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Research Article

Math Anxiety Among Full-Time And Working First-Year Students In UAE

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ABSTRACT

Unlocking the complexities of math anxiety and attitudes toward College mathematics holds the key to unlocking academic success for first-year college students. This study integrated quantitative and qualitative methods to explore math anxiety and attitudes among full-time and working first-year students in the United Arab Emirates (UAE). Notably, a gap exists in understanding the experiences of these student groups, particularly in College Mathematics. Data collected during the early weeks of the first semester provided insights into students' initial challenges during this critical transition phase. Findings revealed varying levels of math anxiety between full-time and working students, with the latter, who often juggle work and study responsibilities, reporting higher anxiety levels. Despite this, working students exhibited a more positive outlook on the practical application of mathematics. Differences in anxiety-inducing scenarios highlight unique challenges influenced by students' life contexts. Furthermore, the study explored the emotional responses and perceived usefulness of College Mathematics, revealing contrasting outlooks between full-time and working students. The thematic analysis of students' comments emphasized the crucial role of faculty in shaping students' experiences, highlighting the importance of supportive teaching methods. The findings also emphasized the necessity of specific interventions and support systems to tackle the issue of math anxiety and enhance favorable learning encounters among students in their first year. This study contributes to our understanding of math anxiety in the context of first-year students' transition to college, emphasizing the importance of tailored support mechanisms to address the unique needs of these student populations.

Keywords: college transition, anxiety triggers, emotional responses, perceived usefulness

Introduction

In the United Arab Emirates (UAE), college mathematics is a cornerstone of higher education. It is commonly offered as a subject in general education programs and serves as a foundation for various academic programs. Additionally, it is a gatekeeper for future vocational success (Tawdrous, 2022). The importance of mathematics cultivating problem-solving, logical reasoning, and critical thinking abilities should be valued. These skills are essential in diverse academic fields and foster innovation (Feng, 2023; Cresswell & Speelman, 2020). Therefore, gaining insight into the dynamics of math anxiety and attitudes toward College Mathematics is essential for improving the academic experience of first-year college students in the UAE

Globally, improving math proficiency is a significant challenge, with 59% of OECD students expressing concerns about the difficulty of their math courses (OECD, 2016). As reported, 54% of the students in the UAE achieved Level 2 proficiency, falling below the OECD average of 76% (OECD, 2018). Additionally, just 5% reached Level 5 or above, indicating adeptness in complex math scenarios, compared to the OECD average of 11%. These disparities highlight potential secondary-tertiary transition (STT) issues impacting first-year college students. Research suggests that emotional difficulties and poor math attainment before the transition can increase math anxiety at age 18 (Field, Evans, Bloniewski, & Kovas, 2019), affecting students' adaptation to college-level math (Di Martino, Gregorio, & Iannone, 2023). Furthermore, past experiences play a crucial role, as negative feelings from earlier math encounters can lead to math anxiety in college, potentially causing

students to avoid challenging study tasks such as solving practice problems (Jenifer, Rozek, Levine, & Beilock, 2022).

Research by Di Martino et al. (2023) highlighted the critical importance of studying the transition from secondary to tertiary education, providing insights into why students often struggle with university-level math after high school. This understanding is vital for shaping math education research and its implications for students pursuing STEM degrees. Giannoulas and Stampoltzis (2021) emphasized the significance of focusing on first-year students, whose prior experiences with math shaped their expectations and attitudes toward university math courses, impacting their overall university experience and future career prospects. Addressing teaching methods and math anxiety early on, as emphasized by Burazin, Lovric, and Jungic (2020) and Almuharraqi and Toworfe (2018), is crucial for enhancing student engagement and success in foundational first-year mathematics courses across various disciplines. Moreover, negative attitudes towards math and perceived threats from mathematical stimuli contribute to the development of math anxiety (Shakmaeva, 2022), which predicts future STEM participation and achievement, highlighting its importance in enhancing STEM outcomes (Daker, Gattas, Sokolowski, Green, & Lyons, 2021). Despite attempts to ease the transition for first-year math students through initiatives such as bridging courses and support centers (Kouvela, Hernandez-Martinez, & Croft, 2018), challenges persist, underlining the need for continued research to better support students in adjusting to university-level mathematics.

