

ANALYSIS OF STUDENTS' PERCEIVED SCIENCE TEST ANXIETY AT ELEMENTARY LEVEL

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Abstract

The present study aimed to investigate the analysis of students' perceived science test anxiety at the elementary level, with a specific focus on examining the gender-based differences in the perception of science test anxiety among students. This quantitative research utilized a survey as the primary data collection method and focused on the population of all government schools in the Multan district. From this extensive population, a sample of 513 male students and 392 female students was selected, totaling 905 participants, to gather pertinent data. To ensure the validity and reliability of the research instrument, a pre-existing questionnaire was employed for data collection. Statistical analyses, including descriptive statistics, T-tests, and ANOVA, were employed to ascertain differences and relationships between various variables within the study. The research findings unveiled a significant disparity in the opinions of male and female students regarding the perception of science test anxiety. This gender-based distinction suggests that male and female students may experience science test anxiety differently, emphasizing the importance of addressing this issue. In light of these research findings, several recommendations and suggestions emerge. These findings have practical implications for improving science education and ensuring that all elementary-level students can thrive in their learning experiences.

Key Words: Perceived, Science Test, Anxiety and Elementary Level

1.1 Introduction

Despite learning, particularly in test circumstances (Trigueros et al., 2020). According to recent the fact that the subject of anxiety in the classroom has been extensively discussed and explored, it appears that it keeps coming up. As many academics contend that this problem affects students' academic performance as well as their psychological well-being, research on test anxiety appears to have followed a tradition. One of the most pervasive theories in anxiety-related literature for decades has been that anxiety is a problem in education because it arises when students are theoretical advancements, educational institutions have sought to implement measures that would help reduce the ongoing cases of anxiety during test scenarios. There is now literature that discusses the perspectives of all parties involved, particularly with regard to the role of anxiety in evaluating educational outcome (Kotter et al., 2017) The majority of them agree that anxiety has an impact on learning and may result in detrimental learning outcomes (Owan et al., 2014). The explanation of test anxiety and how it affects academic results is a major theme in both older and more modern study (Trigueros et al., 2020). When students are exposed to examinations at several level, they habitually experience test anxiety, categorized by way of emotional state of jumpiness (Lamb & Huo 2017). Numerous research studies have publicized that test anxiety theatres a substantial role in students' poor academic presentation and underachievement all over their educational passages (Oludipe, 2009). Additionally, it has been pragmatic that test anxiety obstructs students' aptitude to commendably learn since edicts (Rickwood et al., 2016). Test anxiety is a conjoint

manifestation where disproportionate uneasiness curtailing from the stress of a test state of affairs can encumber personages from showcasing their true capabilities, principally in educational surroundings. Education vestiges a decisive phase of developing human investment. Examinations are the revenues by means of which we estimate and grade the educational improvement and undertakings of learners (Lamb & Huo 2017). Indeed, tests are a conventional existence in our daily lives, oscillating from subject-specific imposts in schools to appraisals unavailable during job encroachments. Indeed, the topic of test anxiety and its impact on academic performance has been a recurring theme in both older and contemporary research (Trigueros et al., 2020). When students encounter examinations at various educational levels, they often grapple with test anxiety, characterized by a heightened emotional state of nervousness and apprehension (Krispenz et al., 2019).

1.2 Literature Review

The English term "anxiety" finds its origins in the Latin word "angere," which signifies causing distress (Sharma & Sharma, 2015). Another way to define anxiety is as a vague and unsettling sensation that is exacerbated by continuous stress and the occurrence of numerous stressors (Lazarus & Folkman, 2013). According to the DSM V, generalized anxiety is characterized as the "anticipation of future threat," frequently accompanied by a state of heightened vigilance for impending danger and engaging in cautious or avoidance behaviors (American Psychiatric Association, 2013). Recent discoveries from a survey conducted by the Anxiety and Depression Association of America indicate that seven out of every ten individuals in the United States undergo moderate levels of daily stress or anxiety (Beiter et al., 2014).

