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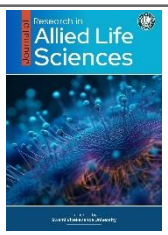

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The Role of Classroom Strategies in Mitigating Chemistry Anxiety and Promoting Mental Health in Higher Secondary Students of West Bengal

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Abstract

The purpose of this research is to examine the classroom strategies that help to reduce the chemistry anxiety level and enhance the mental health of higher secondary students in West Bengal. A review of literature also stresses the significance of culturally specific interventions that are compatible with education scenario of West Bengal leading to this research study. Thus, the study's implications are there to support the notion that when classroom concepts are aligned with local contexts, students' chemistry anxiety will be lower, and their psychological wellbeing will be higher. In this way, the subjected interventions are aligned with local needs, and both theoretical and practical experience that educators use help to provide children with better possibilities to cope with anxiety and to improve their well-being and academic achievements.

Keywords: *Chemistry Anxiety, Classroom Strategies, Mental Health, Higher Secondary Education, West Bengal*

1. Introduction

Chemistry being a high insulin subject with several theories and abstract thoughts becomes a cause of high anxiety amongst higher secondary students especially those in West Bengal where competitions are high. Managing this anxiety in class is important in academic achievement as well as the students' well-being. Stress and anxiety are especially highlighted by research findings on how they should be kept at a bare minimum so as not to affect learning: a favorable environment for learning that also nurtures the objective to improve his or her state of mind enhances student success. One of the strategies that used effectively is the scaffolder instruction in which students are given tutorials of how to build their knowledge progressively in order to avoid feeling overwhelmed as suggested by Wood et al (1976). Besides, stressing students' choice regarding learning activities can increase the level of students' power, and thereby decrease their apprehension of didactic approaches to learning (Deci, Vallerand, Pelletier, & Ryan, 1991). This is due to the fact that constructivist strategies in teaching such as PBL, assist the students to relate the new information being taught with that own knowledge that they possess hence improving on how they understand things and reduce on stress levels as mentioned by Brusilovsky and Millán (2007). In addition, such measures like positive reinforcement along with the cultivation of the growth mindset will help to redirect motivation from the negative aspect such as failure back into learning process and positively impact the students' psychological well-being (Yeager & Dweck, 2012).

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Consequently, the emotionally supportive relationships with teachers are also crucial, as such relationship secure the students necessary emotional resources to cope with classroom academic stressors and to promote student's resilience (Parker et al., 2006). In conclusion, adopting mindfulness techniques into a classroom setting can reduce student anxiety and increase concentration hence increasing the classroom balance and not a stressful affair, as it is widely perceived (Kabat-Zinn, 1990). Thus, the use of such strategies enables the educators in West Bengal to develop a better learning climate in Chemistry lessons, which targets the learning process and learners' emotional well-being.

2. The Statement of the Problem

Chemistry is one of the most difficult subjects, which, in higher secondary education, produces high levels of stress in the learners. This aspect is very apparent in West Bengal where academic requirements and competition forces the students to work harder. The difficulty rises from the fact that efficient management of this anxiety done in ways that enhances both students' academic performance and well-being. Nevertheless, anxiety acknowledged impairing both learning and mental health, very few of the contemporary classrooms designed to address this stress. A number of studies has also revealed that the conventional instructional approaches, that tends to rely on memorization of information and the usage of examinations to measure learning, can aggravate students' stress. In addition, ineffective communication, particularly the absence of emotional support and weak feedback systems leads to poor learners' experience, and overall human health and performance. Classroom practices like, using a variety of strategies including the use of instruction and formative assessment can help in lowering anxiety levels of learners. Yet, there is dearth of information on how these strategies incorporated and implemented within the framework of educational context of West Bengal. In order to fill this gap, it is crucial to study how particular classroom practices introduced to lessen the anxiety and improve the mental wellbeing. This research was meant to establish and assess these strategies to come up with positive recommendations that can enhance both efficacy in academics as well as the wellbeing of students.