Currently, within the United Arab Emirates, there are two primary cohorts of first-year students within the collegiate setting: students who engage in full-time academic pursuits and those who concurrently pursue employment alongside their studies. Furthermore, the unique challenges working students face and their specific needs are overlooked, especially in mathematics. As prior experiences and attitudes impact learning and achievement toward mathematics, the study also recognized the significance of capturing students' initial attitudes toward college mathematics by gathering data during the early weeks of the semester. By proactively addressing their needs during this critical period, interventions will support students in overcoming math anxiety and fostering a conducive learning environment.

The study expects to contribute to an existing body of knowledge by investigating math anxiety and initial attitudes among first-semester full-time and working college students in the United Arab Emirates. Specifically, the study aimed to find out the following: (1) Assess the initial math anxiety levels of full-time and working first-year college students toward college mathematics during the early weeks of the first semester, and (2) Investigate the initial attitudes toward college mathematics of full-time and working first-year college students during the early weeks of the first semester.

Review of Literature

A comprehensive exploration of first-year students' math anxiety levels and attitudes toward college mathematics was conducted. Recognizing the distinctive experiences of full-time and working individuals, the study aimed to unveil key factors influencing math anxiety, evaluate attitudes, and address existing research gaps.

Math Anxiety Among First-Year College Students

Investigating the prevalence of math anxiety in first-year students as they transition to university is vital for ensuring a smooth adjustment and academic success, benefiting both full-time and working students. However, most studies discussed math anxiety among first-year students without explicitly distinguishing between full-time and working students.

Based on the descriptions provided by Navida (2022), Gosling and Williams (2021), Brezavšček, Jerebic, Rus, and Žnidaršič (2020), and Cumhur and Tezer (2019) specifically within the context of first-year college students define math anxiety as an adverse emotional reaction characterized by feelings of tension, nervousness, fear, and worry related to mathematical situations experienced by students during their initial year in college. Math anxiety includes experiencing nervousness or tension when working with numbers or solving math problems, fear or apprehension in math-related contexts, worry about math tests or exams, and worry about math grades. Math anxiety may also involve stress, panic, and feelings of being unsuccessful or lacking confidence in one's math abilities, often triggered by challenging math tasks, past negative experiences with math, and apprehension of failing in math courses and assessments.

Math anxiety among first-year college students is influenced by various factors, including students' perceptions of mathematics and past experiences (Navida, 2022; Alibraheim, 2021). While some students may have a positive attitude towards math, others may experience intense anxiety, leading to discomfort and dissatisfaction with their studies (Szczygieł, 2022). This apprehension can potentially affect scholastic achievements, one's emotional state of being, and the decisions made regarding one's career trajectory (Khasawneh et al., 2021). Students who are anxious about math often experience stress and fear, leading to difficulties in understanding concepts and completing assignments (Cumhur & Tezer, 2019). Despite efforts to alleviate math anxiety, research gaps persist, hindering a comprehensive understanding of the issue (Cumhur & Tezer, 2019). It is crucial to address math anxiety early on to prevent its adverse effects on students' attitudes, beliefs, and academic success (Almuharraqi & Toworfe, 2018; Olangco, 2016). Further research is needed to fully understand and effectively address math anxiety among college students (Cumhur & Tezer, 2019).

