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PROMOTING EMOTIONAL INTELLIGENCE TO STRENGTHEN RESILIENCE, SCIENCE LEARNING, AND INCLUSIVE SUPPORT FOR STUDENTS WITH DISABILITIES

MUHAMMAD ASIF SHAHZAD[1], ZAHIDA JAVED[2], SABA HANIF[2] SHAHID RAZA[1], ZUBAIR YOUNAS[3], SUMAIRA KULSOOM[1], MUHAMMAD NAEEM SARWAR[2*], SUMERA BARI[4]

[1]DEPARTMENT OF LEADERSHIP EDUCATION, UNIVERSITY OF EDUCATION, LAHORE, 54770, PAKISTAN
[2]DEPARTMENT OF STEM EDUCATION, UNIVERSITY OF EDUCATION, LAHORE, 54770, PAKISTAN
[3]SCHOOL EDUCATION DEPARTMENT, MULTAN, PAKISTAN. EMAIL: naeem.sarwar@ue.edu.pk
[4]EDUCATOR DEPARTMENT OF SPECIAL EDUCATION, GOVT. INSTITUTE FOR SLOW LEARNERS, PUNJAB, PAKISTAN

Abstract
Emotional intelligence (EI) plays a vital role in fostering resilience, enhancing academic performance, and promoting the holistic development of students, particularly in inclusive classrooms. This study explored how EI strategies can be employed in inclusive science classrooms to support students with disabilities, strengthen resilience, and improve science achievement. Using a qualitative approach under the interpretivist paradigm, data were collected through semi-structured interviews, focus groups, structured classroom observations, and document analysis. Participants included 15 teachers, 13 staff members, and eight student focus groups, recruited through purposive sampling until data saturation was achieved. Triangulation across multiple data sources and member checking were used to enhance trustworthiness. Findings revealed that while teachers recognized the importance of EI, its practical application was inconsistent due to limited training, insufficient conflict resolution strategies, and inadequate systemic support. Additional challenges included gaps in support for students with disabilities and the absence of structured frameworks to foster peer relationships and resilience. The study concludes that EI strategies hold significant potential to improve both academic and emotional outcomes; however, their effective integration requires comprehensive teacher training, enhanced resources, and stronger institutional commitment. These rigor-focused insights contribute to advancing inclusive science education practices.
Keywords: Emotional Intelligence, Resilience in Education, Science Achievement, Inclusive Classroom Strategies, Students with Disabilities, Data Saturation, Triangulation

1. INTRODUCTION

Emotional intelligence (EI) constitutes several emotional perceptions that can be assessed through the use of various questionnaires and rating scales (Petrides et al., 2018). It includes a person's capacity to identify, comprehend, communicate, categorize, control, and direct affective states, in themselves and others (Valente, Lourenço, et al., 2020). The educational context has seen EI tied to many different elements of school life, making it an intriguing topic for researchers. Some of these elements include learning, academic achievements, pro-social behaviors among students, and effective teaching (Dolev & Leshem, 2016). The importance of EI in education has been recognized for a long while, and research has shown its influence on the emotional health and well-being of students and their performance on standardized tests and other assessments of academic achievement (Akerjordet & Severinsson, 2007). The significance of EI in education goes far beyond just student outcomes; educators must be effective, too.

Research has demonstrated that the competencies of EI influence teacher conduct in a manner that positively affects student outcomes (Khassawneh et al., 2022). Increased levels of teaching effectiveness are more likely to be found in teachers who have robust emotional capabilities, which appear to enhance their work performance and allow them to create a positive, self-regulated learning environment for their students (Valente, Veiga-Branco, et al., 2020).

There are many challenges to nurturing resilience and ensuring academic success for students, especially when you take into account their EI and the techniques used in the classroom (Cleary et al., 2018). Research exists that suggests a favorable relationship between resilience and academic success, even incorporating such experiences as professional placement. However, other research presents another side (Cleary et al., 2018). This inconsistency underscores the intricate interaction among EI, resilience, and academic performance. In addressing these matters, teachers can turn

to instruction focused on resilience and implement the core features of such instruction—self-efficacy, reflective capacities, and self-assurance (Walsh, 2024).