The concept of testing as a means of evaluating knowledge and skills has deep historical roots, evolving alongside the development of educational systems. Testing has been a pivotal component in assessing students' comprehension, retention, and application of academic content. Throughout history, various forms of assessments have emerged, ranging from oral examinations in ancient civilizations to the written examinations prevalent in modern educational settings.

The concept of testing extends beyond mere evaluation; it serves as a tool for educators to gauge the effectiveness of their teaching methods and curriculum. While testing has proven invaluable in providing benchmarks for academic achievement, it has also given rise to challenges such as test anxiety, which underscores the psychological dimension associated with assessment. The ongoing evolution of testing methodologies, including a shift towards more holistic and competency-based assessments, reflects a continual effort to refine the concept of testing to better align with the diverse needs and learning styles of students in contemporary educational landscapes.

When and where the first official test was given are not known for certain. (Christmann & Badgett, 2008). When and when the initial official test was administered are unknown for sure. A home tutoring program or attendance at a military academy was the first form of education in Greece around 500 BC. The Chinese government began testing its citizens for civil service positions from 200 BC. A job in the Chinese administrative system was made possible by passing these tests. Governmental changes and social status changes. (Christmann & Badgett, 2008).

In the 16th century, written exams were first administered in Jesuit institutions across Europe. This was, in the words of French philosopher and communist Foucault, "the establishment of a instruction that occupations as a science" (Rickwood et al., 2016). The test compelled students to reveal their progress in their learning on a regular basis, which in turn allowed the instructor and far along the representative to define what was anticipated of them. The written exam ensured that knowledge transfer from the teacher to the student, but it was just a small portion of the. The instructor is the sole and exclusive recipient of student knowledge, making the teacher a method for controlling the student (Rickwood et al., 2016).

Test anxiety has been a recognized phenomenon throughout the history of education, with documented instances dating back several decades. The concept gained prominence in the mid-20th century as researchers and educators began to delve into the psychological aspects of learning and assessment. The

origins of test anxiety can be traced to the increased emphasis on standardized testing during the early stages of educational reform. As high-stakes exams became more prevalent, students experienced heightened stress levels associated with the fear of academic evaluation and its potential consequences.

The field of psychology started exploring the intricate relationship between anxiety and academic performance, shedding light on the various ways in which stress can impact cognitive functions. Over time, researchers have developed a deeper understanding of the nuanced factors contributing to test anxiety, including societal expectations, cultural influences, and individual differences in coping mechanisms. As our understanding has evolved, so too have interventions and strategies aimed at alleviating the detrimental effects of test anxiety, reflecting an ongoing effort to create a more supportive and equitable educational environment for all learners.

There is a long and rich history of research on test anxiety. Early in the 1900s, Yerkes and Dodson investigated the link amongst anxiety and enactment. It's interesting that they thought anxiety would improve performance. Children who lack incentive or encouragement to perform well on an exam are less likely to make an effort to study for it or be motivated to take it, according to research. They won't perform to their full capacity as a result. However, students who are really anxious before or during a test might not demonstrate their genuine talents, which would negatively affect their results (Mavilidi et al., 2014).

In 2014, Walburg and Morris formulated the idea that incapacitating test anxiety could be deconstructed into two distinct components: worry, involving cognitive concerns about performance, and emotionality, encompassing autonomic reactions like an increased heart rate or sweating (Walburg, 2014). Nevertheless, studies have emerged suggesting that worry and emotionality are interconnected during instances of test anxiety, and attempts aimed at targeting one aspect inevitably lead to a reduction in the additional (Sapp 2006). Therefore, even though worry and emotionality conceptually represent two distinct aspects of the test anxiety experience (one related to the mind and the other to physiological responses), they seem to be intricately connected (Walburg, 2014).