3. The Significance of the Study

The relevance of this study is in the ability of the findings to help deal with the problem of chemistry anxiety prevalent among higher secondary students in West Bengal, a place which is notorious for its high academic stress levels. Due to the focus on identifying the factors that can help reduce classroom anxiety and support MH, this study provides important information on creating more conducive, and constructive, learning environments. Findings can help teachers and policymakers in understanding effective strategies of anxiety management and students' psychological well-being as essential components for academic achievement and quality learning environment. Sarason (1984) has found out that a high level of academic anxiety is associated with poor achievement, academic performance and poor mental health. In doing so, the study offers practical teacher tips for adopting Class Strategies that stress such practices like formative assessments, formative assessments, and positive nit reinforcement that is recognized for decreasing student anxiety and creating a healthy classroom-learning environment (Black and Wiliam, 1998; Wood, Bruner and Ross, 1976). In addition, this study for the significance of emotional support and interdependent teacher-student relationships for lowering stress level as well as building up resilience, which is considered conducive to the academic as well as the personal – emotional growth of the student (Parker et al. , 2006). This research will be instrumental in the identification of improved strategies designed to facilitate better management coping strategies for students when

confronted with academic difficulties as well as other aspects of positive mental health hence enriching the educative experience (Deci, et al. , 1991). Finally, this study seeks to combine the epistemological approach with the practical approach in order to enable educators develop the necessary strategies to support students in high strenuous academic environment.

4. The Research Questions

RQ1: In what ways do instructional methods promote a positive mental health environment in chemistry classrooms?
RQ2: What are the key characteristics of teaching practices that create a supportive and anxiety-reducing learning environment in chemistry?
RQ3: How do students describe the impact of a supportive learning environment on their mental health and ability to cope with challenges in chemistry?

5. The Objectives of the Study

O1: To identify instructional methods that students find most effective in alleviating anxiety and promoting a positive mental health environment in chemistry lessons.
O2: To identify teaching practices that students find most effective in alleviating anxiety and promoting a positive mental health environment in chemistry lessons.
O3: To explore the role of a supportive classroom atmosphere in building students' confidence and reducing fear of failure in chemistry.

6. The Review of Related Literature

The analysis of literature also outlines multiple strategies for addressing the subject under study, including ways to improve the students' welfare and minimize the learning anxiety in the context of education. Nkopodi & Jakovljevic (2024) have grouped twelve indicators of supporting ICT use in incorporation of indigenous knowledge in STEM learning environment but the theoretical model proposed by the authors does not include empirical support. In Cronin (2023), the author focuses on mental health in daily activities and culturally appropriate curricula in reducing anxiety in middle school students with practical approaches in safe learning environment. Oladejo et al. (2023) took on the examination of the CTCA in f2f as well as blended learning environments to compare the results with the traditional techniques for reducing chemotherapy stress as well as for better comprehension of the topic. Finally, Ahorsu et al. (2021) effectiveness of peer-led mental health promotion and coping-strategies workshops to enhance university students' mental health awareness and behaviour; future studies are needed to assess the effectiveness of such mental health interventions in the long-term. As a whole, these works reveal that to treat educational anxiety and to enhance the psychological wellbeing, it is necessary for educational administrators to ground their practice as well as research on conceptual foundations.

7. Research Gap

As the important recognition grows at present among the students and teachers to minimize the chemistry anxiety and improve the Mental Health among the students of higher secondary there is a conspicuous deficiency in the methods to recognize the specific classroom strategies, which used effectively in West Bengal. Other research carries out the general advice or is based on efforts that are more extensive without exploring the significance of specific regions and culture. Additionally, the evidence for the utility of classroom-level interventions inclusive of localized

instructional practices or culturally responsive source of mental health support to moderate anxiety and improve general mental health of students in this region is scarce. Filling this gap would require exploring how different approaches e tailored for the conditions of West Bengal and assessing their effect on students' achievement at a personalized level.

8. Methodology of Study

Document analysis is a type of research technique applicable in the study of a subject under consideration, which involves the comprehensive assessment, and interpretation of documents in a systematic manner in order to get some insights into the subject in question. It entails the process of critically assessing and analyzing documents, reports, articles, policy papers and any other kind of textual materials that in one way or the other are related to the research problem. Document analysis is therefore a research strategy through which research data collected from existing sources in an attempt to reveal pattern, trends and themes.

9. Analysis and Interpretation

Pertaining to Objective 1:

O1: To identify instructional methods that students find most effective in alleviating anxiety and promoting a positive mental health environment in chemistry lessons.

