Environment and Social Psychology (2024) Volume 9 Issue 11
doi: 10.59429/esp.v9i11.3166

RESEARCH ARTICLE

Examining teaching practices of mathematics and science instructors: Potential factors in increasing anxiety among students

Aina P. Gervacio*

Teacher Education, Biliran Province State University, Biliran, 6566, Philippines

*** Corresponding author:** Aina P. Gervacio, Ainagervacio16@gmail.com

ABSTRACT

Anxiety in higher education students is often exacerbated by unnoticed teaching methods in science and mathematics classes. This study seeks to identify specific teaching strategies that unintentionally heighten student anxiety and examines how these practices contribute to increased anxiety levels. Using semi-structured interviews, data were collected from 40 students currently enrolled in higher education institutions across the Biliran, Philippines. Thematic analysis was applied to systematically identify recurring themes and patterns in the students' responses, offering insights into the factors that trigger anxiety in these subjects. The research highlighted that many instructors were unaware that their teaching methods could induce anxiety. The findings outlined the specific stages of teaching activities where anxiety intensified, helping educators understand how students experienced and internalized anxiety throughout the learning process. The results of this study had significant implications for enhancing instructional approaches in science and mathematics. By identifying anxiety-inducing teaching methods, the research offered practical recommendations to minimize anxiety in the classroom setting, contributing to improved student performance and overall well-being. This study also paved the way for future research into anxiety-inducing teaching methods across various academic disciplines, promoting a broader understanding of the impact of teaching practices on student mental health.

Keywords: learning anxiety; mathematics learning; science learning; teaching practices

1. Introduction

Educators serve as pivotal catalysts in influencing and enhancing student achievement. Traditional teaching methods, particularly those centered on the teacher, often reflect a one-directional transmission of knowledge, where the educator imparts information with limited opportunities for student interaction[1]. This instructional approach, although commonly utilized, may restrict active participation and engagement from learners. By focusing primarily on lecture-based delivery, this model leaves little room for collaborative learning or the development of critical thinking skills. As education continues to evolve, it becomes crucial to adopt more learner-centered approaches, which encourage students to take a more active role in their educational journey. Transitioning to interactive methodologies not only enhances student engagement but also leads to better learning outcomes.

ARTICLE INFO
Received: 18 October 2024 | Accepted: 15 November 2024 | Available online: 11 December 2024

CITATION
Fabrao MCC, Examining teaching practices of mathematics and science instructors: Potential factors in increasing anxiety among students *Environment and Social Psychology* 2024; 9(11): 3166. doi:10.59429/esp.v9i11.3166

Instructional practices, defined as the systematic techniques and strategies employed by educators during interactions with students, are critical in shaping the learning environment[2]. These methods are especially significant in subjects like mathematics, where instructors not only convey complex concepts but also guide students in managing and improving their learning processes[3]. Effective teaching requires meticulous lesson planning and the appropriate use of educational materials. Instructors must also adapt their teaching styles to address the diverse learning needs of their students, ensuring inclusivity. Moreover, the ability of educators to personalize lessons and address real-world applications can significantly boost student motivation and engagement. Sensitivity to individual student circumstances creates a supportive environment that is conducive to long-term academic success.

The educational process is comprised of three core components—curriculum, instruction, and assessment—each of which plays a vital role in the holistic development of students. The curriculum outlines the essential knowledge students must acquire, instruction determines how this knowledge is delivered, and assessment evaluates students' understanding and progress[4]. These elements are interdependent, and their effective integration is key to achieving educational success. A well-structured curriculum ensures that students are exposed to relevant and timely knowledge, while appropriate instructional strategies facilitate effective learning. Simultaneously, continuous assessment provides valuable insights into student performance, enabling timely interventions when necessary. When these components work in harmony, they provide a well-rounded educational experience that promotes both intellectual and personal growth[5].

Despite the recognition of more progressive teaching methodologies, many educators still adhere to traditional views that treat knowledge as a static entity, easily transmitted from teacher to student without modification[6]. This perspective often results in students being passive recipients, primarily focusing on listening and note-taking while the teacher presents information. Such an approach can limit the opportunities for active learning, critical analysis, and application of knowledge. In today's rapidly evolving world, education must shift towards cultivating critical thinkers and problem-solvers. Engaging students in discussions, collaborative projects, and experiential learning activities helps them apply theoretical knowledge in real-world contexts. Ultimately, fostering a more interactive learning environment prepares students for the complexities of the modern workforce.