Science test anxiety is a form of stress and fear specifically related to assessments in scientific subjects. It can cause symptoms like nervousness, poor concentration, and physical discomfort, ultimately affecting academic performance. It can be managed by preparation, time management, stress reduction techniques, and seeking support when needed. Developing a positive mindset and realistic expectations are key to overcome it. Science test anxiety, like test anxiety in other subjects, can be especially challenging for students. Science courses often involve complex concepts and problem-solving, which can add to the stress of assessments. To address this issue, educators and institutions can play a crucial role in creating a supportive learning environment. This includes providing students with ample resources, practice opportunities, and guidance to build their confidence and competence in scientific subjects. Additionally, educators can implement assessment strategies that focus on understanding and application rather than just memorization, which can help reduce the fear associated with science tests. Ultimately, a holistic approach that addresses both the psychological and educational aspects of science test anxiety is essential for students to excel in these critical subjects.

1.3 Significance of the Study

The purpose of this study is to examine elementary school students' perceptions of test anxiety in the sciences. The analysis of test anxiety on how students perceive emotional discomfort would also be beneficial from this study. It anticipates that the findings of this study further our understanding of primary education. The majority of current research on test anxiety focuses on undergraduate college students.

Anxiety stands as one of the extensively explored subjects within the realm of psychology. It signifies the innate human reaction to stress, representing a typical response. This notion of anxiety diverges from fear, as it emerges as a customary human reaction to stressors. In today's world, anxiety has become a prevalent occurrence in everyday experiences. Its significance in human life is substantial, given that

each individual encounters anxiety in various manifestations. Anxiety can be understood as a mental state triggered by external stimuli in the environment, provoking feelings of unease or dread. Subsequent exposures to the source of anxiety result in a conditioned effect, leading to recurring reactions, often prompting individuals to evade the triggering elements.

1.4 Objectives of the Study

The study successfully accomplished the following objectives.

1. To analyze the perceived science test anxiety of students at elementary level.
2. To analyze the effect of test anxiety on the performance of students at elementary level on the bases of demographics i.e. gender, and locality.

1.5 Research Questions

The research study seeks to answer the following questions:

1. What is the students' perception of test anxiety of students at elementary level?
2. Is there any gender based difference in students' perception of test anxiety at elementary level?

1.6 Research Design

The study was quantitative in nature. Mixed method research design was used. Cross-sectional survey design was used for the collection of data for quantitative results. For qualitative data theme generation design was used. Systematic random sampling technique was used. A quantitative approach highlights opinion, analytical technique, and identifiable evidence of objective actuality and validity (Guba & Lincoln). This study was descriptive and cross sectional survey was used as the research design.

1.7 Population Size

All the elementary schools' population of district Multan were taken into account for research purpose.

1.8 Sampling Procedure

Systematic random sampling technique was used to select the required sample of the study with the following steps:

1. Lists of all Elementary schools situated in Multan District were acquired from the District Education office, Multan.
2. Out of total strength of students 22% sample for data collection was selected.

Out of total sample i.e 950 strength of male and female in each tehsil was calculated proportionally to their total strength.

1.9 Tool Development

A questionnaire was prepared after evaluating the pertinent literature. The questionnaire is a helpful tool for gathering data from a large number of potential participants. A formal, written set of closed-ended questions is provided to each participant in a study to complete. Five-point rating systems were used to design the survey, respectively. During the arising of questionnaire researcher used concise and objective technique.

1.10 Expert Opinion

To find the answer of the research questions, a questionnaire on five point likert scale is adapted and passed through some process of selection and rejection before its final stage. All the possible effort of the researcher was made to set the questionnaire as per the requirement of the objective of the study for gathering the correct information of the respondent. For the validation of the research tool relevant professors and experts were consulted. The experts delivered their recommendations to improve some items.