Instructional methods play a pivotal role in promoting a positive mental health environment in chemistry classrooms by reducing stress, fostering engagement, and supporting students' The detailed ways in which instructional methods contribute to a healthier mental space for students in chemistry were given below: Instructional methods play a pivotal role in promoting a positive mental health environment in chemistry classrooms by reducing stress, fostering engagement, and supporting students' The detailed ways in which instructional methods contribute to a healthier mental space for students in chemistry were given below:

Active Learning

This strategy helps the students to be more involved with what they are learning, resulting in discussions, problems solving and group work. This method prevents the information being taken passively by the students and develop confidence about their capability to comprehend complex subjects like chemistry. In a study done by Freeman et al. , (2014) they have found that active learning as a teaching strategy is very effective in reducing effect and enhancing mental health since it encourages students to participate and own the learning process. When students are participating, there is little pressure on them and therefore the pressure caused by the content of learning ceases to overwhelm them.

Collaborative Learning

Students use cooperative learning strategies on how best to approach a given problem or assignment or even participate in a certain discussion. In chemistry, some of the collaborative works could be group projects, pair teaching or solving problems together. It keeps the clients together to avoid loneliness that is bad for their health thus enhancing their wellbeing. According to Johnson and Johnson (2009), studies show that students, who work in groups, have an increased sense of support thus reducing the levels of pressure. It also enables students to compare what they find hard and what is easy to accomplish and this therefore helps make learning a more enjoyable process.

Differentiated Instruction

Differentiated instruction aims at a change of needs, ways or ability of students within the classroom. Hence, the way in which concepts can be taught in chemistry class including use of various teaching aids, demonstrations, experiments

or multimedia can help to minimize the load and hence the anxiety that may be occasioned by learning chemistry. This is because when students are provided with instructional support correspondingly to the learning styles required, less stress is felt, which in turn could be beneficial to general mental health. This personalized approach makes students feel they are not left out thus helping them to be emotionally well and confident.

Mindfulness-Based Instruction

It will also be beneficial to incorporate mindfulness activities into the structure of a class to support student's stress and anxiety. In chemistry, mindfulness maybe applied before an important test or a lecture that is expected to be complicated in order that the student's mind can be controlled and made ready for the lesson. There is evidence showing important positive effects of mindfulness interventions in educational context on learner stress and anxiety with the overall improvement of mental well-being (Zenner, Herrnleben-Kurz & Walach, 2014). Such practices can aid in enhancement of the students' emotional skills in any ways that would enable them to handle certain academic pressures especially in such a course as chemistry, which is widely regarded as complex.

Formative Assessment and Feedback

In formative assessment, the students receive frequent and low risk feedback of performance so that they may check on their progress and learn what they need to adjust. Such an approach enables students to learn when they are making errors hence eliminating stress associated with failure (Black & Wiliam, 2009). Offering the students feedback on regular bases provides them with confidence in the work they are doing since they know that they are being guided and helps to foster a positive mental health for the students by easing performance pressure and offering the students a chance to improve.

Scaffold Learning

Scaffolding is a learning-teaching technique in which the teacher gives successive levels of support in order for the students to attain greater levels of reasoning. In chemistry this can be done in the process of explaining some concepts where one starts with giving very many small steps and then as the students become more capable one starts to reduce the number of steps given to the students. Scaffold instruction can also be seen as way to decrease anxiety as it guarantees students are not overburden with the level and content of the knowledge in focus (Wood, Bruner, & Ross, 1976). When the level of learning difficulty is progressively assumed to be complex, the student has the feeling of accomplishment hence boosting his/her mental health.

It is also important to note that educational approaches like active learning, collaborative learning, differentiated instruction, mindfulness, formative assessment, and scaffold learning greatly to the teaching and nurturing of positive mental health among learners in chemistry classes. Thus, the suggested interventions create the conditions that bring the learners feelings of confidence and enhanced learning capacity. Enhancing the mental health of the learners in school is important for making sure that learners achieve academic success and also achieve good emotional health in case of any challenges that come along the process of learning complicated subjects in schools such as chemistry.

A conceptual review of instrumentational methods including active learning, collaborative learning, differentiated instruction, and practices that embrace mindfulness, formative assessment, and scaffold learning accounts for a positive environment concerning students' mental health in chemistry classes. These approaches enable the students to be comfortable engaged, free from anxiety and thus be confident as they perform their tasks. It is therefore universally important to support students' mental health so that the students not only learn and excel academically but also have the emotional capacity to learn these difficult subjects as Chemistry.

Pertaining to Objective 2:

O2: To identify teaching practices that students find most effective in alleviating anxiety and promoting a positive mental health environment in chemistry lessons.

To posit students to be motivated, active, and successful in chemistry is important to make lessons to be free of anxiety

by offering support in learning environment. The specific components of teaching practices related to such setting entail the engagement of students, support for diversity, and support of emotional needs of students. Following are six important characteristics, which are described in detail as under.