Attitudes towards Mathematics Among First Year College Students

Attitudes toward mathematics have been defined as a three-dimensional construct by Di Martino & Zan (2011), encompassing emotional disposition, the vision of mathematics, and perceived competence, influenced by internal factors like practice and preparation and external factors such as teachers' characteristics and parental support (Alibraheim, 2021). It includes affective responses, cognitive beliefs, and behavioral tendencies. Attitudes involve feelings and beliefs about mathematics, including anxiety, liking, usefulness, motivation, and confidence, with math anxiety reflecting fear and worry (Escalera Chávez, Moreno García, & Rojas Kramer, 2018). In this study, attitudes towards Mathematics are operationally defined as a comprehensive set of multi-dimensional responses encompassing emotional, cognitive, and behavioral aspects that characterize first-year students' engagement and experiences in their College Mathematics subject.

Examining the attitudes of first-year college students in mathematics provides insights into pre-university preparation and recent educational experiences, highlighting the malleability of their formative-stage attitudes and offering an opportunity for early intervention to foster positive academic perspectives (Charalambides, Panaoura, Tsolaki, & Pericleous, 2023; Alibraheim, 2021; Kouvela et al., 2018). The initial university year is crucial for shaping students' confidence and success in fundamental mathematics (Szczygieł, 2023; Navida, 2022; Giannoulas et al., 2021). Fostering a positive attitude towards math, as emphasized by Szczygieł (2023), is essential throughout the university to sustain students' confidence and interest, preventing the development of math anxiety linked to lower achievement and reduced interest in STEM careers, ultimately minimizing dropout rates from STEM education. How students view math and how they study it can affect how anxious they feel; finding math challenging or lacking effective study methods might make them more worried, whereas positive thoughts and good study habits can reduce anxiety (Navida, 2022). In this light, Giannoulas and Stampoltzis (2021) stressed the importance of addressing mathematical anxiety and employing effective learning strategies to enhance educational outcomes and cultivate a sense of competence.

Several studies examined first-year college students' attitudes toward math. Giannoulas and Stampoltzis (2021) identified the factors influencing engineering students' attitudes toward mathematics in their first year of college. The study revealed that students' nervousness or confidence, diverse learning goals, beliefs about intelligence, persistence in effort, problem-solving approaches, learning strategies, past experiences, and considerations of mathematics' relevance collectively contribute to shaping their attitudes during their initial year in an engineering program.

Two studies conducted in the Gulf Region aimed to explore the attitudes of first-year students toward mathematics, one in Saudi Arabia by Alibraheim (2021) and another in the United Arab Emirates by Moussa and Saali (2022). Alibraheim's (2021) qualitative research involved interviews with 26 first-year engineering students, revealing that 58% exhibited positive attitudes influenced by supportive teachers, parental encouragement, and effective practice. In contrast, 42% displayed neutral attitudes associated with negative teacher characteristics, assessments impacting self-perception, English language proficiency challenges, and time management difficulties. Moussa and Saali (2022) studied the attitudes of 361 university students across different academic levels. The findings indicated predominantly positive attitudes towards mathematics, with distinctions observed among students at various stages of academic progression. First-year students exhibited lower attitudes than intermediate and advanced levels, particularly in their interest in math, perceived importance for future careers, and attitude toward the significance of math lessons. However, unlike Alibraheim's (2021) study, the impact of teachers on students' attitudes toward math was insignificant in beginner and intermediate math courses in Moussa and Saali's (2022) research.

Based on the existing literature, the study focused on math anxiety levels and attitudes toward College Mathematics among first-year UAE students to address a noticeable research gap. Previous studies have often examined math anxiety and attitudes toward mathematics among first-year college students in general, addressing the distinct needs of both full-time and working students during the critical transition period of the first semester had been overlooked. By examining these factors within the unique context of the UAE, this study contributes valuable insights into understanding and addressing math anxiety and attitudes toward College Mathematics among first-year college students, aligning with the call for more research in underrepresented geographical areas to tackle these issues comprehensively.

Methodology

A cross-sectional research design investigated math anxiety levels and attitudes toward College Mathematics among first-year students during the Academic Year 2022-2023. Quantitative and qualitative methods were utilized for comprehensive insights.

