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RESEARCH ARTICLE

Experiential Learning Anxiety and Inducing motivation of learners in mathematics and science-oriented courses

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ABSTRACT

Anxiety in learning mathematics and science remains one of the most common emotional barriers that hinder student performance, confidence, and participation. While many studies have explored traditional interventions for improving academic outcomes, fewer have examined how experiential learning specifically addresses anxiety and motivates learners to engage meaningfully in these subjects. This study investigated how experiential learning strategies reduce learner anxiety and enhance motivation in mathematics and science-oriented courses, as observed by instructors from basic and higher education institutions in Calbayog City, Samar and Tagudin, Ilocos Sur, Philippines. Using a qualitative research design, data were gathered through online semi-structured interviews with twenty-five (25) instructors who had at least two years of teaching experience and practice in implementing experiential learning approaches. Thematic analysis identified recurring strategies that foster a positive and participatory classroom environment. The findings revealed that experiential learning activities such as collaborative problem-solving, hands-on experimentation, reflective debriefing, and real-world applications help normalize mistakes, reduce fear of failure, and cultivate confidence. As anxiety decreases, students exhibit higher motivation, improved persistence, and greater interest in problem-solving tasks. The study concludes that experiential learning provides an effective framework for enhancing both the emotional and cognitive dimensions of mathematics and science education.

Keywords: Experimental learning; anxiety, inducing; mathematics; science

1. Introduction

Mathematics and science serve as essential pillars of education that develop analytical reasoning, problem-solving, and innovation skills. In education, it develops students' ability to think deeply, deconstruct problems, and evaluate evidence to enhance academic performance and critical thinking skills. To promote innovation and creativity, it is essential to prioritize the development of problem-solving skills among learners [1-2]. Despite their importance, these subjects often generate fear and apprehension among learners, causing anxiety that interferes with concentration and performance [3-4] Students who perceive these

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disciplines as rigid, complex, or overly abstract tend to lose confidence, avoid participation, and disengage from learning activities. Such anxiety can hinder not only academic achievement but also the willingness to explore and appreciate the real-world value of these subjects [5].

The persistence of anxiety in mathematics and science classrooms has long been linked to conventional teaching approaches that emphasize memorization, correctness, and competition over comprehension and exploration. Traditional lectures and repetitive drills may deliver content effectively, but they often fail to cultivate emotional safety and learner confidence [6]. When students feel pressured to perform perfectly or fear making mistakes, learning becomes an intimidating process rather than an enjoyable one. This emotional burden affects learners' motivation, leading to diminished interest and avoidance behavior [7].

To address these challenges, educators have explored more student-centered pedagogies that promote active involvement and positive emotional experiences. One promising approach is experiential learning, which emphasizes learning through doing, reflecting, and applying knowledge in authentic contexts [8]. Instead of focusing solely on theoretical instruction, this method allows learners to connect abstract ideas to real-world situations through experiments, projects, and interactive problem-solving. Encouraging students to experience and reflect, experiential learning can help reframe anxiety as curiosity and transform fear of failure into opportunities for growth.

Experiential learning supports emotional engagement by integrating reflection and self-assessment into the learning process. When students are given the freedom to explore, make decisions, and apply lessons to practical situations, they become more motivated and confident in their abilities [9]. This sense of autonomy and accomplishment reduces anxiety levels and nurtures a mindset that views challenges as manageable. As learners become more comfortable in applying their knowledge, they not only strengthen their academic performance but also develop resilience and a positive attitude toward problem-solving in mathematics and science [10-11].

This study addressed the problem of persistent learner anxiety and low motivation in mathematics and science-oriented courses, particularly in contexts where traditional instruction emphasizes correctness, speed, and abstract reasoning. Although experiential learning has been widely promoted as a learner-centered pedagogy, there remains limited empirical evidence detailing how specific experiential practices are implemented by instructors to address anxiety and motivation within discipline-specific contexts such as mathematics and science.

This study examined how mathematics and science instructors employ concrete experiential learning practices to reduce learner anxiety and enhance motivation, focusing on classroom strategies, instructional sequencing, and emotional support mechanisms as observed through instructors' lived teaching experiences.

2. Literature review

Mathematics and science are subjects that require logical reasoning, problem-solving, and critical thinking. However, these same qualities often make them intimidating to learners, causing anxiety that negatively impacts motivation and performance [12-13]. This form of anxiety is not only cognitive but also emotional, students experience tension, fear, or mental blocks when faced with mathematical or scientific problems. Such reactions often stem from early negative experiences, strict evaluation methods, lack of encouragement, and fear of public mistakes. Over time, these feelings translate into avoidance behavior, low confidence, and disinterest in the subjects [14].

Academic anxiety in mathematics and science can manifest through physiological symptoms such as rapid heartbeat, sweating, or loss of concentration during problem-solving activities. These reactions reduce

working memory capacity, hindering the learner's ability to recall formulas or apply logical reasoning under pressure [15]. Social factors, such as fear of being judged by peers or teachers, further heighten this anxiety. Many students hesitate to ask questions or volunteer answers due to embarrassment, especially when the classroom culture values speed and accuracy over understanding. Likewise, repetitive testing and high-stakes assessments reinforce the perception that mistakes equate to failure, which discourages risk-taking and participation [16].