Different methods have been demonstrated to be useful for resilience development. They include: collaborative activities, reflective exercises, guided study, problem-oriented learning, and hands-on experiences (Walsh, 2024). Moreover, combining the theory of EI with characteristics of positive psychology, such as self-efficacy, motivation, and resilience, can drive students' mental health and academic performance to even greater heights (Guillen et al., 2022; Shengyao et al., 2024). These understandings underscore the importance of designing entire educational systems that embrace not only the effective teaching of academic content but also the EI of the students and their ability to withstand the kind of pressures that are endemic to our system of education (Rosser Limiñana & Soler Ortiz, 2024).

Students with learning disabilities (LD) face substantial difficulties in comprehending expository science texts—many of them are not able to read the way most of us read. Science, for most people, is not particularly intuitive. It is a way of understanding the world that's grounded in many years of formal and informal training (Sabharwal, 2024). These problems continue despite a change in educational approaches from textbook teaching methods to inquiry-based teaching methods. Inquiry-based teaching methods benefit all sorts of students, including those who struggle with reading. It has been confirmed from the literature that targeted vocabulary instruction (ES = 1.25) and comprehensive interventions concerning numerous constituents (ES = 0.64) can efficiently improve science-related reading comprehension for LD students (Sabharwal, 2024).

The obstacles that students with disabilities encounter are not limited to the physical, social, or cultural spheres. Attitudinal and political hurdles are a complex array that they must navigate, often exerting far more effort and burning far more calories to get over these hurdles than their non-disabled peers (Hopkins, 2011). In educational environments, students with disabilities encounter unique challenges. They can overcome these challenges due to their ability, which is influenced by EI and resilience. Research shows that students with learning disabilities (LD) have lower scores in stress management and adaptability facets of EI than their peers without disabilities (Reiff et al., 2001).

Resilience, defined as the ability to recover from or adjust to stress, is a key predictor of positive health-related outcomes. For students with disabilities, resilience may be a personal asset that helps them achieve academic success (Chopra & Kanji, 2010). Encouraging resilience in students, particularly those facing extra challenges because of their disabilities, might be a crucial method of ensuring their academic success in higher education (Clohessy et al., 2019).

The goal of this research was to examine the role EI plays in constructing resilience, enhancing performance in the sciences, and providing valuable help to students with disabilities in educational environments. Identifying, managing, and controlling emotions define EI and are seen as crucial elements in improving results for both students and educators. The complex interaction of EI, resilience, and academic success, particularly for students with learning disabilities, requires more thorough investigation. This article aims to address the following research questions.

- How do teachers perceive and implement EI strategies to enhance resilience and learning outcomes in science classrooms?
- What challenges and opportunities do teachers and support staff encounter when applying EI strategies to support students with disabilities?
- How do EI-based teaching practices shape classroom interactions and peer relationships in inclusive science classrooms?

2. LITERATURE REVIEW

EI is a complex construct that encompasses the capacity to identify, comprehend, and regulate emotions in both oneself and others. The fundamental elements of EI comprise self-awareness, self-regulation, motivation, empathy, and social skills (Antonopoulou, 2024). Self-awareness involves the recognition of one's emotional states and their effects, while empathy pertains to the ability to understand and react to the emotions of others (Arias et al., 2022) within the educational setting, EI significantly influences interpersonal dynamics and educational outcomes. Learners exhibiting higher levels of EI tend to display enhanced academic drive and achievement (Arias et al., 2022).

Research indicates that EI competencies, including self-awareness and self-regulation, are beneficial for educators, enhancing their problem-solving abilities and commitment to quality when interacting with students (Afzalur Rahim & Minors, 2003) Additionally, EI skills play a crucial role in intercultural education, enabling effective cross-cultural communication (Guntersdorfer & Golubeva, 2018). Although EI is separate from conventional IQ, both contribute to comprehending emotional processes (Ciarrochi et al., 2000). Fostering EI in educational settings can lead to greater life satisfaction, enhanced relationship quality, and improved academic performance (Pope et al., 2012). It is, therefore, suggested that we put into place programs that bolster emotional competencies in our students. These are not just content-filled programs; they are significant because they affect students at a very fundamental level. They reach into students' "psycho-evolutionary" growth and touch their academic motivation (Arias et al., 2022).