Participants

One hundred ninety-five (195) first-year students from a UAE higher institution participated, with 170 students (87% response rate) sampled conveniently. The study included 107 full-time students (mean age: 19) and 63 working students (mean age: 26).

Data Collection Instruments

The "Math Anxiety Self-Test," adapted from Freedman (n.d), assessed respondents' math anxiety levels based on ten scenarios, categorized into levels: High Anxiety (40-50), Moderate Anxiety (30-39), Not Sure (20-29),

and Not Anxious (10-19). This scale facilitated precise quantitative analysis. Additionally, two questions gauged attitudes toward College Mathematics: (1) emotions elicited by learning math and (2) perceived usefulness. Participants had the option to provide comments for qualitative insights.

Survey Administration

The online survey, pre-tested for clarity, was conducted during Weeks 1 to 3 of the semester to minimize assessment-related stress, aligning with findings suggesting timing influences responses (Levere & Kahlon, 2019). Participants were briefed on the survey's purpose, with clarifications available for unclear terms, and encouraged to respond online via an anonymous survey hyperlink, ensuring confidentiality and honest responses.

Reliability Assessment

The Math Anxiety Self-Test's dependability was evaluated using Cronbach's Alpha, producing a satisfactory coefficient of 0.8173, ensuring the test's consistency in measuring anxiety levels. Kosman (2019), Anouti, Shehayeb, and Mchiek (2018), and Paul and Ngirande (2014) utilized this as a tool in their research.

Data Analysis

Descriptive statistics summarized quantitative data, while frequencies and percentages elucidated student response distributions. Thematic analysis unveiled significant themes and patterns in qualitative data derived from student comments.

Ethical Standards

Securing participants' informed consent, safeguarding their confidentiality, and obtaining approval from the higher education institution were key ethical considerations.

Results and Discussion

The study examined math anxiety levels and attitudes toward college mathematics among two distinct groups: full-time first-year college students transitioning from high school and working students, specifically in the UAE higher education context. Data collected during the initial weeks of the semester provided insights into students' early perspectives, emphasizing the significance of comprehending their initial challenges. This understanding is essential for developing customized educational strategies and support systems tailored to the needs of these student cohorts.

Initial Math Anxiety Levels of Full-Time And Working First-Year College Students

Table 1 exhibits the frequency and percentage of full-time and working college students experiencing various levels of math anxiety.

Table 1 *Distribution of Math Anxiety Levels Among Full-time and Working College Students*

	Full-time Students		**Working Students**	
Anxiety Levels	Frequency	%	Frequency	%
High Anxiety	5	4.67%	5	7.94%
Moderate	33	30.84%	16	25.40%
Not Anxious	18	16.82%	19	30.16%
Not Sure	51	47.66%	23	36.51%
Grand Total	107	100.00%	63	100.00%

As results indicate, distinct patterns in math anxiety levels can be observed. The results of the study showed that working students were more likely to report high levels of anxiety compared to full-time students. This difference could be attributed to the additional stress of balancing work and study. Interestingly, the data revealed that working students were more decisive in their self-assessment of anxiety, with slightly lower reporting uncertainty and more identifying as 'Not Anxious.' Full-time students expressed more uncertainty about their anxiety levels.

In both full-time and working student groups, a notable number expressed uncertainty about their anxiety levels, mirroring findings from Alibraheim's (2021) study on Saudi first-year engineering students and the study of Cumhur and Tezer (2019). The 'Not Sure' category may authentically reflect genuine uncertainties about students' feelings toward mathematics, highlighting the need for future research to explore its implications on overall academic experiences in this context.