Traditional instruction in mathematics and science often relies on lectures, memorization, and teacher-centered delivery. While this structure can transmit content efficiently, it leaves little room for exploration or emotional support [17]. Learners are expected to absorb knowledge passively, which can alienate those who struggle to keep up with abstract concepts. When classroom interaction is limited to right-or-wrong questioning, students who fear mistakes become less active, and their anxiety intensifies [18]. Furthermore, limited contextualization of topics such as solving equations or memorizing formulas without understanding their real-world application makes learning feel disconnected and purposeless. This emotional and cognitive disconnect fuels boredom and reduces internal motivation.

Experiential Learning provides a transformative framework for addressing both the emotional and cognitive barriers associated with traditional instruction. It emphasizes learning by doing, reflection, and practical application, thereby allowing students to directly engage with the learning process [19]. Through experiences such as simulations, experiments, or field-based problem-solving, learners construct knowledge from real situations instead of memorizing abstract information. This active process helps reframe anxiety by focusing on discovery rather than perfection [20]. For example, students who handle materials in a laboratory or explore real-life data in mathematics are more likely to develop curiosity and confidence, as they see learning as exploration, not evaluation.

Experiential learning reduces anxiety by creating low-pressure, high-engagement environments. Learners become active participants rather than passive listeners, and this shift restores their sense of control and competence [21]. When they can physically manipulate variables in an experiment or explore math concepts using real-life examples, their perception of difficulty diminishes. Reflection, an integral component of experiential learning, also helps students process emotions tied to performance anxiety. Analyzing what went well and what can be improved, learners gain self-awareness and resilience [22]. Classroom routines such as cooperative learning, guided discovery, and real-world project applications encourage students to collaborate, share solutions, and learn from peers without fear of ridicule.

Teacher's critical role in managing this process is their behavior such as modeling calmness, validating mistakes, and encouraging dialogue, directly influences how learners perceive academic challenges [23]. Teachers who apply experiential techniques often begin with accessible, low-stakes tasks before progressing to more complex activities. This gradual exposure helps learners build confidence and reduces stress triggers. For instance, students may start by solving simple real-life measurement problems before transitioning to more abstract algebraic modeling. The progressive difficulty allows students to feel successful early on, lowering their anxiety threshold and fostering persistence [24].

Motivation is closely tied to how learners perceive their ability to succeed. Experiential learning naturally enhances motivation because it aligns learning with real-world relevance and personal meaning. When learners see that mathematical and scientific principles explain daily phenomena such as budgeting, environmental issues, or technology, they become more invested in understanding these subjects [25]. Furthermore, hands-on experiences foster autonomy, competence, and relatedness; three psychological needs

that support intrinsic motivation [26]. Students are more likely to exert effort when they feel ownership of their learning process and experience satisfaction from overcoming real challenges.

Experiential learning also encourages collaboration, a factor strongly linked to sustained motivation. Working in groups helps learners exchange ideas and witness different ways of thinking, reducing isolation and fear of failure [27]. Cooperative learning environments build social support, where success is shared and mistakes become opportunities for discussion rather than embarrassment. Reflection sessions, project debriefings, and feedback cycles allow learners to evaluate their progress and set achievable goals, reinforcing their belief in self-improvement [28].

The emotional environment of the classroom strongly influences how experiential learning impacts anxiety and motivation. Teachers who build mutual respect, empathy, and inclusiveness create spaces where learners feel valued regardless of ability level. Activities that celebrate effort, curiosity, and creativity help dismantle the stigma of failure [29]. Wininger et al. [30] highlighted that when learners are assured that mistakes are normal and valuable for understanding, their anxiety naturally decreases. Instructors' openness to multiple learning styles like visual, auditory, kinesthetic, and reflective also allows diverse learners to engage according to their strengths.

Combining active engagement with emotional support, experiential learning promotes holistic growth. Learners begin to associate mathematics and science with accomplishment and curiosity instead of tension or fear [31]. Over time, their confidence and motivation extend beyond academic settings, shaping positive attitudes toward learning in general.

Overall, the literature highlights that experiential learning transforms both emotional and cognitive aspects of learning mathematics and science. It reduces anxiety by replacing fear-driven behaviors with confidence-building experiences and enhances motivation by providing meaningful, relevant, and interactive learning opportunities. Teachers are the central role in facilitating these experiences, shaping classroom environments where students feel empowered to explore and participate. However, there remains a need to further examine how instructors specifically implement these strategies in different educational contexts and how these practices influence the balance between emotional well-being and academic performance.

