, it might be challenging to encourage students to succeed in their studies regularly. Studies may be brought on by failure to progress through the learning process. Adaptability is regarded as buoyancy mathematics.

The goal of buoyancy mathematics is to reduce the anxiety associated with learning mathematics. Hence, coping strategies are required [14]. Nevertheless, the rapid changes have brought about multiple challenges, which may need to be observed. The buoyancy theory has been highlighted in this regard. To meet the obstacles, students must be prepared with buoyancy mathematics. As a result, they need to receive proper support [13].

2.3 Predictors of Academic Buoyancy

Academic buoyancy represents a person's views, which call for them to persevere through the learning process. Goal orientation and self-regulation are two significant factors in building academic buoyancy [15]. Biggs' 3P [16] effective learning model can be used to explain this further. The model offers recommendations for increasing mathematical buoyancy. Math learners must clearly understand their learning objectives, a concept known as goal orientation. It is a preliminary stage in the learning process. In addition to having an outstanding aim for learning mathematics, it's critical for children to have positive self-regulation to be resilient during the process. Recent studies validated Biggs's concept [15,17]. The studies focused on two aspects of goal orientation: academic atmosphere (the interaction between a child's academics, family and school), and self-efficacy, specifically self-awareness (clarity), low anxiety (composure), confidence, commitment, and self-control. Getting these two factors could ensure one's learning. However, the demanding schedule at school and the changes to education may make students doubt their ability to understand mathematics. Hence, this study aims to investigate to what extent the students (FELDA's students) sustain their mathematics learning with their mathematics perceptions (attitudes as described in Bigg's model) towards mathematics buoyancy. Specifically, this study focuses on the relationship between the achievement of goal orientation and academic buoyancy among FELDA's secondary students.

2.4 Achievement of Goal Orientation and its Relationship to Academic Buoyancy

Understanding individuals' achievement goal orientations can be helpful for teachers in creating learning environments that promote intrinsic motivation, a growth mindset, and positive emotions while minimising anxiety and fear of failure. A theory called "achievement goal orientation"

determines what motivates people and how they approach tasks related to achieving goals. This framework includes four main goal orientations: mastery approach, mastery avoidance, performance approach, and performance-avoidance [18]. Mastery approach goals emphasise improving and learning new skills, while mastery avoidance goals involve avoiding situations that could lead to failure [19]. In contrast, performance-approach goals emphasise achieving favourable judgments from others, such as high grades or praise, while performance-avoidance goals focus on avoiding negative judgements, such as low grades or criticism [20]. The achievement goal orientation framework says that each person can have more than one goal orientation, which can change depending on the situation or task at hand. For example, a student may have a mastery approach orientation for a subject they like and a performance-avoidance orientation for a subject they find hard [21].

3. Methodology
3.1 Research Design

For study utilised a correlational research design to gather quantitative data, focusing on the relationship between achievement goal orientation and academic buoyancy in the context of learning mathematics. By investigating these variables, the study aimed to shed light on the role of goal orientation in students' mathematics learning. The findings from this investigation offer valuable insights into how students in the field of mathematics education can be better supported and guided.

3.2 Participants

Participants were chosen from four secondary schools on Malaysia's southern and eastern coasts in the FELDA areas. The 463 participants were between the ages of 15 and 16 and were randomly chosen. Among the participants, 54% were female, while 46% were male, representing a nearly balanced gender distribution.

3.3 Measures

The data were collected using two survey instruments. The Academic Buoyancy Scale (ABS) [22], consisting of 28 items, was adopted to measure students' capability to deal with mathematics learning setbacks. Eight subscales are involved in measuring these constructs: self-perception, learning practice, teachers' character, teachers' teaching practice, parents' internal support, external support, peer support, knowledge, and skills. The reliability test promised internal consistency with a Cronbach's Alpha of 0.927. The value was aligned with a previous study that showed an alpha of 0.91 [22]. Table 1 provides some examples of items in the ABS questionnaire.