The results from Table 1 highlight that students exhibit varying degrees of math anxiety at the start of their College Mathematics course, suggesting that this anxiety may have originated from previous negative experiences with math. These early challenges and underperformance can lead to persistent math anxiety across educational transitions, affecting students' attitudes and performance throughout college and beyond (Charalambides et al., 2023; Jenifer et al., 2022; Alibraheim, 2021; Daker, 2021; Giannoulas & Stampoltzis, 2021; Burazin et al., 2020; Cumhur & Tezer, 2019; Field et al., 2019; Olango, 2016). Consequently, addressing

math anxiety early in the college journey is crucial to mitigate its impact on students' academic experiences in College Mathematics. The necessity for tailored interventions and support mechanisms to alleviate math anxiety among first-year students transitioning to higher education needs attention.
Table 2 shows how students rank different scenarios that cause anxiety in College mathematics during the early semester.

Table 2 *Mean Scores and Rankings on Math Anxiety Self-Test Items Between Full-time and Working First-Year College Students*

Math Anxiety Self-Test	Full-time Students		Working Students	
Items (Scenarios)	Mean	Rank	Mean	Rank
1. I cringe when I have to go to math class.	2.38	9	2.10	10
2. I am uneasy about going to the board in a math class.	2.67	4	2.78	4
3. I am afraid to ask questions in math class.	2.29	10	2.22	8
4. I am always worried about being called on in math classes.	2.62	6	2.11	9
5. I understand math now, but I worry that it's going to get really difficult soon.	3.18	2	3.00	3
6. I tend to zone out in Math class.	2.50	8	2.75	6
7. I fear Math tests more than any other kind.	3.48	1	3.68	1
8. I do not know how to study for math tests.	2.63	5	2.62	7
9. It's clear to me in math class, but when I go home it's like I was never there.	2.59	7	2.68	6
10. I'm afraid I won't be able to keep up with the rest of the class.	2.95	3	3.03	2

Note: Math Anxiety Self-Test adapted from E. Freedman (n.d). Copyright©1997-2023.

Table 2 aimed to identify which scenarios are more anxiety-inducing for the two cohorts of first-year students. It compared the mean anxiety scores and ranked these scenarios for both full-time and working students, as measured by the Math Anxiety Self-Test. The results revealed that full-time and working students shared common anxieties about math tests, with "I fear Math tests more than any other kind" ranking highest for both groups. This finding aligns with current research indicating that first-year students frequently encounter feelings of unease about mathematics assessments (Navida, 2022; Almuharraqi & Toworfe, 2018; Olango, 2016).
Moreover, differences emerged in their secondary anxiety-inducing scenarios, revealing varying concerns. Full-time students worried about the difficulty of future math concepts, while working students feared falling behind in class. This finding suggests that students' life contexts and experiences influence their perceptions of math anxiety triggers. Recognizing these nuances is essential for tailoring support mechanisms to each student cohort's needs. Understanding these subtleties is crucial in customizing support systems to cater to the distinct requirements of individual groups of students.

Initial Attitudes Toward College Mathematics of Full-Time And Working First-Year College Students

The study operationally defined attitudes toward Mathematics as a comprehensive set of multi-dimensional responses characterizing first-year students' engagement in College Mathematics. The discussion encompassed an exploration of the emotional responses of both full-time and working students to College Mathematics, an examination of the perceived usefulness of the subject, and a thematic analysis of their comments aimed at uncovering the attitudes of first-year students toward College Mathematics. Examining these attitudes provides insights into pre-university preparation and educational experiences, offering opportunities for early intervention (Charalambides et al., 2023; Szczygieł, 2023; Navida, 2022; Alibraheim, 2021; Giannoulas et al., 2021; Kouvela et al., 2018)
Table 3 lists the initial feelings or emotions toward learning College Mathematics and shows the frequency and percentage of students who reported each emotion.