Inclusive and Differentiated Instruction

Of the features of anxiety-reducing teaching practices, one of the crucial aspects is the catering for the students' needs in the process of instruction. Differentiated instruction takes into account learning modality, aptitude and rate but guarantees that every child gets the necessary support to accomplish what is expected of him/her. In chemistry, this can include changing the type of the material delivered to the students (visual aids, practical activities, computer-based material etc.). The student's achievement is high and anxiety low, when teaching is done in a way that treats every student individually and with consideration to his or her needs (Tomlinson, 2014).

Formative Feedback and Assessment

Giving expressions of feedback on a daily, weekly, monthly basis on concepts that have been taught assists the students to assess their competence without pressure from tests. Compared to the more common summative assessment, which is done periodically and seeks to determine a learner's performance in a given course, formative assessment that is done and meant to support learning as it is done in the course of learning, relieves learners pressure associated with tests and scores. In chemistry, formative assessment like quizzes or in class activities like solving of problems or daily briefings offer students the chance to exercise and enhance their competency thereby gaining confidence (Black & Wiliam, 2009). Peer or self-judgments that are on achievement and on effort, on the process, help to enhance the concept of the growth–mind-set, which brings down the level of anxiety.

Active and Collaborative Learning

Students can learn through participating in activities such as peer teachings, group assignments and problems-based learning. In areas like chemistry where the ideas might be a little complex, it means that students can share information, relieve pressure and even motivate each other. Normal involvement decreases anxiety as a participant is more engaged in problem solving than in listening (Freeman et al., 2014). If students are interactive and not cramming something down their throats, they will not only learn about it but also get to understand it hence reducing the phobia of the failure.

Supportive Teacher-Student Relationships

If formal and informal communication channels have to be established, then close support relationships between teachers and students are the key for reducing the level of anxiety in the learning context. A positive classroom climate cannot be emphasized enough as warm teachers who show concern, concern for the students' welfare and listen to the students' needs make students feel safer. In chemistry, in particular where the content is quite voluminous and can elicit feelings of nervousness it gives the students tremendous relief to know that the teacher is there to help when needed (Jennings & Greenberg, 2009). Positive interactions eliminate the fear of failure, which makes the students include help seeking behaviour consequently improving the learning environment.

Structured and Predictable Learning Environment

Hypothesis 2 – Students are less anxious when they know what to expect in the classroom Teachers and students have to adhere to particular norms when in the classroom. This means that a structured environment that means what is taught, how it is taught and how learning will be evaluated is well structured offers reduced uncertainty. In chemistry, organization of lessons with specific and predictable elements such as a short briefing or wrap up allows students to control their task load in the sense of learning (Marzano, 2003). Organized should cause low levels of anxiety because anxieties are reduced by structure in the environment.

Mindfulness and Emotional Regulation

Through teaching them to be mindful in the classroom, as well as to include strategies of emotional regulation, the students can better control their anxiety. Teachers who choose to use short mindfulness activities, including deep breathing exercises or relaxation to the environment of the chemistry classroom will assist the students to de-stress before engaging in deeper analysis of concepts involved in Chemistry. A number of studies have revealed that mindfulness helps in reducing anxiety and enhancing concern and Self-regulation, and especially in vulnerable academic contexts such as STEM learning (Zenner, Herrnleben-Kurz and Walach, 2014). It enables the students to cope with the challenges of leaning chemistry as well as develop positive attitude towards learning; this is by reduction of stress.

Mistrust of anxious feelings, structure of the classroom, promoting positive relationships between both the teacher and the students, principles of formative assessment, active learning, and mindfulness of the environment are teaching practices that help to support a less anxious environment to learn chemistry. These practices meet both the academic and affective requirements of the students and thus enhance success in as far as their psychological health is concerned. More specifically, chemistry being a difficult subject, these strategies would be effective whilst ensuring that stress levels are overcome and positive attitude to learning is enhanced.

Pertaining to Objective 3:

O3: To explore the role of a supportive classroom atmosphere in building students' confidence and reducing fear of failure in chemistry.