Investigations have shown a robust and favorable relationship between EI and student engagement. They have gone further to establish that this also holds true for academic performance across the many varied educational settings that exist. It is evidenced through the literature that students having higher EI levels show improved intellectual and

affective engagement (Maguire et al., 2016). This linking is mainly visible in higher education, where EI functions as a positive predictor for all aspects of student engagement and improves critical learning outcomes, including grade point average, general learning outcomes, and student satisfaction (Zhoc et al., 2020). The effect of EI on learning goes well past traditional measures of academic performance. Overall research findings in science education point to EI being vitally important for academic achievement. As an illustration, a research effort aimed at medical students in Saudi Arabia found a substantial connection between the cumulative EI component scores and academic achievement (Altwijri et al., 2021).

In addition, studies have shown that cognitive ability is associated with EI and that individuals who are high in either EI or cognitive ability tend to receive high scores on standardized tests (Shafait et al., 2021). It is important to note that the relationship between EI and academic achievement is not always straightforward. Some studies have shown that while overall EI might not be a significant predictor of final academic outcomes, certain EI skills, such as conscientiousness, adaptability, empathy, organizational awareness, and relationship-building, can predict with much greater reliability the likelihood of achieving academic success (Pope et al., 2012). Furthermore, factors such as the level of trust students have in their teachers and the students' overall learning strategy may also influence the relationship between EI and academic success (Shafait et al., 2021). The intricate nature of the association between EI and academic results is highlighted by these findings and suggests that some types of focused, pointed interventions might serve to direct certain students toward realizing their full potential.

Educators can use various means to cultivate EI in students. Hands-on exercises can be used, such as simulations, collaborative discussions about emotions, and thoughtful writing. These exercises assist students in better understanding the nature of their emotions. They help students work with their feelings rather than against them (Khassawneh et al., 2022). For effective implementation, equipping teachers with EI skills is essential. Initiatives aimed at promoting professional growth and focused on bolstering the EI capabilities of educators have the potential to significantly influence their pedagogical practices, which in turn boosts student achievement (Khassawneh et al., 2022). For instance, a study conducted in China found that the EI of school heads and the practices of educational guidance positively influenced the teachers' instructional styles (Chen & Guo, 2020).

Teaching approaches aligned on EI include combining emotion-related vocabulary into teaching, teaching techniques for resolving conflicts, and nurturing empathy through group projects. Investigations have also focused on the employment of educational robots to enhance creativity and EI in students at the elementary level (Wang et al., 2020). Moreover, the TPACK framework can be a valuable tool for developing technological, pedagogical, and content knowledge, especially because few teacher preparation programs provide sufficient technology training for educators. The TPACK framework can serve as a guide for developing EI (Liu & Liu, 2013). Importantly, although training in EI has yielded beneficial results for students in the field of medicine, (Fletcher et al., 2009), the source material states that the connection between EI and academic success is debated. Some studies find that EI is not a strong predictor of how well students perform in an educational institution. They say there is a lack of evidence linking EI with academic achievement (O'Connor Jr & Little, 2003), in contrast to those findings, some researchers assert that heightened EI manifests itself more in the "real world" and that high EI does not correlate with better grades in school. They argue that you don't need to be emotionally intelligent in order to excel at school (Vidal Rodeiro et al., 2012). To sum up, embedding EI in education requires a far-reaching and thorough strategy. This means teacher preparation, hands on activities and EI-oriented teaching strategies. Even if it doesn't affect academic achievement, cultivating EI skills can contribute to students' well-being, social competence, and success in their careers (Li et al., 2009). Instructors might think about implementing interventions focused on EI that are tailored to their specific educational settings and student needs.