3. Methodology

3.1. Research design

This study utilized a qualitative research design employing online semi-structured interviews to explore how experiential learning strategies influence student anxiety and motivation in mathematics and science-oriented courses. The qualitative approach allows for in-depth exploration of instructors' lived experiences, classroom practices, and reflective insights [32-33]. A thematic analysis was conducted to identify recurring patterns and significant themes associated with learner anxiety, classroom engagement, and motivational responses in actual educational settings.

This study examines how experiential learning strategies reduce anxiety and foster motivation among students enrolled in mathematics and science-oriented courses. It centers on the perspectives of instructors from selected basic and higher education institutions in Calbayog City, Samar, and Tagudin, Ilocos Sur, Philippines. Specifically, the research looks into how teachers apply experiential activities to create supportive classroom environments that minimize anxiety and promote engagement. The investigation is limited to qualitative data gathered via semi-structured interviews with instructors who have integrated experiential learning practices. The scope includes two areas: identifying experiential teaching approaches that reduce anxiety, and analyzing how these approaches contribute to higher motivation and participation.

3.2. Population and sampling

The target population of the study consisted of twenty five (25) mathematics and science Instructors from selected basic and higher education institutions in Calbayog City, Samar, and Tagudin, Ilocos Sur, Philippines. Participants were identified through coordination with school administrators and department heads, who recommended instructors known to incorporate experiential or hands-on learning activities in their classes.

Purposive sampling was employed to ensure that participants possessed direct instructional experience relevant to the phenomenon under investigation. Purposive sampling allows the selection of participants who possess direct knowledge or experience with the phenomenon being studied [34]. Inclusion criteria required that instructors (1) taught mathematics or science-related subjects, (2) had implemented experiential learning activities such as real-world problem-solving, hands-on experiments, or collaborative tasks, and (3) had a minimum of two (2) years of teaching experience.

The two-year teaching experience criterion was used to ensure that participants had sufficient classroom exposure to reflect meaningfully on instructional practices and student responses, while also allowing inclusion of early-career instructors who actively adopt innovative pedagogies. This balance supported the study's aim of capturing practical, classroom-based experiential teaching practices. Participants were drawn from public and private Higher education institutions. Mathematics instructors taught subjects such as elementary algebra, linear algebra, statistics, and quantitative reasoning, while science instructors handled general science, physics, chemistry, and laboratory-based courses.

3.3. Instrument

The study used a researcher-developed interview guide as the main instrument for data collection. It consisted of two sets of open-ended questions aligned with the study's objectives. Open-ended questioning provides opportunities for respondents to share deeper perspectives and richer descriptions of their experiences [35]. The first set focused on identifying the teaching practices and experiential learning strategies that educators employ to reduce students' anxiety in mathematics and science classes. The second set examined how reduced anxiety through experiential learning can promote student motivation and participation in problem-solving activities. Table 1 presents the interview guide questions used in this study.

Table 1. Interview guide questions.

Objectives	Interview questions
1. Determine the teaching practices and experiential learning strategies that teachers use to reduce learners' anxiety in mathematics and science-oriented courses	1. How do you create a classroom atmosphere where learners feel less anxious in mathematics and science? 2. What experiential learning activities or strategies have you used that helped reduce students' anxiety? 3. Why do you think these experiential strategies are effective in reducing anxiety?
2. Examine how reduced anxiety through experiential learning can induce motivation and engagement of learners in mathematics and science problem solving.	1. From your experience, what are the common sources of learners' anxiety in mathematics and science? 2. How do you motivate anxious learners to participate actively in problem-solving tasks? 3. How do you manage students who lose focus or interest in mathematics and science due to anxiety?

3.4. Data gathering procedure

Data were collected through individual online semi-structured interviews to allow participants to share detailed instructional experiences without peer influence. Each interview lasted approximately 20-35 minutes.

Interviews were scheduled at the participants' convenience and conducted using secure video conferencing platforms such as Zoom or Google Meet.

All interviews followed the approved interview guide while allowing follow-up probes to elicit concrete examples of experiential learning practices in mathematics and science instruction. With participants' consent, interviews were audio-recorded for transcription and analysis. Ethical standards, including voluntary participation, confidentiality, and informed consent, were strictly observed. Upholding ethical research standards such as confidentiality, voluntary participation, and informed consent is vital to maintaining data integrity and trustworthiness [36].

3.5. Data analysis

The collected data were analyzed using a systematic thematic analysis procedure following established qualitative research guidelines. The use of thematic analysis enabled a clear interpretation of qualitative data and ensured that each theme accurately represented the views of the participants [37]. All interview recordings were transcribed verbatim prior to analysis. The analysis proceeded in four explicit stages to ensure transparency and methodological rigor.

First, the researchers conducted repeated readings of the transcripts to achieve data familiarization and identify initial meaning units related to experiential learning practices, learner anxiety, and motivation. Second, open coding was applied to segments of text that reflected concrete instructional actions, emotional responses, and learning outcomes. Codes such as real-life problem contextualization, collaborative algebra tasks, hands-on experimentation, fear of public mistakes, and confidence through reflection were generated directly from participants' statements. Third, related codes were grouped into broader categories and refined into major themes through constant comparison across participants. These themes included: (1) normalization of errors through experiential tasks, (2) scaffolded problem-solving in mathematics, (3) hands-on inquiry in science learning, (4) reduced performance pressure through collaboration, and (5) enhanced motivation through learner autonomy.