Further, higher education students face numerous stressors that contribute to anxiety, which, if not managed properly, can significantly impair academic performance[7]. Various academic and personal challenges, if left unaddressed, can exacerbate students' anxiety, adversely affecting their success in examinations and coursework[8,9]. The growing prevalence of anxiety in universities has become a major concern, as it directly impacts both academic outcomes and students' mental health[10]. Institutions must recognize the critical role of mental health in academic success and implement comprehensive support systems. Providing access to counseling services, stress management workshops, and peer support programs can alleviate anxiety-related issues. Addressing these concerns holistically not only improves student well-being but also contributes to their overall academic achievement.

This study sought to determine the teaching practices employed by mathematics and science instructors and how these practices might have contributed to increased anxiety among students. Specifically, the research aimed to identify which teaching strategies and instructional methods in these subjects were perceived by students as anxiety-inducing. Furthermore, teachers might not always have been aware that their practices or activities caused anxiety among students. This study aimed to assess these teaching practices and the specific teaching activities that contributed to heightened anxiety.

This paper focused on the processes by which teaching practices escalated anxiety levels, particularly among higher education students. The findings offered valuable guidance for educators in refining their teaching methods to create more supportive and anxiety-sensitive learning environments.

2. Literature review

The emergence of Education 4.0 in the Philippines marks a significant transition towards improving the global standards of classroom instruction at all levels of education. This transformation underscores the critical role that teachers play in influencing decisions that lead to optimal teaching and learning outcomes. Continuous professional development is recognized as essential for educators, helping them to refine their skills and, consequently, elevate the quality of instruction and the development of students[11]. Teachers, as key agents of educational change, must embrace ongoing learning to keep up with the evolving demands of education, ensuring that their practices align with both global standards and the specific needs of their learners.

One vital aspect of teachers' continuous professional development is the implementation of Lesson Study (LS), a well-established model originating from Japan that benefits both educators and students. Lesson Study allows teachers to enhance their pedagogical knowledge, improve their mastery of content, and refine their teaching methods[12]. It fosters a collaborative environment where educators can critically assess and strengthen their classroom strategies. By providing a space for reflection and peer evaluation, LS supports teachers in creating more effective learning experiences for their students. Such professional development models are crucial as they offer a structured means for teachers to continuously evolve in their instructional methods.

In recent years, mental health concerns in the Philippines have risen, particularly exacerbated by the COVID-19 pandemic. Approximately 35.89% of the Filipino population exhibited moderate to severe anxiety symptoms during the pandemic[13]. Young adults, especially, are among the most vulnerable populations in this regard, as mental health issues often develop during this critical period of their lives[14]. Prior to the pandemic, around 16% of children were already experiencing mental health disorders. In academic environments, local studies have revealed that between 35% and 47.2% of students are at risk for depression and anxiety[15]. This growing mental health crisis highlights the need for effective mental health support systems within educational institutions to ensure that students can continue to thrive academically despite these challenges.

Numerous studies have noted a significant increase in the mental health struggles faced by young adults, especially in the context of higher education. The COVID-19 pandemic, in particular, heightened levels of anxiety, depression, and stress among university students[16,17]. These mental health issues have long-lasting impacts on students' academic performance and well-being, reinforcing the need for institutions to provide appropriate interventions. Mental health services must be an integral part of the support structure within universities, ensuring that students receive the help they need to overcome anxiety and perform to their full potential.

Anxiety, a natural human emotion, is often triggered by feelings of uncertainty or fear, especially when individuals perceive an event as threatening to their self-esteem. Anxiety can manifest as either a temporary state or a more persistent trait, depending on its duration. Students are particularly susceptible to anxiety, as they face various pressures related to academics, tests, and major life decisions[18]. According to Phanphec and Gibbs[19], anxiety negatively affects students' academic performance. Furthermore, Fawaz et al.[20] highlight that anxiety is inversely related to student success, as it disrupts students' ability to achieve

cognitive and emotional milestones, especially in remote learning environments. Addressing anxiety in educational settings is thus critical for fostering student success.

Math anxiety is a specific form of anxiety characterized by feelings of tension and worry that arise when students are confronted with mathematical tasks. This condition is prevalent among students and has become a growing concern for educators who strive to promote student comfort, well-being, and achievement[21]. If left unaddressed, math anxiety can severely impair a student's ability to grasp mathematical concepts, leading to lower academic performance and fostering a negative attitude towards the subject. Teachers play an important role in identifying and alleviating math anxiety to ensure that students can approach mathematics with confidence and enthusiasm.

Research has shown that math anxiety can develop as early as the first grade and persist into adulthood, affecting not only academic performance but also career choices[22]. In the United States, nearly two-thirds of adults report some level of fear or discomfort with mathematics, regardless of their background or culture[23]. Adults who experience math anxiety often find it challenging to navigate both daily and academic tasks, highlighting the far-reaching effects of this issue[22]. Given the early onset and long-lasting consequences of math anxiety, it is crucial for both educators and parents to understand its causes and implement strategies to mitigate its impact on students' learning experiences.