The second survey used was the Achievement Goals Questionnaire (AGQ) [18]. This instrument was chosen because it uses a 2-x-2 goal orientation framework involving four independent achievement goal orientation types. It consists of 12 items, with 3 items measuring each type of goal orientation exclusively. The existing validity of this instrument was referred to as a guide in establishing its originality [18]. The reliability test showed an average high level of internal consistency for the four-goal orientations, namely mastery approach, mastery avoidance, performance approach, and performance-avoidance, with alpha values of 0.751, 0.702, 0.872, and 0.705, respectively. Table 1 provides some examples of items in the AGQ questionnaire.

Respondents must give their feedback on a four-point scale (1=strongly disagree; 2=disagree; 3=agree; 4=strongly agree) for both questionnaires. Rating scale calibration analysis has supported the use of a four-point scale [22].

Table 1
Examples of items

Variable	Dimension	Items
Academic buoyancy	Self-perception	I am confident in my math abilities despite being disturbed by thoughts that Math has no use.
	Learning practice	I want to learn Mathematics even if I can't get help from others when I have problems in solving Math questions.
	Teachers' character	I am eager to learn Mathematics even though I am often scolded by the mathematics teacher.
	Teachers' teaching	I am confident of mastering Mathematics even when taught by a teacher who cannot make me understand a topic being taught.
	Internal support	I am eager to learn Mathematics even though my parents expect good achievements.
	External support	I tried to learn Math even though my parents couldn't help me in solving Math questions.
	Peer support	I tried to maintain concentration even when I was interrupted by other friends during the Math class.
	Knowledge, and skills	A lot of Mathematical formulas to memorize did not affect my Mathematical learning.
Achievement goals orientation	Mastery approach	It is important for me to know the contents of the mathematics subject thoroughly.
	Mastery avoidance	Sometimes I feel worried because I don't fully understand the content of Math lessons.
	Performance approach	My goal in Math class is to get a better grade than most of the other students.
	Performance-avoidance	The feeling of fear of getting a poor achievement in the subject of Mathematics became my source of motivation.

3.4 Statistical Analysis

The collected data were analysed using the Statistical Package for the Social Sciences (SPSS) to address the research question. The analysis involved both descriptive and inferential statistics. Firstly, a descriptive analysis was conducted using the mean to present the students' ratings on their academic goal orientation and academic buoyancy. The mean is a measure of central tendency that provides an average score for each variable. The description focused on the relative interpretation of the mean scores, which were categorised into three levels: 'high', 'moderate', and 'low'. A mean close to '4' (ranging from '3.5' to '4') indicates a 'high' level of academic goal orientation or buoyancy. A mean ranging between '2' (inclusive) and '3.5' (exclusive) indicates a 'moderate' level of academic goal orientation or buoyancy. Mean less than '2, indicating a 'low' level of academic goal orientation or buoyancy. Next, inferential statistics were used to analyse the relationship between the variables. Specifically, correlational analysis using Pearson correlation was employed to assess the intercorrelation between each type of achievement goal orientation and academic buoyancy. Pearson correlation measures the linear relationship between two continuous variables, providing information about the strength and direction of their association. The significance levels were set at 5%, meaning correlations with a p-value less than or equal to 0.05 were considered statistically significant.

4. Results

4.1 Descriptive Statistics for the Variables

The first part of the findings is presented to answer the following research question:

- Research Question One: What are the FELDA's secondary school students' levels for academic buoyancy in mathematics and achievement of goal orientation?

The mean value for academic buoyancy was relatively moderate (mean = 2.82 relative to the highest scale of 4). This indicated that students have moderate abilities in dealing with mathematics learning setbacks. Meanwhile, among the domains of achievement of goal orientations, mastery avoidance orientation (mean = 3.19) was adopted most by the participants, followed by performance-avoidance (mean = 3.12), performance approach (mean = 3.09), and mastery approach (mean = 3.04). All domains of goal orientation showed a relatively moderately high level of goal orientation, with the domains of approach (namely mastery approach and performance approach) showing a lower level than the domains of avoidance (namely mastery avoidance and performance-avoidance).