Finally, the identified themes were validated by cross-checking them against the original transcripts to ensure consistency and accurate representation of participants' experiences. To strengthen analytic credibility, representative verbatim excerpts were retained and integrated into the Results section to illustrate how each theme emerged from the data. Below is the Table 2 presents a summary of the coding framework and emergent themes derived from the thematic analysis of interview transcripts.

Table 2. Thematic Coding

Analytical Focus	Initial Codes	Code Category	Themes
Anxiety Reduction	Fear of wrong answers, hesitation in algebra	Emotional learning barriers	Mathematics-related anxiety
Experiential Learning Strategy	Real-life budgeting tasks, group equation-solving	Experiential instructional practices	Scaffolded experiential problem-solving
Science Learning Experience	Hands-on experiments, guided inquiry	Active learning processes	Anxiety reduction through inquiry-based experimentation
Learner Motivation	Choice of task context, peer collaboration	Autonomy and social support	Enhanced motivation and engagement

4. Results

Research Objectives 1. Determine the teaching practices and experiential learning strategies that teachers use to reduce learners' anxiety in mathematics and science-oriented courses.

Question No. 1. How do you create a classroom atmosphere where learners feel less anxious in mathematics and science?

1.1 *Normalize mistakes and sharing struggle*

Ten (10) respondents expressed that algebra as a primary source of student anxiety, particularly when learners were introduced to multi-step linear equations involving symbolic manipulation. For instance, one teacher described how students initially struggled with solving systems of linear equations due to fear of making errors in sign changes and substitution. To address this, the instructor implemented collaborative problem-solving activities where learners first modeled equations using real-life budgeting scenarios before transitioning to symbolic representations. This experiential sequencing reduced anxiety by allowing students to grasp the concept concretely before engaging with abstract algebraic notation.

> "I try from Day 1 to tell the students: it's OK to make mistakes. In fact, mistakes are where we learn. I share examples of my own struggles in math as a student, just so they see that nobody is perfect."

> "I also use more group work so that students can help each other; pairing up weaker students with those who understand lets them ask small questions without everyone looking."

1.2 *Safe and respectful classroom culture*

Ten (10) respondents shared that they notice many of their students are quiet or avoid questions because they are afraid of being teased or looked at. To address this, they begin the year by co-creating clear classroom norms for respect with their students and making it explicit that no one will be ridiculed for trying or giving wrong answers. Additionally, they mentioned that they also begin classes with warm-ups that are low-stakes fun puzzles or observation tasks that are not graded heavily. This helps lighten the mood before diving into more difficult content. They also try to give extra attention to those who are falling behind, maybe in extra tutorial sessions, or invite them to ask questions after class. Some don't speak up in front of the class, so offering one-on-one helps. It reduces social anxiety triggers and students feel more comfortable to speak up.

> " I notice many of my students are quiet or avoid questions because they are afraid of being teased or looked at."

> "I also begin classes with warm-ups that are low-stakes—fun puzzles or observation tasks that are not graded heavily. This helps lighten the mood before diving into more difficult content."

1.3 Teacher self-awareness

Five (5) respondents expressed that as a mathematics lecturer, they try to model calmness. If they make an error in class, they correct it without drama, and showing that even experts slip up and that checking their work is normal in mathematics. By speaking about errors as opportunities for insight and allowing students to revise their own answers without penalty, they reinforce that productive struggle is part of real learning. By seeing that, students feel less fear of being exposed. Additionally, they shared that they incorporate different modes of learning like visual, symbolic, hands-on, sometimes software tools. For example, in linear algebra, using geometry or software visualization helps those who struggle with abstract symbolic parts. They also slow their pace and give thought time to signal that speed is not the main goal, and they thank

students for contributing even when their answers are incomplete or incorrect. Over time, these practices reduce their fear of being exposed and create a classroom culture where taking intellectual risks feels safe.

> "As a mathematics lecturer, I try to model calmness. If I make an error in class, I correct it without drama, showing that even experts slip up and that checking our work is normal in mathematics."

> "I incorporate different modes of learning — visual, symbolic, hands-on, sometimes software tools. For example, in linear algebra, using geometry or software visualization helps those who struggle with abstract symbolic parts."

Question No. 2. What experiential learning activities or strategies have you used that helped reduce students' anxiety?

2.1 *Student Choice & Voice*

Ten (10) respondents expressed that they let students choose which real-world scenario to apply the math to like budgeting, sports stats, or social media analytics so it feels less like a test and more like relevance. Sometimes they prepare several word problems with the same underlying math but different contexts and let them pick which one to solve. For statistics, they allow students to even bring their own data sets such as basketball scores, K-pop streams, mobile game ratings so the work feels personal and non-threatening. Additionally, they mentioned that this has made them more confident when writing essays and emails because they were actively learning, not just passively accepting corrections. It feels like having a personal tutor who is patient enough to explain the same concept as many times as they need.