Similarly, anxiety related to science has also been found to significantly hinder students' academic performance. Science anxiety can diminish students' interest in pursuing scientific studies and affect their overall school attendance[24]. The challenging nature of science-related subjects, coupled with the complexity of the material, often heightens students' anxiety levels. As a result, students with high levels of science anxiety tend to struggle academically and may shy away from further scientific education or careers. Addressing science anxiety is essential for fostering a more inclusive and supportive learning environment where students feel empowered to succeed in science.

3. Methods

3.1. Research design

This study employed a qualitative exploratory research design to determine the teaching strategies in science and mathematics that inadvertently lead to heightened anxiety among students. Exploratory research, as Chavez[25] notes, serves as the foundation for more conclusive studies by providing an initial understanding of the phenomenon under investigation. This approach allows for an in-depth examination of participants' experiences, which is essential for identifying anxiety-inducing factors in instructional practices. Furthermore, the design enabled a comprehensive exploration of how specific teaching practices may contribute to student anxiety in these disciplines.

3.2. Population and sampling

The population for this study comprised 40 higher education students currently enrolled in institutions within the Biliran, Philippines. A purposive sampling technique was employed to select participants, ensuring that those who had recent experience with science and mathematics classes were included. This sampling method was chosen to ensure that the participants were directly exposed to the teaching practices being studied, as purposive sampling is effective for studies requiring focused insights[26]. The selection criteria also considered diversity in terms of academic performance and anxiety levels, as these factors could influence perceptions of teaching methods.

3.3. Instrument

Data were collected using semi-structured interviews, which incorporated open-ended, probing, and follow-up questions to gain deeper insights into students' experiences with anxiety during Mathematics and Science classes. Chavez and Ceneciro[27] emphasized that semi-structured interviews are effective for collecting narrative data as they allow participants to express their thoughts freely while enabling researchers to probe further for clarification and additional detail. The interview guide was specifically designed to address the study's objectives, focusing on identifying anxiety-inducing teaching practices and understanding the process through which these practices exacerbate anxiety. Participants were encouraged to elaborate on their initial responses, providing a more nuanced understanding of the factors contributing to their anxiety. **Table 1** presents the interview guide questions used in gathering the responses from students.

Table 1. Final interview guide questions.

Research Objectives	Interview questions
Determine the teaching strategies and teaching practices which increase anxiety among students.	1. What specific teaching strategies do you find anxious during mathematics and science classes? 2. Can you describe how certain teaching practices increase your anxiety? 3. What particular teaching activity do you think heightens your anxiety during mathematics and science classes?
Determine the process of how teaching strategies and teaching practices increase anxiety among higher education students.	4. On what particular part of the process of the teaching activity do you find it anxious? 5. How does anxiety develop during the teaching activity?

3.4. Data gathering procedure

The data collection process adhered to strict ethical guidelines to ensure the safety, security, and confidentiality of all participants. Prior to conducting the interviews, participants were fully informed of the study's purpose, and consent was obtained in line with ethical research practices[25]. Ethical considerations were rigorously upheld, with participants reassured that the data collected would remain confidential, and they were informed that no physical or psychological harm would occur during the study. The interviews were conducted over a two-week period and were scheduled at times convenient for the participants, ensuring that the process was respectful of their academic commitments.

3.5. Data analysis

Thematic analysis was employed to analyze the data collected from the interviews. This method allowed for the identification and interpretation of recurring themes and patterns in the participants' responses, as suggested by Chavez[28]. The analysis process involved multiple stages, including identifying key themes related to anxiety-inducing teaching practices, and interpreting the relationship between these practices and students' anxiety levels. This systematic approach helped ensure that the data were thoroughly examined, providing insights into both the teaching strategies that trigger anxiety and the specific stages of teaching activities where anxiety tends to intensify. The findings were then cross-verified with existing literature to ensure reliability and accuracy, further strengthening the study's conclusions.

4. Results

Objective 1. Determine the teaching strategies and teaching practices which increase anxiety among students.

Theme 1: Spot Solving

Twenty-four (24) participants expressed that cold calling and on-the-spot problem-solving in class significantly heighten their anxiety. They explained that being asked to answer questions without prior

warning makes them feel pressured and unprepared, particularly when they are unsure of the answer or fear making a mistake in front of their peers. This teaching strategy creates stress as they feel judged and under a spotlight, leading to nervousness and self-doubt.