The results from both the mastery approach and performance approach domains indicated that the participants had a lower inclination to approach the mastery of mathematics content. Additionally, these students showed less success in performing well in mathematics, as reflected in the academic buoyancy. Consistent with these findings, the participants also perceived themselves as more prone to avoidance in both mastery and performance aspects of mathematics. This is evident in the results of mastery avoidance and performance-avoidance, which suggest that students were more likely to avoid situations that required them to demonstrate their mastery or perform well in mathematics.

Thus, this study highlights that the participants had moderate academic buoyancy, meaning they possessed moderate abilities to cope with setbacks in mathematics learning. Their goal orientations were predominantly avoidance-oriented (mastery avoidance and performance-avoidance), indicating a tendency to avoid situations involving mastery and performance in mathematics. On the other hand, they displayed a lower inclination to approach the mastery of mathematics content, and their performance in mathematics was also less successful. These results align with the participants' perception of themselves as more prone to avoidance in both mastery and performance aspects of mathematics, resulting in a lower rating in academic buoyancy.

4.2 Relationship Between the Achievement Goal Orientation and the Achievement Buoyancy

The second part of the findings is presented in Table 2 to answer the following research question:

- Research Question Two: Is there any relationship between the achievement of goal orientations and academic buoyancy in mathematics?

The correlation analysis was performed at a significance level of 0.05. The results of bivariate correlation, r (refer to Table 2) showed that all achievement goal orientations were positively and significantly correlated with academic buoyancy. To be specific, mastery approach orientation has the strongest correlation with academic buoyancy (r = 0.538), followed by performance approach orientation (r = 0.411) at a p-value < 0.05. Meanwhile, mastery avoidance orientation has the weakest correlation with academic buoyancy.

Table 2
Intercorrelation between variables

	Mastery approach	Mastery avoidance	Performance approach	Performance avoidance
Academic buoyancy	0.538	0.184	0.411	0.381
p - value	<0.05	<0.05	<0.05	<0.05
Number of participants: 463				

The results showed that all achievement goal orientations were found to be positively and significantly correlated with academic buoyancy. This suggests that students who displayed higher levels of goal orientation were also more likely to exhibit greater academic buoyancy, indicating their ability to bounce back and cope with academic challenges effectively. In particular, the strongest correlation observed in the relationship between mastery approach orientation and academic buoyancy ($r = 0.538$) has indicated a robust positive relationship between students' inclination to adopt a mastery approach, characterised by a focus on improving skills and mastering the content, and their ability to remain resilient in the face of academic setbacks. Students with a strong mastery orientation might view challenges as opportunities for growth and skill development, contributing to their higher academic buoyancy. Besides, the results showed a significant positive correlation between performance approach orientation and academic buoyancy ($r = 0.411$). The correlation suggests that these students tended to gain a goal-driven mindset and desire for success, contributing to their higher academic buoyancy, pushing them to persevere and overcome obstacles, and hence performing well in academic tasks. On the other hand, the correlation between mastery avoidance orientation and academic buoyancy ($r = 0.184$) was weaker compared to the other goal orientations. Mastery avoidance orientation reflects a tendency to avoid situations that require demonstrating competence or mastery. The weak positive correlation implies that students with higher levels of mastery avoidance orientation may still exhibit some degree of academic buoyancy, but to a lesser extent than those with other goal orientations with desires for gaining approaches. A lower correlation was also observed in performance avoidance ($r = 0.381$), reflecting an inclination to avoid situations requiring effort in mathematics. It is possible that these students might struggle more with setbacks due to their inclination to avoid challenges.