> " I let students choose which real-world scenario to apply the math to like budgeting, sports stats, or social media analytics so it feels less like a test and more like relevance."

> " This has made me more confident when writing essays and emails because I'm actively learning, not just passively accepting corrections."

2.2 *Collaborative Problem-Solving*

Ten (10) respondents expressed that instead of individual tasks, they set up small-group challenges where students talk through the solution together, which lowers individual pressure and allows peer support. They assign rotating roles like recorder, presenter, or checker so everyone contributes without feeling singled out, and they mix students of different abilities so they can support each other. They begin with low-stakes tasks and gradually move to more complex problems, and they guide groups with clear prompts so no one dominates. Additionally, they mentioned that rather than grading individuals, they focus on the process and teamwork, and they make a point of celebrating small wins. All of this helps create a cooperative environment where students feel safe to try, make mistakes, and learn together.

> " Instead of individual tasks, I set up small-group challenges where students talk through the solution together, which lowers individual pressure and allows peer support."

> " Rather than grading individuals, I focus on the process and teamwork, and I make a point of celebrating small wins."

2.3 Reflective Debrief

Five (5) respondents mentioned that after a hands-on activity, they always give students a quiet minute to note down their thoughts before sharing. This pause allows shy students to collect their ideas and reduces

speaking anxiety. Sometimes they offer prompts like a question to answer, a diagram to complete, or a quick checklist to guide their reflection. Additionally, they mentioned that they also let them pair-share first before speaking to the whole class, so they rehearse their answers with a peer. They don't grade these notes instead they're purely for processing and confidence-building. This small routine helps turn whole-class discussions from intimidating to manageable, especially for quieter learners.

> "After a hands-on activity, I always give students a quiet minute to jot down their thoughts before sharing."
>
> "I also let them pair-share first before speaking to the whole class, so they rehearse their answers with a peer."

Question No. 3. Why do you think these experiential strategies are effective in reducing anxiety?

3.1 *Ownership increases motivation*

Ten (10) respondents expressed that allowing choice like picking a scenario to apply the concept gives students a sense of control. This control not only reduces performance pressure but also makes the activity feel less like a rigid test and more like an exploration. Because the task connects to their own interests or experiences, students are more motivated, confident, and willing to take risks. Additionally, they mentioned that instead of everyone doing the same rigid exercise, each student works on something personally meaningful, so it feels like exploring rather than being evaluated. They not only let students choose the scenario but also how they present their work (poster, oral explanation, graph, or code). This flexibility allows them to show understanding in a way that feels comfortable.

> *"Allowing choice—like picking a scenario to apply the concept—gives students a sense of control."*
>
> *" Instead of everyone doing the same rigid exercise, each student works on something personally meaningful, so it feels like exploring rather than being evaluated."*

3.2 *Group efforts build confidence*

Ten (10) respondents expressed that when students work in groups or on real-life problems, they feel they're 'in it together' instead of being singled out. They create a supportive environment where mistakes are seen as part of the group process rather than individual failure. This lowers the fear of being wrong in front of everyone. Additionally, they mentioned that no one is singled out, students can test ideas, ask questions, and take intellectual risks without the fear of public embarrassment. Real-life problems also shift the focus from 'getting the right answer' to 'finding a workable solution,' which naturally lowers anxiety and builds teamwork.

> " When students work in groups or on real-life problems, they feel they're 'in it together' instead of being singled out."
>
> "No one is singled out, students can test ideas, ask questions, and take intellectual risks without the fear of public embarrassment."

3.3 Reflection time give time to think

Five (5) respondents expressed that reflection time after the activity helps students gather their thoughts before speaking. For shy students, that pause is crucial to lessen public-speaking anxiety. This pause turns a high-pressure 'answer now' moment into a thoughtful response opportunity. It also encourages deeper processing of what they just learned, not just quick recall. Additionally, they mentioned that students can

note down notes, sketch a diagram, or rehearse a phrase, which boosts their confidence when sharing aloud. Even extroverted students benefit because their answers are more considered. Over time, these low-stakes reflection moments help normalize speaking up and reduce public-speaking anxiety.

> "Reflection time after the activity helps students gather their thoughts before speaking. For shy students, that pause is crucial to lessen public-speaking anxiety."
>
> " Students can jot down notes, sketch a diagram, or rehearse a phrase, which boosts their confidence when sharing aloud."

Research Objectives 2. Examine how reduced anxiety through experiential learning can induce motivation and engagement of learners in mathematics and science problem solving.

Question No. 1. From your experience, what are the common sources of learners' anxiety in mathematics and science?