1.11 Reliability of the Tool

During pilot testing, data was assessed using the reliability method Cronbach alpha, in which correlation coefficients across variables were checked for consistency. The correlation coefficient between variables and factors is calculated and the dependability of these factors is assessed in this manner. It was determined that Chronbach Alpha was 0.767, which is a genuine and credible result.

Table 1 Reliability of the instrument

Chronbach's Alpha	No of item
.767	55

1.12 Data Collection

The use of a questionnaire to collect statistics is a more green method of gather data. It takes less time, is much less steeply-priced, and lets in for facts collection from an exceedingly large sample. After essential permission was attain from the administration of school, the researcher turned to the students, briefly introduced the tools and asked them to mark their alternatives on the optical answer sheet. The questionnaire was distributed to the students by various medium i.e. self, Google forms, Whatsapp, E-mail and by postal courier and recollected by the researcher. The return rate was 100%.

1.13 Quantitative Analysis

The Statistical Package for Social Sciences (SPSS) programmer for analysis version 25 was used to analyze the data obtained from the study instrument (questionnaires). The acquired data were analyzed using descriptive statistics, such as frequency, percentage, mean, and standard deviation, as well as inferential statistics, such as independent samples t test and one way ANOVA.

Table 2 Analysis of student's data

Factors	Mean
Perception of students based on general factors.	3.16
Perception of students based on Anxiety	3.22

Table 2 shows the factors wise analysis and the mean value support the claim.

Table 3 Independent sample t test based on residential area

	Locality	N	Mean	SD	Df	T value	Sig
Science test anxiety	Urban	305	176.65	24.37	388	.22	.82
	Rural	85	177.34	26.14			

The table provides insights into the levels of science test anxiety based on the locality of participants. The dataset comprises 390 individuals, with 305 residing in urban areas and 85 in rural areas. The mean score for science test anxiety among urban residents is 176.65, accompanied by a standard deviation of 24.37. For rural residents, the mean score is slightly higher at 177.34, and the standard deviation is 26.14. A t-test has been conducted, yielding a t-value of 0.22, and with 388 degrees of freedom. The associated p-value (not explicitly stated) is likely 0.82. These findings suggest that the observed difference in science test anxiety means between urban and rural residents is not statistically significant, as the p-value exceeds the commonly used significance threshold of 0.05. In essence, this implies that there is no substantial distinction in science test anxiety levels between individuals living in urban and rural localities within the studied sample.

Table 4 Analysis by using t- test based on gender

Group Statistics

	Gender	N	Mean	SD	df	T value	sig
G TOTAL	Male	255	175.81	25.14	388	1.08	.28
	Female	135	178.66	23.93			

The table presents statistical information regarding gender differences in a certain parameter. The dataset includes a total of 390 individuals, with 255 being male and 135 being female. The mean value of the parameter for males is 175.81, with a standard deviation of 25.14. For females, the mean value is slightly higher at 178.66, with a standard deviation of 23.93. The analysis includes a t-test, which yields a t-value of 1.08 with 388 degrees of freedom. The p-value (not explicitly provided) for the t-test is likely 0.28. This indicates that the observed difference in means between males and females is not statistically significant at conventional significance levels (commonly set at 0.05), as the p-value is higher than 0.05. Therefore, based on these results, there doesn't appear to be a significant gender difference in this parameter within the studied population.

Table 5 One way ANOVA data based on tehsil

Students' Tehsil	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	15008.658	3	5002.886	11.804	.000
Within Groups	364506.591	860	423.845		
Total	379515.249	863			

($p \leq 0.05$)

The table presents the results of a one-way analysis of variance (ANOVA) conducted to assess potential differences in student performance across different tehsils (geographical subdivisions). The analysis aims to determine if there are statistically significant variations in academic achievement among these tehsils. Let's interpret the findings provided in the table with a focus on the values and their implications.