Table 3 *Initial Emotional Responses to Learning College Mathematics*

	Full-time Students		Working Students	
Emotional Responses	Frequency	%	Frequency	%
Excited	27	12%	24	20%
Nervous	55	25%	17	14%
Happy	30	14%	23	19%
Sad	12	5%	6	5%

Confident	22	10%	17	14%
Scared	26	12%	13	11%
Angry	8	4%	4	3%
Anxious	28	13%	11	9%
Others	14	6%	3	3%
Grand Total	222	100%	118	100%

Table 3 suggests that full-time students may experience more anxiety and fear when initially exposed to College Mathematics compared to working students. Working students approach College Mathematics more positively, as indicated by the higher percentages of 'excited' and 'happy' responses. The similarity in the rates of 'sad' and 'confident' responses between the two groups could indicate commonalities in specific emotional experiences despite differences in their overall emotional profiles. Research by Giannoulas and Stampoltzis (2021) and AlMuharraqi and George Toworfe (2018) stressed the critical role of emotions in shaping attitudes toward mathematics. Negative and positive emotions significantly influenced how students perceived, engaged with, and succeeded in math. The observed differences in emotional responses between full-time and working students highlight the importance of addressing students' emotional experiences to foster positive attitudes toward mathematics and improve academic performance in College Mathematics.

Table 4 displays the frequency and percentage distribution of the perceived usefulness ratings of college mathematics among first-year college students.

Table 4 *Perceived Usefulness Ratings Among First-Year College Students for College Mathematics*

	Full-time Students		Working Students	
Perceived Usefulness	Frequency	%	Frequency	%
Not at all	5	5%	2	3%
Slightly	15	14%	1	2%
Fair	29	27%	19	30%
Much	33	31%	17	27%
Very Much	25	23%	24	38%
Grand Total	107	100%	63	100%

Table 4 indicates that working students perceived college mathematics as more useful than full-time students, likely influenced by its practical application in the workplace. It calls for further exploration into how real-world application impacts students' perceptions of mathematics, particularly among working students. Conversely, full-time students tend to view mathematics as less useful, echoing previous findings (Charalambides et al., 2023; Burazin et al., 2020), which attribute this perception to a formalistic view of mathematics and difficulty in connecting it to daily life or future careers. However, it is essential to note that these explanations may primarily apply to full-time students in our study, as working students exhibit a distinct pattern of perceived usefulness, emphasizing the influence of practical application. This divergence emphasizes the importance of considering different student groups' unique perspectives when interpreting attitudes toward college mathematics, highlighting the need for further exploration into the practical application of mathematics in the workplace for working students.

Thematic Insights on Student Attitudes

Understanding students' attitudes toward College Mathematics is crucial for improving the learning experience. Valuable perspectives have emerged through a thematic analysis of comments voluntarily shared by respondents along with the administered online survey.

The thematic analysis of students' comments uncovered seven distinctive themes, reflecting the experiences of full-time and working students:

1. Perceived Difficulty and Concerns (Full-time Students): Students expressed concerns about the difficulty of math and their basic skills.
2. Desire for Success and Improvement (Full-time Students): Full-time students desire to succeed and improve in math.
3. Need for Assistance and Self-doubt (Full-time Students): There were indications of self-doubt and requests for extra help among full-time students.
4. Perceived Importance and Positive Attitude (Working Students): Working students recognized the importance of math and expressed positivity towards improving their skills.
5. Appreciation for Instructor and Teaching Style (Working Students): Working students appreciated the instructor's teaching style and clarity of explanations.
6. Request for Homework and Practical Examples (Working Students): Working students requested more homework and practical examples to aid learning.
7. Hope for Future Ease in Math-related Classes (Working Students): Working students expressed hope for future math-related classes to become easier and clearer.

The findings derived from the thematic analysis significantly complemented and validated the quantitative data collected in our study. The nuanced insights obtained through students' comments offered qualitative depth to the quantitative measures, enriching our overall understanding of their attitudes and concerns toward College Mathematics.

Full-time students exhibited a higher frequency of negative emotions, as reflected in their comments expressing concerns about math difficulty and self-doubt. On the other hand, working students demonstrated a positive attitude towards improving math skills, appreciating the instructor's teaching style, and requesting practical examples for better understanding. Both groups desired success in math but may require different types of assistance. Full-time students needed more support and assistance with basic math skills and exam readiness, and while working, students prioritized practical applications and appreciated clear explanations and homework assignments.