5. Discussion

This study focused on secondary school students in Malaysia, specifically those from FELDA. More attention is needed to overcome obstacles to learning a complex subject, namely mathematics. After completing the transition from elementary school to middle school, it was observed that secondary school students required more assistance in resolving school-related issues independently. Particularly, their competence is linked to academic positivity [23]. As a result, the promise of academic performance may require additional focus on buoyancy development.

The findings revealed that the FELDA students' academic buoyancy is relatively moderate in mathematics learning. This suggests that students were able to bounce back from setbacks and challenges in their mathematics learning, which is a positive attribute for academic success. Academic buoyancy is essential for academic success because it helps students stay motivated, have confidence, and feel like they are in charge of their academic lives, even when things get hard. It helps individuals be resilient when facing future jobs. Students who experience academic buoyancy are likely more resilient in the face of academic setbacks, and they keep a positive state of mind and attitude towards any learning, especially a difficult subject like mathematics [6]. This suggests that

students were able to bounce back from setbacks and challenges in their mathematics learning, which is a positive attribute for academic success.

Interestingly, observations of their inner-built personalities (the four domains of achievement goal orientation) showed that their attempts to avoid problems on the way to mastery and performance were higher than their approaches to mastery and performance. This suggests that they were more likely to avoid situations that showed a tendency to cause failure in the performance of the achievement.

The finding indicating the strongest relationship between mastery approach orientation and academic buoyancy highlights the importance of adopting a positive mindset towards learning and academic challenges. A demonstrating mastery approach can motivate a person to learn and master a task instead of just getting a particular result [20]. In other words, people who take a "mastery approach" are more likely to see academic challenges as chances to grow and improve instead of threats to their self-worth or abilities. This way of thinking is significant for academic buoyancy, which is defined as the ability to overcome academic setbacks and challenges, like low test scores in mathematics, tough assignments, or negative feedback, and bounce back to a positive state of mind [6]. Managing the mastery of mathematical concepts necessitates a thorough understanding of fundamental concepts. As a result, going through the mastery approach is critical for long-term success in mathematics.

Additionally, individuals with a performance approach are also more likely to experience academic buoyancy. This approach emphasises achieving positive outcomes and striving for success, which can also be applied to the workplace. Similarly, this study showed a moderately positive correlation between performance approach orientation and academic buoyancy. Hence, FELDA's students focused on achieving positive outcomes while striving for success and avoiding failure. Specifically, individuals with a performance-oriented orientation tend to have higher levels of academic buoyancy, which can lead to tremendous academic success and well-being. The relationship between performance-approach orientation and academic buoyancy was also reported in previous studies. They found that individuals with a solid performance-oriented orientation tended to set challenging goals, work hard to achieve them, and attribute success to their efforts, while controlling and attributing failure to external factors [24].

Even though FELDA's pupils displayed a relatively higher level of mastery avoidance and performance-avoidance goals, these factors had a limited association with buoyancy. These avoidances inhibit individuals from taking risks and learning from mistakes they make, thereby diminishing their academic buoyancy. Studies have shown that mastery-avoidance and performance-avoidance goals are associated with negative outcomes of academic buoyancy [25]. This is because mastery-avoidance goals are characterised by a focus on avoiding competency, while performance-avoidance goals are characterised by a focus on avoiding positive evaluation.

6. Conclusions

The findings indicated that achievement goal orientation contributed to mathematical academic buoyancy. In particular, the stronger link between the achievement goal orientation approaches (i.e., the mastery approach and the performance approach) and academic buoyancy in learning mathematics showed that more strategies are needed to build personalities that strive for mastery and performance. Intriguingly, the results also suggested that students must divert from strategies of avoiding failure to achieve mastery and performance. Those who can learn from their mistakes and utilise them as opportunities for growth and development are likely to be more productive at work. Overall, the results of this study indicated that achievement goal orientation and academic

buoyancy are crucial for success in the workforce. The findings in this study shed light on how to foster students' achievement goal orientation in their ability to overcome academic setbacks. A sign of mastery avoidance had informed a need to focus on mastery of content for increasing mathematics buoyancy.

Acknowledgment

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