> "For me, it's definitely those 'on-the-spot' problem-solving situations that get me."
>
> "They teach quickly then call or choose random students to answer their question in class."
>
> "Cold calling is the worst! I'm already nervous about the material, and then the teacher calls on me unexpectedly."
>
> "In these classes, one of the most known teaching strategy that makes students anxious in class was on the spot solving of problems."
>
> "I've always found cold calling in class to be a major source of anxiety. Being randomly selected to answer a question in front of everyone feels like a spotlight is on me."
>
> "One strategy that increases my anxiety is when instructors use surprise quizzes or test."
>
> "The random and on the spot recitation to solve problems given are one of the particular teaching activity that heightens my anxiety during these classes."
>
> "When we are asked to solve problems in front of the class, I get anxious about each step of the process."

Theme 2: Fast-Paced Instruction

Twenty (20) participants shared that the fast-paced nature of teaching, where instructors move through topics rapidly without ensuring understanding, increases their anxiety. They emphasized that this teaching strategy leaves them feeling overwhelmed and underprepared, particularly in complex subjects like mathematics and science. This results in a sense of falling behind, which only adds to their stress and anxiety.

> "When teachers move through topics too quickly without ensuring that everyone has grasped the lesson, it makes me anxious because it feels like I'm falling behind."
>
> "Fast-paced lectures: When lecturers talk so quickly, it's as if they're speaking a different language! I feel like I'm always trying to catch up."
>
> "Fast-paced instruction may leave students feeling overwhelmed, unable to keep up, which can also contribute to feelings of anxiety."
>
> "Lastly, when teachers move quickly from one topic to another without allowing time for questions or clarifications."
>
> "Another anxiety-inducing strategy is when instructors heavily rely on group work without assigning clear roles."
>
> "When teachers move too quickly through topics, I feel overwhelmed"

Theme 3: Time-pressure

Sixteen (16) participants mentioned that timed assessments, such as quizzes or exams, create anxiety due to the limited time to process complex problems. They explained that the pressure to complete tasks within strict time constraints adds stress, as they are often unable to fully engage with the material. This teaching strategy makes them feel rushed, leading to mistakes and a fear of receiving lower grades.

> "One strategy that increases my anxiety is when instructors rely heavily on timed assessments, like quizzes or exams."
>
> "For instance, when we are given only 10-15 minutes to solve complex accounting-related math problems."
>
> "In my mathematics class, the teacher often announces a pop quiz just as the class starts, giving us only 10 minutes to solve complex calculus problems."
>
> "Memorization of formulas and procedures which is really difficult… it's stressful because I thought, what if I make a mistake in the formula which I used?"
>
> "I get anxious when there's a timer for activities, especially in Science and Mathematics because I need enough time to analyze the given question or problem."
>
> "Timed practical exams where we need to complete tasks or solve problems within a strict timeframe make me feel rushed and panicked."

Theme 4: Presentations

Twelve (12) participants expressed that public speaking and presentations in math and science classes significantly contribute to their anxiety. They noted that delivering reports or solutions in front of their peers, especially when they feel unprepared or unsure, adds pressure. This anxiety is compounded by the fear of being questioned by the teacher afterward, which can lead to embarrassment or humiliation if they cannot provide accurate answers.

> "The worst thing was the teacher will ask questions after your report. To test your knowledge… some humiliates students if they can't answer or if they made a mistake."
>
> "Public speaking, such as presenting solutions or findings in front of peers, can trigger social anxiety."
>
> "In these situations, I worry that I may not fully understand my part, and the responsibility of explaining my section to the group adds pressure."
>
> "Solving given problems in front of the class is one factor that makes me anxious"
>
> "When students are being evaluated in front of the class and eventual face significant consequences for their performance makes me feel anxious, what if I'm next?"
>
> "Significantly raises my anxiety levels. For instance, in my science class, the teacher often calls on students without warning"
>
> "I fear making mistakes or not solving the problem correctly under pressure."

> "Honestly, when instructors call students to solve problems in front of the class… I feel anxious because I fear making mistakes."
>
> "Fear of Public Speaking, many people feel nervous about speaking in front of others, especially when it involves complex topics like math and science."
>
> "The teaching activity that heightens my anxiety the most is when I'm asked to perform oral presentations or explain mathematical concepts in front of the class."
>
> "Sometimes I can't express what I want to share properly because my thoughts are unstable."

Theme 5: Competitive Learning Environment

Twenty (20) participants conveyed that a competitive atmosphere within the classroom contributes to their anxiety. The drive to outperform peers creates stress and distracts from collaborative learning, leading them to focus more on individual achievements than on understanding the material collectively.

> "A competitive environment within the classroom… creates a stressful and anxiety-inducing atmosphere."
>
> "The fear of getting it wrong in front of everyone causes me anxiety."
>
> "It's hard to relax and participate when you're worried about letting your group down."
>
> "The fear of getting it wrong in front of everyone causes me anxiety."
>
> "It felt like everyone was competing, and I'd get super stressed out about my grades."

Objective 2. Determine the process of how teaching strategies and teaching practices increase anxiety among higher education students.