2.1 Defining Resilience in the Classroom Context

In the educational sphere, resilience refers to a student's ability to surmount academic difficulties and bounce back from defeats. Resilient students are able to thrive in spite of challenging circumstances and are able to engage in their communities and take advantage of lifelong learning (Tortosa Martínez et al., 2023). These resilient learners generally exhibit greater levels of dedication to school than their less resilient counterparts (Farina et al., 2021). Resilient students are emotionally intelligent and cope well with stress. When the going gets tough, they are more prone to handling the situation better than others and not falling apart. They are less anxious, more resilient, and able to carry on through to the end without burning out. These conditions exist because resilient students tend to have a different and better way of navigating their life situations and finding a way to move forward through the tough parts and into the sunnier spots (Romano et al., 2020).

Resilience among students usually parallels another trait; the growth mindset. When we think of resilience, most of us envision overcoming difficulties, but that can be misleading. Resilient students adapt well in the face of change and are better equipped to deal with stress (Dweck & Yeager, 2020). The association among resilience, EI, and academic achievement is complicated and multidimensional. Research shows that academic resilience is a strong and positive predictor of EI. In turn, EI has a significant and strong impact on academic performance (Ononye et al., 2022). Furthermore, both EI and resilience have a direct effect on students' satisfaction with life, while academic engagement functions as a mediator of the three factors in relation to life satisfaction and academic achievement (García-Martínez et al., 2021). In summary, the component of resilience that exists within the educational environment is absolutely

essential for the academic success of students. This is a well-known fact. Yet the scarcely explored connection between school climate factors and resilience begs for more attention. From this, we can certainly surmise that a better understanding of the aforementioned neglected area of research is bound to enhance our knowledge of the link between school climate factors and resilience (San Román-Mata et al., 2020). Promoting the growth of resilience and EI in educational contexts can yield a better set of academic outcomes and a more robust preparation for future difficulties.

2.2 Fostering Resilience through EI

Academic resilience and EI are tightly woven together and can be cultivated through diverse instructional methods. The vital role that teachers play in cultivating student resilience manifests in two ways. First, educators create supportive environments that allow students to take risks—to learn from failures. When students know their teachers are rooting for them, they are more likely to go out on a limb and really push themselves intellectually. And second, teachers employ a number of techniques that bolster the internal protective factors we know make kids bounce back more quickly when they do face challenges (Hughes, 2021). Teaching methods that foster resilience consist of reflective practices, positive reframing, problem-based learning, and mindfulness exercises (Hughes, 2021). These methods help students achieve self-efficacy, optimism, EI, and self-care. These are the fundamental elements of resilience. In addition, teachers can cultivate resilience in students by acknowledging their common wish to achieve and by fostering close relationships with them (Mayer et al., 2008). It is significant that research has shown resilient students are more likely to have better outcomes in science education. An examination of eighth-grade students in Hong Kong found that resilient learners obtained higher scores in measures of scientific confidence, enjoyment of learning science, and scientific appreciation (Wang & Liu, 2023). The implication of this finding is that promoting resilience may especially pay off in terms of science education outcomes. To sum up, fostering resilience via EI offers a hopeful approach to improving student success.

2.3 The Unique Challenges of Science Education

Distinct intellectual and emotional obstacles confront students in science education, which requires a unique blend of critical thinking, problem-solving skills, and emotional guts. Science education's many layers can be especially daunting for students with learning disabilities. It is not merely the content of science that challenges these students but also the immense cognitive load associated with learning in this discipline (Hall & West, 2011). All students face these challenges, as they are not limited to any specific group. That's because science education demands a great deal from individuals. It asks them to comprehend complex and detailed ideas, to engage in authentic and meaningful activities that are the clearest form of "hands-on" learning, and to develop the kind of thinking that underpins the science that we do. It is noteworthy that resilience and EI are playing vital roles in helping overcome the barriers to reaching the finish line when it comes to scientific attainment. Investigating the relationship between EI and academic performance has generated a variety of results. Certain studies appear to show a correlation that supports EI's impact on academic performance. On the other hand, some studies have come up with results that do not seem to correlate with EI in a very positive way. For instance, O'Connor Jr and Little (2003) proposes that EI is not a dependable predictor of academic achievement, irrespective of the assessment method employed.