It is agreed that a favourable learning environment determines the students' psychological characteristics and their capacity to manage the academic demands of chemistry. Regarding the environment student would complete this statement as a place that is safe, stimulating, where the students are keen to continue learning and where there is evidence of their ability to overcome challenges. The following discussion explains the aspect how students perceive about the influence of the supportive environment and are as follows:

Increased Confidence and Reduced Anxiety

Time and time again students will say that a positive learning environment enhances their ability to deal with difficult subjects such as chemistry. They will not struggle with high levels of anxiety, which would in turn hinder them from learning whenever they feel supported by the teacher as well as their fellows. The fact based on the literature review shows that whenever students feel that the environment is safe and conducive, their levels of anxiety reduce and hence they are able to perform better academically (Ringeisen and Buchwald, 2010). By alleviating this anxiety, students have the ability to be more involved in the process of learning and as a result have positive beliefs about their academic competence.

Emotional Safety and Mental Well-Being

Positive classroom climate enables student emotional safety or the state that students themselves say is critical for their emotional health. This has been pegged on the concern that students and learners can easily raise issues, ask questions, and seek assistance with solutions without stigmatization. Students' self-organization and the ability to perform tasks requires their feelings to be secure and safely addressed in order to enable them to address other tough issues such as chemistry or other difficult subjects (Jennings & Greenberg, 2009). Emotional safety leads to wellbeing by decreasing stress and increasing psychological resources, which enables students to handle-aspect of learning in chemistry such as comprehension of concepts and problem solving.

Sense of Belonging and Peer Support

Students usually stress the necessity of students' solidarity in the process of group cooperation in a learning environment. Chemistry problems, experiments, and projects also help students to have a feeling of being together eliminating feelings of loneliness and anxiety. Students are able to learn together in groups whereby positive aspects such as sharing of ideas, support system during difficult times and happiness in achievements are promoted. Hence,

the social aspect of learning does not only assist students to deal with academic challenges, but also fosters the creation of community, which socially healthy for students (Johnson & Johnson, 2009).

Growth Mindset and Coping Strategies

In supportive learning environments students mentioned carrying out a process of socialization that leads to creation of the growth perspective that can enable them overcome difficulties in chemistry pursuits. Having a better attitude in class as well as encouraging teachers and a positive classroom environment enable the child to embrace mistakes. It is connected with better strategies for managing academic problems, if such a person encounters them (Dweck, 2006). The students who embrace growth mindset work hard in content area: chemistry and they are psychologically healthier having less fear of failing.

Encouragement of Active Participation and Autonomy

Some students explain how such positive environments make them to take an active role in their education that is empowering and enables them to deal with impacts. The High Interaction, which involves enabling students to ask questions, solve problems as well as be more practical, empowers the students to take charge of their learning process. When students feel empowered, they will be able to tackle chemical related problems with more confidence hence, eradicating feelings of helpless, which are associated with, stress levels (Freeman et al., 2014). It also enhances their ability to solve problems in case of any issues thus improving on their mental health.

Positive Teacher-Student Relationships

This comes out clearly, when students assert how practicing positive relationships with their teachers may help them be able to handle the stresses associated with chemistry. When the teachers are friendly, patient and willing to assist the students the students in turn have confidence to ask questions and seek clarification regarding issues they find challenging. Quality teacher-student relationships decrease; academic expectancies and foster a sense of belonging, affection and relevance which is crucial for good emotional well-being among students (Roorda et al., 2011). These are basic relations in creating the climate for accomplishment of students' tasks and making them believe that they are able to cope with the academic challenges.

Students label a positive learning climate in chemistry as one that enhances self-estates, makes one feel safe to learn; embraces teamwork; fosters growth inclined mind-sets; student and teacher liberties and good teacher-student relationships. The elements enable students deal with these academic issues by offering a solution to anxiety; building up the students' abilities to resist, bypassing the feeling of loneliness or being alone to the class or group. Such environments enable students not only get good grades but also be psychologically healthy throughout the process of learning.

10. Conclusion

Therefore, it can also be said that to eradicate Chemistry Anxiety and to improve the mental health of the Higher Secondary Students in West Bengal requires a multilayered approach that incorporates the methods that are prevailing in the classrooms of region and cultural sensitivity. This is because the present study has pointed out a significant lack in the literature of research findings that could explain how p2p learning methods and mental health approaches could be adapted and implemented on localized basis for delivering and achieving education and health related goals in this specific context. Therefore, the subsequent research works should be directed towards enhancing and evaluating the theoretical approaches to account for the education-culture context of the West Bengal. Using experience by matching the interventions with local demands and, on the other hand, embracing theoretical and applied knowledge, educators foster students' success in fighting anxiety and promoting well-being for better academic results and mental health.

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