Theme 1: Sharing Ideas

Twelve (12) participants shared that group discussions or moments when they are required to share their thoughts cause significant anxiety. They worry about how well they can express their ideas and whether their classmates will judge them if they don't articulate their thoughts clearly. This pressure often prevents them from fully engaging or sharing their best insights.

> "For me, the most anxiety-inducing part is the 'share' part… It's hard to relax and just share your thoughts when you're worried about being judged."
>
> "During group discussions, when the instructor comes around and listens to my explanation or asks follow-up questions, I feel a lot of pressure to be correct and thorough in my answers."

Theme 2: Negative Perceptions

Twelve (12) participants expressed that they feel anxiety when they are directly observed by teachers, especially when their work or answers are being evaluated in real-time. This included moments such as solving problems in front of the class or being assessed while working on tasks. The fear of making mistakes and being corrected in front of peers increases their anxiety significantly.

> "The pressure intensifies when I know the instructor is evaluating my work on the spot, as it feels like I'm being judged in real time."

"I was confident giving an answer, but I was corrected. The teacher's intentions may not to humiliate me, but it crashed all the self-confidence that I have."

"What if they laugh at me? What if they think I'm stupid?"

"What if I say something wrong? Will my teacher get mad at me or will my classmates laugh at me?"

"If the feedback is negative, it can further reinforce feelings of inadequacy and anxiety."

"Fear of judgment from peers and instructors can contribute to feelings of inadequacy and apprehension."

"Anxiety develops due to fear of negative evaluation, pressure to perform, and unpredictability in the classroom."

Theme 3: Low Confidence

Twenty (20) participants reported that anxiety builds during teaching activities when they lack confidence in their understanding of the subject matter. This lack of confidence makes students feel unsure about their ability to complete tasks, participate in discussions, or solve problems in front of others. As a result, they become anxious about failing or being unable to keep up with the lesson, especially in subjects that require precision or involve complex concepts.

"My mind starts racing, trying to figure out the problem. But then the doubt creeps in: 'What if I can't solve it?'"

"Anxiety develops when the given activity during the teaching-learning process is too much for the students' current ability."

"I start feeling anxious about not fully understanding the material, especially when the instructor introduces a complex topic."

"When I encounter complex concepts…my anxiety starts to build as the instructor moves quickly to the next topic."

"The uncertainty of whether my understanding is correct or if I'm following along with the lessons properly builds anxiety."

5. Discussion

Objective 1. Determine the teaching strategies and teaching practices which increase anxiety among students.

Academic institutions are primarily responsible for ensuring that students engage with their lessons, often by assigning tasks and preparing educators to engage actively with their students[26]. However, the practice of cold-calling, where students are asked questions unexpectedly, tends to increase anxiety and decrease student participation. This method, despite its intentions to improve student performance, often causes more harm than good by negatively impacting student engagement[29]. The potential negative consequences of cold-calling emphasize the importance of creating learning environments that encourage voluntary participation, minimizing undue stress on students.

The emphasis on quick pace of daily life has been linked to rising stress levels, and this connection is particularly evident in the academic environment, where students experience the pressure of keeping up with

fast-paced instruction[30]. Increased stress, especially among students, is closely tied to a lower sense of satisfaction with life[31]. In support of this, research underscores the need for educational settings to pace lessons in ways that prioritize student well-being while maintaining academic rigor.

Typically, instructors bear the responsibility for assessing student learning, predominantly using summative assessments. These assessments gather information from various sources to develop a comprehensive understanding of student performance and provide feedback for enhancing future educational practices[32]. This focus on summative methods, while useful for evaluating progress, can create intense pressure on students, particularly when time constraints are a significant factor. Such pressures can impact student learning and performance, underscoring the need for a balance between timed assessments and alternative assessment methods.

The study highlights that students often experience significant anxiety and fear when confronted with public speaking or debate scenarios. In such situations, uncertainty can intensify these emotions, leading to apprehension about communication[33]. Anxiety, which is future-oriented and stems from uncertainty, contrasts with fear, which is more present-focused and arises from perceived certainty of negative outcomes[33]. This dynamic between anxiety and fear during presentations highlights the importance of fostering a supportive environment where students can develop their public speaking skills without excessive pressure.

The emphasis on practice of science inherently involves uncertainty due to the processes of inquiry, critique, and exploration of multiple potential solutions[34]. This unpredictability in teaching practices can cause anxiety among students, particularly when they are unsure of the outcomes or methods being applied. Encouraging a culture of learning that embraces uncertainty as part of the academic experience can help students navigate these challenges with greater confidence.

Students, particularly in secondary and tertiary education, are regularly exposed to stressors related to academic expectations. This stress often leads to disruptions in sleep, with academic demands contributing to poor sleep quality in young people[35]. The ongoing pressure to perform well in public and academic settings underlines the need for institutions to address the impact of stress on students' overall well-being.