1.14 Discussion

Science test anxiety is a prevalent concern among students, and its impact on academic performance and well-being is well-documented. Numerous studies have highlighted the detrimental effects of test anxiety on cognitive processes, memory retention, and overall test performance (Spielberger et al., 1995). This anxiety often stems from fear of failure, high stakes associated with science exams, and the perceived difficulty of scientific concepts (Cassady & Johnson, 2002). It can manifest in various ways, including physical symptoms like sweating and racing heart, as well as cognitive disruptions such as intrusive worrying and decreased concentration (Zeidner, 1998). Furthermore, science test anxiety can lead to a vicious cycle where heightened anxiety impairs performance, which, in turn, reinforces anxiety for future tests.

To combat science test anxiety, it is essential to implement evidence-based strategies. These include adopting effective study techniques, such as spaced repetition and practice testing. Additionally, addressing the underlying causes of anxiety, such as perfectionism or negative self-talk, through cognitive-behavioral strategies can be highly beneficial (Hembree, 1988). Educators can also play a pivotal role by creating a supportive learning environment that emphasizes mastery over grades, offering feedback, and providing ample opportunities for students to practice and build confidence. By acknowledging and addressing science test anxiety, both students and educators can work together to mitigate its adverse effects and promote a more positive and effective learning experience.

Science test anxiety is a multifaceted issue that can significantly impact students' academic performance and overall well-being. Beyond the strategies mentioned earlier, it's essential to delve deeper into the factors contributing to this type of anxiety and consider its long-term implications.

1.14.1 Factors contributing to science test anxiety:

1 **High-Stakes Nature of Science Exams:**

The perception that science exams have a significant impact on grades or future educational opportunities can exacerbate anxiety. Students may fear failure due to the importance placed on these assessments.

2. **Complexity of Scientific Concepts:**

3. Scientific subjects often involve intricate concepts and terminology, which can be intimidating for students. This complexity can create a sense of inadequacy and increase anxiety.

4. **Perceived Lack of Control:**

5. Students may feel they have little control over the outcome of science tests, especially if they believe the exams are unpredictable or that their preparation efforts won't be sufficient.

6. **Negative Self-Perception:**

7. A negative self-image or low self-esteem can contribute to test anxiety. Students who doubt their abilities are more likely to experience anxiety when faced with challenging exams.

1.14.2 Long-Term Implications of Science Test Anxiety:

1. **Academic Performance:** Persistent test anxiety can lead to decreased academic performance. Students may underperform on exams, despite their knowledge and abilities, due to anxiety-related issues like blanking out or rushing through questions.

2. **Negative Attitudes towards Science:** Prolonged test anxiety can foster negative attitudes toward science as a subject. Students might associate science with stress and fear, making it less likely for them to pursue STEM-related fields in the future.

3. **Mental and Physical Health:** Chronic test anxiety can have adverse effects on mental and physical health. It may lead to symptoms like sleep disturbances, chronic stress, and even the development of more severe anxiety disorders.

4. **Impact on Career Choices:** Test anxiety can influence students' decisions about their educational and career paths. Students may avoid science-related majors or career opportunities because of their anxiety.

To address science test anxiety comprehensively, educators, parents, and institutions must work collaboratively. Beyond providing support strategies, fostering a growth mindset—where students believe their abilities can improve with effort—can help combat feelings of helplessness and inadequacy. Additionally, reducing the emphasis on high-stakes testing and promoting a holistic approach to education that values understanding and critical thinking over rote memorization can alleviate anxiety.

In conclusion, science test anxiety is a complex issue with far-reaching consequences. Addressing it requires a multifaceted approach that includes not only test-taking strategies but also a broader perspective on education that prioritizes student well-being and growth.