Fear of making mistakes publicly

Ten (10) respondents expressed that many of their students worry about giving wrong answers in front of the class. In math and science, where answers can be exact, they're afraid of embarrassment. Many of them have experienced being corrected harshly or even laughed at in the past, which makes them hesitant to speak up. The added pressure of answering in front of peers especially when some classmates respond very quickly intensifies this anxiety and leads to constant self-comparison. Additionally, they mentioned that some students also worry that making mistakes will lower the teacher's impression of them or cost them points in a high-stakes environment. Without a classroom culture that treats errors as part of learning, they conclude that it's safer to stay silent than to risk embarrassment.

> " Many of my students worry about giving wrong answers in front of the class. In math and science, where answers can be exact, they're afraid of embarrassment."
>
> " Some students also worry that making mistakes will lower the teacher's impression of them or cost them points in a high-stakes environment."

1.2 *Time pressure during tests*

Five (5) respondents expressed that Timed quizzes and problem sets increase anxiety. Even students who understand the topic freeze when the clock is ticking. The countdown makes them rush, skip steps, or second-guess themselves. Many panic when they see others finishing faster, which can cause them to blank out completely. Additionally, they mentioned that some also feel that time pressure favors quick recall rather than deep reasoning, so they become frustrated and anxious. This is especially hard on students who need more processing time, or struggle with test-taking in general. In the end, they may know the concepts but can't show it accurately because the timer amplifies their fear of mistakes.

> " Timed quizzes and problem sets increase anxiety. Even students who understand the topic freeze when the clock is ticking."
>
> " Some also feel that time pressure favors quick recall rather than deep reasoning, so they become frustrated and anxious."

1.3 *Complexity of concepts and language*

Ten (10) respondents expressed that Scientific terms and multi-step math problems overwhelm students. They get anxious when they can't immediately see how ideas connect. The students usually get anxious because they're juggling too much in decoding new vocabulary, remembering formulas, and applying several

steps in sequence. When they can't instantly see how the pieces fit together, they feel lost. Additionally, they mentioned that many of their students also struggle with the technical language used in textbooks or lab manuals even if they understand the concept informally, the formal terms intimidate them. This cognitive overload makes them afraid to start solving a problem for fear they'll get stuck halfway.

> "Scientific terms and multi-step math problems overwhelm students. They get anxious when they can't immediately see how ideas connect."

> "Many of my students also struggle with the technical language used in textbooks or lab manuals even if they understand the concept informally, the formal terms intimidate them. "

Question No. 2. How do you motivate anxious learners to participate actively in problem-solving tasks?

2.1 Giving simple or low-stakes problem

Ten (10) respondents expressed that they start with very simple, low-stakes problems. When students experience success early, their confidence builds. Gradually, they increase the complexity of the problem given so the students don't feel overwhelmed right away. They also often solve examples together first, then let students try on their own. Additionally, they mentioned that early problems are framed as practice rather than graded work, and are often collaborative so no one feels singled out. They also make deliberate connections to previously learned skills and provide immediate positive feedback after small wins. Through incremental scaffolding students gain confidence and are less likely to feel overwhelmed as the problem-solving tasks grow more challenging.

> " I start with very simple, low-stakes problems. When students experience success early, their confidence builds."

> "Early problems are framed as practice rather than graded work, and are often collaborative so no one feels singled out."

2.2 Multiple ways to solve problems

Five (5) respondents expressed that they allow multiple solution paths. They emphasize creativity over speed. Anxious learners participate more when they know there isn't only one 'correct' way to solve the task. They motivate anxious learners by emphasizing that there are multiple ways to approach a problem and that creativity is as important as accuracy. They invite students to explain how they reached their answers and give partial credit for well-reasoned attempts. Additionally, they mentioned that they also model different approaches themselves and praise interesting or unusual methods to show that originality is valued. Flexible time limits for exploratory work further reduce the pressure to be fast, helping anxious students participate more confidently and thoughtfully in problem-solving tasks.

> " I allow multiple solution paths. I emphasize creativity over speed. Anxious learners participate more when they know there isn't only one 'correct' way to solve the task."

> " I also model different approaches myself and praise interesting or unusual methods to show that originality is valued."

2.3 Building supportive room environment

Ten (10) respondents expressed that they build a supportive peer culture. Early in the semester, they set norms that have no ridiculing, respectful listening, and constructive feedback. This creates a classroom climate where anxious learners feel safe to try. They model calm and respectful responses themselves, use

structured peer feedback protocols that begin with positive comments, and quickly intervene if ridicule or dismissive behavior occurs. Additionally, they mentioned that thoughtful pairing or small-grouping, rotating roles in activities, and incorporating community-building tasks early on help students see one another as allies rather than competitors. Celebrating effort and persistence alongside correct answers reinforces the norm that trying is valued, creating a classroom climate where anxious learners feel safe to take risks.

> " "I build a supportive peer culture. Early in the semester, I set norms that have no ridiculing, respectful listening, and constructive feedback."

> "Thoughtful pairing or small-grouping, rotating roles in activities, and incorporating community-building tasks early on help students see one another as allies rather than competitors."

Question No. 3. How do you manage students who lose focus or interest in mathematics and science due to anxiety?

