

## Chemistry Anxiety Among Bachelor-Level Students in Science Education

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**Article Info:** Received: May 13, 2023; Revised: June 11, 2023; Accepted: July 11, 2023

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**Abstract:** *This research aims to investigate the reasons for anxiety among Bachelor's level Chemistry students. This study adopted a phenomenological research approach to elicit in-depth responses from teachers and students about their lived experiences and perceptions that cause anxiety in science classes due to the chemicals in the lab. The data was collected through in-depth interviews with students who suffer from anxiety in Chemistry classes. This study tried to uncover some of the roots of scientific fear. The interviews resulted in clear descriptions of the pupils' anxiousness. Fear appears to be linked to language issues, instructional approaches, and perception of chemistry views the student's main source of anxiety is the language problem. Understanding the causes of science anxiety may also help educators construct more effective classes. They can think about the reasons for worry in these students and create some experiences for them to motivate them to complete the course. If teachers are aware of the issues that arise from students' chemistry anxiety, they can assist students in reducing their worry. furthermore, they can focus more effectively on course activities and materials. Using visual resources, asking questions, and creating activities that require active student participation, the instructor can help students overcome their passive approach to the subject during a lecture.*

**Keywords:** *Anxiety, Perceptions, Chemistry, Organic, In-Organic*

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### Introduction

Scientific anxiety is a new term describing a condition that most science teachers, regardless of their level of experience, are familiar with. Science anxiety is a fear of scientific studies that intelligent and accomplished pupils have. (Mallow, 1978 p.6) This terror is accompanied by the sense that they cannot, no matter what attempt is taken to comprehend ideas in science successfully. Anxiety about science is perceived as a powerful filter. Many intellectuals are discouraged from pursuing careers in science. Those scientific findings pupils who begin teaching as worried students act as bearers of anxiety. What can we do as science teachers to help our pupils overcome their fears about science? Jeffry Mallow, who has overseen the development of a desensitizing clinic program at Loyola University in Chicago, created the term science anxiety. (Hensley, 1996; Mallow et al., 2010; Westerbak & Primavera, 1992). This program assists science-averse college students in overcoming their fears about science. Other scholars have handled the topic by using Jean Piaget's cognitive development theory. For more than 50 years, Swiss developmental psychologist Jean Piaget researched the formation of logical reasoning in children. A theory of cognitive development has emerged from his considerable research.

Anxiety is a phrase that has been around for almost a century. Mallow, on the other hand, developed the term science anxiety in 1977 Loyola University Chicago established the first Science Anxiety Clinic (Mallow, 1978 p.92). In this clinic, researchers combined three independent treatments to lessen science anxiety: (1) science skills acquisition, (2) altering students' negative self-thoughts, and (3) desensitization to science anxiety-producing events using muscle relaxation (Mallow, 1981). Consequently, their students get infected. Finally, science-averse kids integrate into our community and

contribute to the changing climate. Anti-science views are pervasive in today's society. Science anxiety includes several characteristics which majority of which are related to science. Science anxiety, clutching on science tests distaste for laboratory exercises, and dislike of inquiry teaching are some of the more common characteristics of science-anxious students. Chemistry anxiety is a serious issue that students and teachers are dealing with nowadays. Chemistry teachers, in particular, must be aware of the origins and effects of chemistry anxiety, as well as how to assist pupils in overcoming it. An inability to attempt scientific issues, a dread of speaking in advanced science classes, and being abnormally tense in science class are all indications of chemical anxiety. Students working memory is hampered by science anxiety. It strikes people of different ages and for various reasons. The teacher is the primary source of science fear. If the teacher has a negative attitude toward chemistry, his students are likely to have the same attitude. However, the teacher can help students overcome their fears of science by reinforcing basic abilities, ensuring that pupils comprehend the chemistry language, and offering a support system (Schwartz, et al. 2002). The better a teacher understands chemistry anxiety, the better he can prevent it and assist students in overcoming it. As a result, effective teaching techniques must be used in the classroom to suit students' requirements and desires for science.

### **Significance of Study**

Teachers want to know that their efforts are paying off in terms of student achievement. The researcher and others can use the data and knowledge acquired from this study to better teach chemistry anxious kids. The research reveals which processes or teaching tactics are most effective for students, as well as any classroom activities that enhance or lessen their anxiety when learning Chemistry. Then, in class plans and processes, activities that may aid the student's learning could be included.

### **Purpose of the study**

The main purpose of this study was to investigate the reasons for chemistry anxiety among Bachelor's level students.