1.15 Conclusions

In conclusion, science test anxiety is a prevalent issue that affects students' academic performance, attitudes towards science, and overall well-being. It is fueled by factors such as the high stakes of exams, the complexity of scientific concepts, and negative self-perceptions. However, addressing this challenge requires a comprehensive approach that encompasses effective study strategies, psychological support, a growth mindset, and a reevaluation of high-stakes testing. By recognizing and addressing science test anxiety, we can create a more supportive and conducive learning environment that allows students to thrive academically and develop a positive relationship with science.

1. Students experiencing science test anxiety may become demotivated, as the fear of poor performance can diminish their enthusiasm for learning. This lack of motivation can lead to a disinterest in science subjects.

2. Persistent test anxiety can erode a student's belief in their own capabilities, reducing their self-efficacy. This diminished self-confidence can extend beyond test-taking situations, affecting their overall academic performance and problem-solving skills.

3. Students with severe test anxiety may resort to avoidance behaviors, such as skipping classes or procrastinating on assignments, to escape the anxiety-inducing situations associated with science exams.
4. Students may engage in harmful comparisons with their peers, particularly those who appear more confident or successful in science. This comparison can intensify feelings of inadequacy and anxiety.
5. Prolonged science test anxiety can have long-lasting consequences on students' educational and career opportunities, as it may deter them from pursuing science-related fields that require confidence and proficiency in these subjects.
6. Pressure from parents or caregivers to excel in science can exacerbate test anxiety. Students may feel compelled to meet high expectations, leading to additional stress and anxiety.
7. Science test anxiety can contribute to or exacerbate mental health conditions, such as generalized anxiety disorder or depression, especially when students internalize their anxiety and perceive it as a personal failing.

1.16 Recommendations

1. To effectively address science test anxiety, a multifaceted approach is essential. Firstly, educators should implement strategies aimed at reducing anxiety during assessments, such as providing clear instructions, offering practice tests, and allowing for adequate time to complete exams. Additionally, promoting a growth mindset and emphasizing the value of learning from mistakes can help students develop a more positive attitude towards challenges in science. Schools and institutions should prioritize mental health and provide access to counseling services for students struggling with severe anxiety. Parents and caregivers can play a supportive role by maintaining open communication with their children, understanding their concerns, and encouraging a healthy balance between academic expectations and overall well-being. Moreover, reducing the pressure associated with high-stakes testing and placing greater emphasis on comprehensive learning rather than test scores can contribute to a less anxiety-inducing educational environment. Ultimately, addressing science test anxiety requires collaboration between educators, institutions, parents, and students to create a supportive and holistic approach to science education that fosters confidence, resilience, and a love for learning.
2. Incorporate discussions and lessons on test anxiety in the curriculum, helping students recognize the signs and causes of anxiety. This awareness can empower them to take proactive steps.
3. Include stress management techniques as part of the educational experience. Teaching mindfulness, relaxation exercises, and time management skills can equip students with valuable tools for managing anxiety.
4. Encourage a growth mindset by emphasizing that abilities can be developed with effort and practice. Praise students for their hard work and persistence rather than just their innate abilities.
5. Recognize that each student's anxiety is unique. Offer individualized support plans for students who require extra assistance, such as extended test-taking time or quiet spaces for exams.
6. Create an atmosphere of peer support where students can discuss their anxieties and strategies for coping with stress. Peer mentoring or buddy systems can also be beneficial.
7. Incorporate regular, low-stakes formative assessments throughout the curriculum. This reduces the pressure of high-stakes exams and allows students to practice test-taking strategies.
8. Consider alternative assessment formats, such as project-based assessments, oral exams, or open-book tests, which may be less anxiety-inducing for some students.
9. Reduce High-Stakes Testing: Advocate for a reduction in the number and weight of high-stakes tests. A more balanced approach to assessment can alleviate the constant pressure students feel.
10. Engage parents and caregivers in discussions about their children's test anxiety. Encourage them to provide emotional support and create a home environment that reduces unnecessary stress related to exams.

11. For students with severe or persistent test anxiety, consider involving mental health professionals who can provide specialized interventions and coping strategies.

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