3.1 Allowing collaboration with classmates

Ten (10) respondents expressed that they keep assessments low-stakes at first. Instead of graded quizzes, they let students work in pairs to solve a problem on the board. This way, they learn from each other and don't feel they're under a microscope. Once they build confidence, they gradually increase the challenge. Additionally, they mentioned that they sometimes post optional challenge problems for those ready for more, while others build confidence at their own pace. Gradually, as their comfort grows, they rotate who writes on the board and slowly increase the difficulty. This routine of no-stakes practice, peer support, and positive feedback helps anxious learners regain focus and interest in mathematics and science.

> " I keep assessments low-stakes at first. Instead of graded quizzes, I let students work in pairs to solve a problem on the board."

> "I sometimes post optional challenge problems for those ready for more, while others build confidence at their own pace."

3.2 Model your own problem-solving out loud

Ten (10) respondents shared that when students look overwhelmed, they normalize the struggle by sharing their own mistakes and how they solved them. It helps reduce their fear of failure. They also offer 'math consultations' outside class so they can ask questions privately without feeling judged. Additionally, they mentioned that they also share stories of famous mathematicians and scientists who failed many times before succeeding to show that setbacks are normal. They make it a point to praise good questions, not just correct answers, and provide flexible consultation times in person or online. These strategies build a culture where mistakes are seen as opportunities, reducing fear of failure and helping students regain confidence.

> " When students look overwhelmed, I normalize the struggle by sharing my own mistakes and how I solved them."

> "I also share stories of famous mathematicians and scientists who failed many times before succeeding to show that setbacks are normal. "

3.3 Pause-and-reflect breaks

Five (5) respondents mentioned that sometimes students lose focus because the lesson pace is too fast. They insert small interactive activities like quick polls, drawing diagrams, or group mini-experiments. These break the monotony and give anxious learners a chance to participate without the pressure of giving the

'right' answer. Additionally, they shared that they also pause after explaining key points and give students a minute to note down or discuss ideas with a seatmate, so they can process information before moving on. Sometimes they ask students to stand up and move to different corners of the room to indicate their answers or opinions, which keeps energy up and offers a nonverbal way to engage. These varied strategies slow the pace naturally, reduce anxiety, and help students stay focused on mathematics and science.

> "Sometimes students lose focus because the lesson pace is too fast. I insert small interactive activities like quick polls, drawing diagrams, or group mini-experiments."

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5. Discussion

This study examined how experiential learning strategies influence students' anxiety levels and motivation in mathematics and science-oriented courses, based on the insights and classroom experiences of instructors from basic and higher education institutions in Calbayog City, Samar, and Tagudin, Ilocos Sur. The discussion follows the study's two primary objectives.

Experiential learning practices reduced anxiety when instructors deliberately embedded concrete mathematical and scientific problem situations within structured instructional sequences. In mathematics instruction, teachers reported that student anxiety was most evident during algebraic problem-solving tasks involving multi-step linear equations, symbolic manipulation, and sign operations. To address this, instructors first introduced algebraic concepts through real-life contexts such as household budgeting, resource allocation, and basic financial planning, allowing students to model numerical relationships concretely before transitioning to abstract symbols. For example, students were asked to represent monthly expenses using simple tables and verbal explanations before expressing these relationships as systems of linear equations. This progression minimized cognitive overload and reduced fear associated with abstract algebraic notation.

In science-oriented courses, anxiety commonly emerged during laboratory tasks that required precise measurements, hypothesis formulation, or interpretation of experimental results. Teachers mitigated this anxiety by implementing guided inquiry activities where learners conducted hands-on experiments with clearly defined steps, collaborative roles, and opportunities for revision. For instance, instead of assessing immediate accuracy, instructors allowed students to repeat measurements, discuss discrepancies, and reflect on procedural errors. This experiential structure reframed mistakes as part of scientific inquiry rather than indicators of failure.

The findings demonstrate that anxiety reduction did not result from experiential learning as a general pedagogical label, but from discipline-specific practices that directly addressed the inherent challenges of mathematics and science content. Instructors' accounts consistently emphasized that experiential learning was effective only when problematic situations such as solving algebraic equations or conducting laboratory experiments were intentionally scaffolded and contextualized. These practices transformed abstract difficulty into manageable tasks, reinforcing student confidence and engagement.

The first objective was to identify teaching practices and experiential strategies that instructors use to help reduce learners' anxiety in mathematics and science. From the interviews, a recurring idea emerged: teachers observed that establishing a supportive and non-threatening atmosphere greatly helps lessen student

stress. Learners become more comfortable participating when they feel accepted, even when their answers are not entirely correct. This observation aligns with prior studies that emphasize the importance of emotional security in enabling learners to engage more actively in academic exploration [38]. When students perceive their environment as encouraging, they are more likely to attempt complex tasks without fear of embarrassment [39].