### **Vygotsky's approach to social constructivism**

Vygotsky's works emphasized the importance of social contact during the cognitive learning process, whereas Piaget's works focused more directly on cognitive constructivism and indicated that teachers should play a limited role in students' learning. During the learning process, Vygotsky's theory allows for an active, participating instructor or peer (Chen, n.d.). As a result, Vygotsky's constructivism theory gives another theoretical lens through which to interpret pupils' anxiety in light of social circumstances. Humans are active, strong participants in their existence, wrote Vygotsky (1978), and children gain the methods by which they can properly impact their world and themselves at each stage of development (p.123). Vygotsky felt that children's play was an important part of concept understanding and that when

they played with others, they imitated adult actions and roles, which helped them build abilities for future responsibilities. Vygotsky claimed that children's play in the classroom did not fade away, but rather resurfaced during later lessons, laying the groundwork for future knowledge and beliefs. The Zone of Proximal Development (ZPD) proposed by Vygotsky (1978) was based on the idea that learners keep a space in their brains for future learning. According to the social constructivist approach, Vygotsky's, students require social engagement, scaffolded instruction, and the opportunity to collaborate with a more evolved learner.

### **Methodology**

Study designs are research strategies and procedures that range from broad assumptions to specific data-gathering and analysis approaches (Creswell, 2008). This study employed a phenomenological research approach to elicit an in-depth response from students about their lived experiences and perceptions of the causes that cause chemical anxiety in science classes. I prepared interview guidelines and guidelines for key informant interviews. The researcher prepared separate interview guidelines for teachers and students to explore the causes and sources of anxiety in learning chemistry. To collect data for this study, I employed applicable tools and techniques such as participant interviews.

Then my prime goal was to establish rapport with students who have been specialization in Science Education and majoring subject chemistry education under, Mahendra Ratna Campus Tahachal, Tribhuvan University. I briefly explained the purpose of my research study. While completing the interview ( as per the need at different times), Students were invited to participate in the follow-up interview. Thematic network analysis and a continual comparative data analysis technique heavily influenced the examination of the empirical data in this study. As an analytical tool, thematic networks draw on key properties that are common to various qualitative analysis methodologies.

### **Result and Discussions**

To maximize the learning process, it is necessary to make an effort to avoid the harmful consequences of worry. The macroscopic, microscopic, and representational components of the chemical scope of the study are three significant components in chemistry learning. When students are unable to successfully interpret abstract chemistry knowledge in terms of theories, concepts, principles, or problem-solving calculations, they are prone to be apprehensive when learning chemistry. When students fail to create a connection or relationship between these three topic domains of the chemistry study subject, they develop a misunderstanding.

Three key drivers of science anxiety emerged from the qualitative content analysis: "*language Dilemma Issue*," "*pedagogical Issue*," and "*perceptions of Chemistry*." These themes provided a framework for

data description and interpretation. The participants' perceptions of science anxiety were also elaborated using the codes under each of these themes.

### **Language Dilemma Issue**

Students' science fear is attributed to a "*language Dilemma issue.*" The majority of the kids came from public or government schools in rural areas and speak Nepali as their first language. As a result, students are concerned about falling behind because they are unable to keep up with the pace of the lecture, which leads to dissatisfaction as they are unable to properly absorb the material. The majority of the students who were interviewed stated that they had significant difficulty understanding what is being said in class due to an English language barrier. I think language is a major challenge, Researcher asked the question *What are the reasons for chemistry anxiety?* one participant (an anxious student) said of his problem. We studied Nepali in school until we were in class ten. For example, we had learned the word "Sodium" (Na) and to understand the meaning in English for such items. We had to look up something in the chemistry dictionary, which took time." Many of these pupils expressed worry as a result of the difficulties of the English language. Listening to and writing an English text is a key source of worry for almost all of the students interviewed. Yes, it is challenging because of English also because I did not have a decent background in English and it got difficult for me, said another participant. And I'll need a lot more time to overcome these obstacles. The difficulty these children have with hearing and writing in English could be due to a variety of factors.

### **Pedagogical Issues**

Another source of student anxiety was "pedagogical issues," which included a lack of practical materials and the issue of memorizing the subject content. Almost all of the participants expressed dissatisfaction with the absence of students center method teaching. Only simple practical was done, especially those that could be done with locally accessible materials," one of the attendees said. Because practically all of the participants attended a rural/government school. First and foremost, my foundation was not good, and I found things challenging, stated another participant. Later, I felt that this subject was quite engaging." However, because of the lengthy derivations. I was frustrated. But I used to memorize or mug up the information to get by. They are anxious because of the gap in quality between +2 and B.Ed. studies and they find everything difficult to understand, resulting in them forgetting things. Rather than trying to recall and rasp information, students wrote it down. Lack of expert teachers results from poor teaching and learning activities which were found in sample colleges too. Consequently, the students did not know about what they studied. This also promoted anxiety in chemistry. For daily instruction, a teacher can employ a range of strategies and tactics. She/he should weigh the benefits and drawbacks of each approach in comparison to others, as well as match the suitable method to the educational goals and the unique settings in which learning will take place. There is an interaction between the teacher

and the learner in general. It was found that loss of discipline in students implies dominant behavior toward teachers. Undisciplined behavior implies no respective attitude. Negligence to teachers implies negligence to commands. A minimum attitude toward chemistry implies a loss of self-efficiency. Consequently, the anxiety in teaching and learning increased. Teachers employed innovative educational materials to improve relationships. Oral, observational, and practical teaching methods are the three categories.