In the educational sphere, limited access to high-quality resources and students' personal aspirations contribute to a competitive atmosphere. This competition is a reality that many students must confront as they strive to achieve their educational goals[36]. The competitive nature of the learning environment can exacerbate feelings of anxiety, making it crucial for educators to foster collaboration alongside healthy competition.

Young people often face immense pressure to meet or exceed academic standards. This pressure is intended to positively influence their academic performance, yet it can have the opposite effect if it becomes overwhelming. The emphasis on time constraints in educational settings can exacerbate student anxiety, especially when unrealistic expectations are placed on them to achieve high results within limited timeframes.

In higher education settings, oral presentations are a common form of assessment that requires students to engage verbally in both small and large group environments. However, many students experience significant fear when it comes to public speaking[37]. This fear can hinder their academic progress, suggesting that institutions should offer more support to students as they develop their communication skills in public settings.

Anxiety related to testing and coursework can have a direct impact on the grades students achieve in high-stakes examinations. For some students, this anxiety can serve as a motivator, leading to improved

focus and performance. However, for others, it can be debilitating, causing procrastination, difficulty concentrating, and a lack of effective study habits[38]. The differing effects of anxiety on academic performance highlight the need for tailored approaches to assessment that consider the individual responses of students to stress.

Objective 2. Determine the process of how teaching strategies and teaching practices increase anxiety among higher education students.

Anxiety and stress can significantly affect students' performance, particularly in academic areas such as mathematics[39,40]. With the growing concern over student anxiety in higher education, it is essential for institutions to provide environments that reduce stress during collaborative activities, such as group discussions. Doing so can improve both the emotional and academic outcomes for students.

The emphasis on Anxiety remains a significant challenge for students, impacting their academic performance, productivity, and overall achievement. The size of the class can influence how students manage their anxiety, with both large and small class sizes offering opportunities for peer support and confidence-building[41]. Addressing the influence of classroom dynamics on anxiety levels is vital for improving student engagement and success.

Students often struggle with a lack of confidence when it comes to expressing their ideas or communicating with others. Even though many students are capable of critical thinking and creativity, anxiety can prevent them from effectively sharing their opinions[42]. This difficulty in communication highlights the importance of addressing anxiety as a barrier to academic success, especially in fostering environments where students feel empowered to speak up.

The fear of negative evaluation is a significant source of anxiety for students in active learning settings. This fear often arises in social contexts, such as asking or answering questions during class or participating in group work. Some aspects of active learning can either alleviate or worsen this fear, influencing how students perceive and respond to feedback[43]. Understanding how students experience and react to evaluations can help educators design strategies that reduce fear and promote constructive feedback in learning environments.

6. Conclusion

This research underscored the critical relationship between teaching practices and student anxiety, particularly within subjects like mathematics and science. The findings indicated that methods such as cold calling, timed assessments, and surprise quizzes contributed significantly to heightened stress levels among students, often leading to feelings of inadequacy and discouragement in classroom participation. Students reported that these pressure-inducing strategies hindered their ability to engage meaningfully with the material, shifting their focus from learning to merely avoiding mistakes. Moreover, the study highlighted that public speaking, group presentations, and peer evaluations acted as significant triggers of anxiety, often leaving students feeling self-conscious and vulnerable. Such experiences diminished their confidence and overall performance, illustrating a disconnect between teaching methods and effective learning environments.

To address these challenges, it is imperative for educators to adopt more supportive teaching practices that minimize anxiety. Implementing strategies such as flexible assessments, ample preparation time, and fostering a nurturing classroom atmosphere can significantly alleviate student stress. However, this study has limitations, including the focus on a specific demographic of college students, which may not represent the broader student population. Therefore, future research should explore diverse educational contexts and develop innovative, anxiety-reducing strategies tailored to various subjects and student needs. By doing so,

we can foster not only academic success but also a healthier and more inclusive learning environment that prioritizes student well-being.

Conflict of interest

The authors declare no conflict of interest.