The instructors' narratives indicate that experiential learning lowered anxiety through discipline-specific practices rather than through general activity engagement alone. In mathematics classes, anxiety was reduced when learners engaged in scaffolded algebraic problem-solving that began with real-life contexts before advancing to symbolic manipulation. In science-oriented courses, hands-on laboratory experiments and guided inquiry activities enabled students to interact directly with concepts, reducing fear associated with abstract explanations and performance pressure. These concrete instructional practices clarify how experiential learning operates within mathematics and science to support anxiety reduction. These methods invite learners to interact with lessons through real-life tasks and shared activities, turning abstract topics into meaningful experiences [40]. Teachers highlighted that when students participate in collaborative and practical learning sessions, they appear more focused and less tense. Experiential strategies allow learners to enjoy the learning process, which helps reduce stress and improves concentration on academic tasks.

Teachers also stressed that experiential learning builds learner confidence and self-direction. Activities that encourage discovery and exploration strengthen students' belief in their ability to learn independently. This sense of control lessens fear and promotes emotional stability, two factors that are often disrupted in traditional classroom settings [41]. Instructors explained that when students experience success through guided exploration, they begin to develop resilience and a more positive view of mathematics and science [42].

The second objective focused on understanding how the reduction of anxiety through experiential learning enhances student motivation and engagement. Many instructors described anxiety as a barrier that prevents learners from expressing their ideas or solving problems confidently. Common causes include fear of making mistakes, previous discouraging experiences in school, and pressure to achieve perfect grades. These emotional blocks often limit students' willingness to participate or explore unfamiliar concepts.

When teachers implemented interactive and low-pressure activities, students demonstrated greater participation and perseverance. Instructors noticed that learners who were once hesitant to answer questions became more vocal and curious when lessons included movement, group sharing, or experimentation [43]. Anxiety reduction through such experiences encouraged openness and active problem-solving, which improved both confidence and classroom engagement.

Motivation also improved when students understood how mathematics and science apply to real-life challenges. When lessons connect with community issues, environmental observations, or daily situations, learners see relevance and purpose in what they study [44]. This awareness fosters intrinsic motivation, helping students develop genuine interest rather than relying solely on grades or external approval. Purposeful learning experiences strengthen curiosity and persistence, leading to sustained academic improvement.

Instructors further described effective ways to manage students who lose focus or become anxious during class. They used strategies such as dividing lessons into smaller, manageable tasks, providing feedback focused on progress, and allowing flexible assessments that evaluate understanding instead of memorization. Such adjustments give learners a sense of accomplishment and reduce the fear of failure [45]. Teachers observed that continuous encouragement and empathy also help maintain motivation and focus.

The findings demonstrate that experiential learning does not automatically reduce anxiety or increase motivation; rather, its effectiveness depends on deliberate instructional design that responds to subject-specific cognitive and emotional demands. In mathematics, experiential practices were effective only when abstract concepts were systematically connected to concrete representations and real-life problem contexts. In science-oriented courses, anxiety reduction and motivation enhancement occurred when experimentation emphasized inquiry, reflection, and process over immediate correctness. These results confirm that experiential learning contributes to motivation and emotional regulation only when integrated with clear pedagogical intent and disciplinary relevance.

6. Conclusion

This study addressed the problem of persistent learner anxiety and low motivation in mathematics and science-oriented courses by examining how experiential learning practices are implemented by instructors to manage these challenges. Guided by the perspectives of mathematics and science teachers from selected basic and higher education institutions in Calbayog City, Samar, and Tagudin, Ilocos Sur, the findings show that anxiety in these subjects is primarily linked to fear of making mistakes, difficulty with abstract and multi-step concepts—particularly algebra—and pressure associated with performance-based classroom practices.

The results demonstrate that experiential learning contributes to anxiety reduction only when applied through concrete, subject-specific practices. In mathematics instruction, instructors reported that anxiety decreased when algebraic and statistical concepts were introduced through real-life contexts, scaffolded problem-solving, and collaborative tasks that allowed learners to move gradually from concrete representations to abstract symbolic forms. In science-oriented courses, anxiety was reduced when learners engaged in hands-on experiments and guided inquiry activities that emphasized exploration over immediate correctness. These practices directly addressed the sources of anxiety identified by instructors, rather than merely increasing classroom activity.

Consistent with the study's second objective, reduced anxiety was associated with increased learner motivation, reflected in greater willingness to participate, sustained engagement in problem-solving tasks, and improved persistence when facing difficulty. Motivation did not emerge from experiential learning as a general teaching approach, but from specific features such as learner autonomy, peer collaboration, and low-stakes opportunities to make and reflect on mistakes. These elements helped reposition mathematics and science learning from high-risk evaluation to manageable exploration.

Overall, the study confirms that experiential learning can address anxiety and motivation in mathematics and science education when it is deliberately aligned with disciplinary challenges and emotional barriers. The findings emphasize the need for instructors to design experiential practices that respond directly to the nature of mathematical and scientific tasks. While the study is qualitative and context-specific, it provides clear evidence that emotionally supportive, discipline-based experiential learning practices are central to improving learner engagement in mathematics and science-oriented courses.

Conflict of interest

The authors declare no conflict of interest

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