### **Subject Difficulty Issue**

A researcher asked the question *How do you feel about Chemistry now? Have your feelings changed over time?* Students' negative attitudes toward chemistry were influenced by their perceptions of it as unneeded, uninteresting, dislikeable, difficult, incomprehensible, and irrational. It also contains a lot of numbers and chemical symbols, as well as molecular formulas and chemical equations, and necessitates a lot of memorizations and thinking. During Chemistry sessions, the individuals who had a negative attitude toward Chemistry were worried and bored. One participant stated Chemistry is challenging. First and foremost, it is not applicable in real life, because there are no hypothesis. Inorganic chemistry, Organic chemistry, and Physical chemistry, for example, are extremely broad and have little practical applicability. Second, students respond this subject's application and lengthy language are tough to comprehend. Students indicated worry in both scenarios because they were frightened of not grasping the Chemistry subject. Chemistry was seen as a tough course if a student could not assimilate or make sense of the subjects and believed that chemistry was based on reasoning. Because of the difficult and complex chemical nature, many concepts in learning chemistry are abstract, and some concepts are even difficult to explain by analogy and model. As a result, intelligence alone is insufficient for studying chemistry; a positive scientific mindset is also required. Students' scientific attitudes are still in the low and average groups, according to the findings. In addition to determining students' attitudes toward learning chemistry, the statement used in this questionnaire can also describe students' enthusiasm for learning chemistry and the attitudes that students will adopt in particular scenarios. The typical learning process that pupils go through will undoubtedly influence their responses. If former students were frequently taught utilizing practicum methods, students would be more likely to respond to these statements and contribute to their scientific attitude in the areas of the questionnaire linked to laboratory activities. This notion could cause anxiety in chemistry class. The structural understanding of chemistry subject matter is directly proportional to the conceptual understanding, conceptual understanding is directly proportional to the student's Self-efficiency and the student's self-efficiency is inversely proportional to the anxiety in chemistry learning.

### **Conclusion**

In these summaries I conclude that teachers should be aware of their students' science anxiety, as well as the reasons for their concern, to cope with it and help them succeed in science classes. Understanding the causes of science anxiety may also help educators construct more effective classes. They can think

about the reasons for worry in these students and create some experiences for them to motivate them to complete the course. If teachers are aware of the issues that arise from students' science anxiety, they can assist students in reducing their worry and focusing more effectively on course activities and materials. Using visual resources, asking questions, and creating activities that require active student participation, the instructor can help students overcome their passive approach to the subject during a lecture. This research has significance for curriculum designers at both the national and local levels. Students' perceptions of the Chemistry curriculum may be taken into account by curriculum designers, who may devise new ways of structuring course themes, creating activities that require active student participation, and so on. In the science curriculum, for example, some student-centered activities based on cooperative learning, learning cycle models, or debate can be included.

### **Implication**

Education is the fundamental component to develop the nation. Educated manpower is an intellectual asset of the country. The educated manpower is produced by sufficient investment in the field of education. Providing quality education for people is the main duty of the nation. Every people have the right to get an education. Therefore, providing quality education for every child there is needed proper policy and plan. Education policies determine what kind of education we are going to provide and what kind of manpower we are going to produce from that education. Teaching is highly influenced by the policies that are formed by the nation and the investment in education. Investments can be in the form of institute, in form training. To ensure quality education, there should be needed quality teachers, effective strategies, sufficient materials, and the policy of the nation. So, teachers need professional development activities to maintain the quality of education and educational standards of the country. In this regard, I would like to point out some of the implications for the policy level.

- 1) There should reduce anxiety, and supervision activities after providing language problems, teaching-learning activities, and the concept of chemistry. University should provide sufficient numbers of teacher trainers, supervisors, and resources to conduct teaching students center methods and reduce the anxiety of chemistry pieces of training.
- 2) Universities should encourage teachers to research their related fields and subject. An evaluation system should be developed for teachers working performance. There should be the provision of marks for their promotion.

The University should formulate an adequate policy to reduce anxiety for the teachers who are far from the center and far from resources and materials for teaching and learning

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