References

1. Ullah, Z., Saba, N., Imran, S., Abouzar, M., Fazil, M., & Daraz, S. (2021). An Examination Of Teachers' Instructional Practices Fostering Student's Engagement. Webology (ISSN: 1735-188X), 18(6).
2. Uibu, K., Salo, A., Ugaste, A., & Rasku-Puttonen, H. (2021). Observed teaching practices interpreted from the perspective of school-based teacher educators. European Journal of Teacher Education, 46(2), 203–221. https://doi.org/10.1080/02619768.2021.1900110
3. Mohamed, R. H., Khalil, I. A., & Awaji, B. M. (2023). Mathematics teachers' awareness of effective teaching practices: A comparative study. Eurasia Journal of Mathematics, Science and Technology Education, 19(2), em2230. https://doi.org/10.29333/ejmste/12962
4. Fontanos, N., Gonzales, J. F., Lucasan, K., & Ocampo, D. S. (2020). Revisiting flexible learning options (FLOs) in basic education in the Philippines: Implications for senior high school (SHS). UP CIDS Education Research Program.
5. Ogena, E. B., Yeban, F. I., Balagtas, M. U., Bedural, Z. L., Benoza, B. E., & Atienza, B.P. (2020). Education Imperative for the New Normal: Planning for Flexible Learning. Manila: Private Education Assistance Committee
6. Tan, Y.S.M., Caleon, I.S. (2023). The Influence of Science Teachers' Beliefs and Practices on Students' Learning Spaces and Processes: Insights from Singapore. In: Maulana, R., Helms-Lorenz, M., Klassen, R.M. (eds) Effective Teaching Around the World . Springer, Cham.https://doi.org/10.1007/978-3-031-31678-4_28.
7. Assuncao, W.C. (2020). Anxiety and depressive behaviors in university students. https://doi.org/10.14295/vittalle.v32i1.11153
8. Lisnyj, K.T., Russell, R.M., & Papadopoulos, A. (2020). Risk and protective factors for anxiety Impacting academic performance in post-secondary students. Canadian Journal of Higher Education
9. Sumeera, & Khan, Muhsin & Ilyas, Muhammad & Abro, Paras & Ahmed, Naveed. (2024). Exploring the Factors of Anxiety Affecting Students' Academic performance: A Study of Higher Education Institution of Larkana. Voyage Journal of Educational Studies. 4. 68-82. 10.58622/vjes.v4i1.117
10. Gabriel X.D. Tan, Xun Ci Soh, Andree Hartanto, Adalia Y.H. Goh, Nadyanna M. Majeed, Prevalence of anxiety in college and university students: An umbrella review, Journal of Affective Disorders Reports, Volume 14,100658. https://doi.org/10.1016/j.jadr.2023.100658.
11. Bautista, RG., Benigno, VG., Camayang, JG., Ursua, JC., Agaloss, CG., Ligado, FNG., & Buminaang, KN. (2017). Continuing professional development Program as evidenced by the lenses of QSU licensed professional teachers. American Journal of Educational Research, 5(11), 1172-1176.
12. Bayram İ. & Bıkmaz F. (2021). Implications of Lesson Study for Tertiary-Level EFL Teachers' Professional Development: A Case Study From Turkey. SAGE Open.
13. Mendoza NB, Dizon JIWT. (2022). Prevalence of severe anxiety in the Philippines amid the COVID-19 outbreak. J Loss Trauma, 27, 1–3. DOI: 10.1080/15325024.2021.2023298
14. Malolos GZC, Baron MBC, Apat FAJ, Sagsagat HAA, Pasco PBM, Aportadera ETCL, et al.. Mental health and well-being of children in the Philippine setting during the COVID-19 pandemic. Health Promot Perspect. (2021) 11:267–70. Doi: 10.34172/hpp.2021.34
15. Alibudbud R. Academic experiences as determinants of anxiety and depression of filipino college students in metro Manila. Youth Voice J. (2021) 11:1–21.
16. Debowska A, Horeczy B, Boduszek D, Dolinski D. A repeated cross-sectional survey assessing university students' stress, depression, anxiety, and suicidality in the early stages of the COVID-19 pandemic in Poland. Psychol Med. (2020) 52:1–8. Doi: 10.1017/S003329172000392X
17. Hoyt LT, Cohen AK, Dull B, Maker Castro E, Yazdani N. "Constant stress has become the new Normal": stress and anxiety inequalities among U.S. college students in the time of COVID-19. J Adolesc Health. (2021) 68:270–6. Doi: 10.1016/j.jadohealth.2020.10.030.
18. Ajmal, M.; Ahmad, S. Exploration of Anxiety Factors Among Students of Distance Learning: A Case Study of Allama Iqbal Open University. Bull. Educ. Res. 2019, 41, 67–78.
19. Phanphec, P., Taniteerapan, T., Mungkung N.,.(2022) An Analysis of Student Anxiety Affecting on Online Learning on Conceptual Applications in Physics: Synchronous vs. Asynchronous Learning. https://doi.org/10.3390/educsci12040278