The students' comments highlighted the crucial role of faculty in shaping their College Mathematics experiences. It aligns with existing research emphasizing the faculty's pivotal role in guiding students through the math learning process. Faculty support, clear guidance, and practical examples play a vital role in establishing a positively conducive learning environment in College Mathematics, underscoring the need for ongoing support and innovative teaching approaches (Alibraheim, 2021; Burazin, 2020).

Conclusion and Recommendations

The study sheds light on the initial math anxiety levels and attitudes toward college mathematics among first-year full-time and working students in the UAE, revealing important insights for educators and institutions. Students exhibited varying degrees of math anxiety at the start of their College Mathematics course, highlighting the critical nature of this early period. Working students reported higher levels of math anxiety than full-time students, possibly due to the added stress of balancing work and study responsibilities. Both groups expressed fear of math tests but had varying concerns, with full-time students fearing the difficulty of future math concepts and working students worrying about falling behind.

Despite reporting higher anxiety levels, working students displayed a more positive view of math's practical application, suggesting a greater appreciation for its real-world relevance. Full-time students demonstrated more negative emotional responses to math, reflecting uncertainty about its relevance to their future.

Recognizing that intervention is not a one-size-fits-all approach, UAE educational institutions should develop customized support systems to address the varying degrees of math anxiety exhibited by full-time and working students at the start of their College Mathematics course. It underscores the necessity for tailored interventions and support mechanisms to alleviate math anxiety among first-year students transitioning to higher education. Likewise, incorporating practical math applications into the curriculum could benefit both groups by making math feel more relevant and less intimidating within the UAE educational context. Teaching methods should be supportive and responsive to students' emotional and practical needs, emphasizing the crucial role of faculty in shaping positive math learning experiences in the UAE.

The study provides insights into the varying levels of math anxiety between full-time and working first-year college students in the UAE. It draws on the importance of supportive teaching methods and the significant role of faculty in shaping students' experiences with math within the UAE educational context. By exploring first-year students' attitudes and challenges towards college mathematics in the UAE, the paper contributes to understanding math anxiety in transitioning to college, advocating for specific support mechanisms to enhance learning experiences.

Limitations of the Study: Our study provides valuable insights into the initial math anxiety levels and attitudes among first-year full-time and working students in the UAE; it's important to acknowledge certain limitations. The cross-sectional design provides only a snapshot of participants' math anxiety levels and attitudes during the early weeks of the semester. Thematic analysis of qualitative data introduces interpretative subjectivity. The selection of respondents was based on their willingness to participate online, which could have resulted in a limited population representation. The study's scope is limited to first-year students in a specific academic year and location, impacting generalizability. Additionally, unequal representation of full-time (107) and working students (63) may affect comparisons. While the Math Anxiety Self-Test is reliable, it is not without potential biases.

Future Research Work and Study

Future research directions should address several key areas identified in this study. Firstly, there is a pressing need to delve into the distinct challenges and specific needs of working students in mathematics, given their dual work and study responsibilities. Understanding how their experiences and the practical application of math in their work life influence their academic performance and attitudes toward the subject could inform tailored support mechanisms. Additionally, exploring the implications of the 'Not Sure' category in students' self-reported math anxiety levels is crucial. Understanding this category could provide valuable insights into students' academic experiences and feelings toward mathematics, guiding interventions, and support strategies.

Moreover, there is a call for more studies on the impact of real-world application on students' perceptions of mathematics, particularly among working students. Investigating how real-world contexts affect their learning

experience and appreciation of the subject could inform curriculum development and teaching strategies. Lastly, a deeper investigation into the role of emotions in shaping attitudes toward mathematics and its impact on academic performance is warranted. Future research could focus on strategies to foster positive emotional responses among students, improving their engagement and success in math courses.

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