20. Fawaz, M.; Samaha, A. E-Learning: Depression, Anxiety, and Stress Symptomatology among Lebanese University Students During COVID-19 Quarantine. Nurs. Forum 2021, 56, 52–57.
21. Tartaro, D. M. (2023) "Math Anxiety Research Paper," Transformations: Vol. 9: Iss. 1, Article 6. Available at: https://nsuworks.nova.edu/transformations/vol9/iss1/6
22. Pantoja, N., Schaeffer, M. J., Rozek, C. S., Beilock, S. L., & Levine, S. C. (2020). Children's Math anxiety predicts their math achievement over and above a key foundational math skill. Journal of Cognition and Development, 21(5), 709-728. https://doi.org/10.1080/15248372.2020.1832098
23. Mitchell, K. M. (2018). Best practices to reduce math anxiety. Pepperdine university.
24. Fia, Stephen & Ayarkwa, Charles & Obuobi-Ayim, Thomas. (2022). Causes, Effects and Management of Science Anxiety among Senior High School Students in Old Tafo Municipality of Ghana. Open Journal of Psychology. 2. 46-57. 10.31586/ojp.2022.384
25. Chavez, J.V. (2022). Narratives of Bilingual Parents on the Real-Life Use of English Language: Materials for English Language Teaching Curriculum. Arab World English Journal (AWEJ) Volume 13. Number3. September 2022 Pp.325-338 DOI: https://dx.doi.org/10.24093/awej/vol13no3.21
26. Chavez, J., & Lamorinas, D. D. (2023). Reconfiguring assessment practices and strategies in online education during the pandemic. International Journal of Assessment Tools in Education, 10(1), 160-174.
27. Chavez, J. V., & Ceneciro, C. C. (2023). Discourse analysis on same-sex relationship through the lens of religious and social belief systems. Environment and Social Psychology, 9(1).
28. Chavez, J.V. (2020). Academic and Health Insecurities of Indigent Students during Pandemic: Study on Adaptive Strategies under Learning Constraints. Journal of Multidisciplinary in Social Sciences. 16(3): 74-81
29. Jones: Five tips for 'cold calling' in the classroom, Evidence-Based Education, 2023: https://tinyurl.com/2byktxwk
30. Melnikov, V. R., Krzhizhanovskaya, V. V., Lees, M. H., & Sloot, P. M. (2020). The impact of pace of life on pedestrian heat stress: A computational modelling approach. Environmental Research, 186, 109397. https://doi.org/10.1016/j.envres.2020.109397
31. Lippke, S., Schalk, T. M., Kühnen, U., & Shang, B. (2021). Pace of life and perceived stress in international students. PsyCh Journal, 10(3), 425-436.
32. Adzima, K. (2020). Examining online cheating in higher education using traditional classroom cheating as a guide. Electronic Journal of E-Learning, 18(6), 476-493
33. Hasibuan, A. R., & Irzawati, I. (2020). Students' speaking anxiety on their speaking performance: A study of EFL learners.
34. Starrett, E., Jordan, M., Chen, Y. C., Park, J., & Meza-Torres, C. (2024). Desirable uncertainty in science teaching: Exploring teachers' perceptions and practice of using student scientific uncertainty as a pedagogical resource. Teaching and Teacher Education, 140, 104456.
35. Pascoe, M. C., Hetrick, S. E., & Parker, A. G. (2019). The impact of stress on students in secondary school and higher education. International Journal of Adolescence and Youth, 25(1), 104–112. https://doi.org/10.1080/02673843.2019.1596823
36. Li, G., Li, Z., Wu, X., & Zhen, R. (2022). Relations between class competition and primary school students' academic achievement: Learning anxiety and learning engagement as mediators. Frontiers in psychology, 13, 775213.
37. Grieve, R., Woodley, J., Hunt, S. E., & McKay, A. (2021). Student fears of oral presentations and public speaking in higher education: a qualitative survey. Journal of Further and Higher Education, 45(9), 1281-1293.
38. Howard, E. (2020). A review of the literature concerning anxiety for educational assessments. Ofqual: Coventry.
39. Inoferio, H. V., Espartero, M., Asiri, M., Damin, M., & Chavez, J. V. (2024). Coping with math anxiety and lack of confidence through AI-assisted Learning. Environment and Social Psychology, 9(5).
40. Soysal, D., Bani-Yaghoub, M., & Riggers-Piehl, T. A. (2022). Analysis of Anxiety, Motivation, and Confidence of STEM Students During the COVID-19 Pandemic. International Electronic Journal of Mathematics Education, 17(2).
41. Moneva, J. C., Acibar, L. B., & Monding, N. C. (2020). Class size and students' anxiety in oral recitation. Journal of Social Science Studies, 7(2).
42. Puspita, A. G. (2023). An Analysis of the Level of Students' Anxiety on Their Writing Skills. IREELL: Indonesian Review of English Education, Linguistics, and Literature, 1(2), 91-105.
43. Downing, V. R., Cooper, K. M., Cala, J. M., Gin, L. E., & Brownell, S. E. (2020). Fear of negative evaluation and student anxiety in community college active-learning science courses. CBE—Life Sciences Education, 19(2), ar20.