Study by (Agnoli et al., 2012) exposes that attribute (EI) and cognitive aptitude interrelate to influence academic achievement, particularly in language and mathematics. Efficiently addressing the diverse encounters in science education requires a complete approach that takes into account both cognitive and emotional features. Applying resilience-building methods (Singh et al., 2020) and including social and emotional learning (SEL) approaches (Muhibbah, 2024) can back students in conquering hurdles to scientific achievement. Moreover, stressing foundations such as scientific self-assurance, available resources at home, and clarity in teaching (Wang et al., 2023) may improve academic resilience in science education, mainly for students experiencing socioeconomic hardships or those with low EI or resilience levels.

2.4 Improving Science Achievement through EI

The strategies for teaching that involve EI are key to raising science achievement. These strategies work because they create a nurturing learning environment and help students become more resilient when they face challenges connected to the content. It has been shown that instructors with high EI are more successful in their teaching methods, which leads to improved student performance (Maamari & Salloum, 2023). The instructors can create a nurturing classroom for science education by using techniques based on EI. Such a classroom is one that helps students develop the kinds of skills and dispositions that form the foundation of resilience, self-efficacy, and reflective thinking—all commonsensically regarded as being integral to doing well in science (Walsh et al., 2015). Importantly, although EI is often associated with enhanced academic performance, some research has shown that EI by itself may not be a strong indicator of how well students will perform academically (O'Connor Jr & Little, 2003).

This mismatch emphasizes the necessity to integrate EI-centered approaches with pragmatic science learning experiences to construct a more holistic science education framework. To improve science achievement through EI, teachers can apply a mixture of EI instructional practices and resilience-improving techniques linked to hands-on scientific activities. Such a method might include cooperative tasks, self-reflection, inquiry-based learning, and experiential learning (MacCann et al., 2020). By implementing these teaching techniques, teachers can support learners in educating the emotional aids vital to challenge the difficulties of scientific investigation while encouraging a more thoughtful grasp of scientific principles. Moreover, professional development programs aimed at increasing

teachers' EI abilities can result in sharp empathy and emotional understanding, further supporting students' emotional and academic progress in science education (Hen & Sharabi-Nov, 2014).

2.5 Understanding the Needs of Students with Disabilities

In educational settings, students with disabilities meet many problems, including challenges in forming social networks, attaining educational success, and gaining appropriate help. Research display that students with learning disabilities frequently experience problems in emotion recognition, regulation of concentrated feelings, and self-awareness regarding their strengths and weaknesses (Abdullah et al., 2004; Karahan, 2018). These problems can considerably touch students' educational experiences and results. The worth of giving emotional and academic help to learners with disabilities is supreme. Significant links between instructors and learners are vital, chiefly for adolescents with predominant disabilities who face sharp risks of social, emotional, and mental health issues (Akerjordet & Severinsson, 2007).

It is evidenced through the literature that assistive technology (AT) significantly effects academic engagement, academic self-efficacy, and well-being between learners with disabilities (McNicholl et al., 2023). Notwithstanding positive attitudes towards learners with disabilities in certain areas, obstacles continue in meeting the needs of all learners in educational settings (Perez-Esteban et al., 2024). To address these problems, educational institutions must create inclusive support programs and implement evidence-based practices. Operative learning help can improve academic achievement and inspire learners to follow self-development and independent learning (Chopra & Kanji, 2010). Furthermore, computer technology and adaptive devices can authorize learners with severe disabilities to actively contribute in learning alongside their non-disabled peers (Hasselbring & Glaser, 2000). However, it is important to recognize that many educators lack sufficient training in effectively utilizing technology in their classrooms, underscoring the necessity for improved teacher preparation and professional development (Hasselbring & Glaser, 2000; Moroń & Biolik-Moroń, 2021).

2.6 Strategies to Enhance Support

The crucial role that EI plays in creating inclusive classrooms could not be more evident. It is the first avenue through which a teacher reaches a student, particularly a student with disabilities. In today's society, teachers can ill afford not to understand the pervasive and powerful influence that EI has on their work (Molbaek, 2018). All students, including those with significant disabilities, can learn and participate in ways that are appropriate for them. To make this even more possible, educators can and should utilize an array of practical accommodations and interventions. Among the most effective are universal designs for learning, behavioral interventions, and curriculum modifications (Ruppar et al., 2016). Utilizing peer support has developed as a hopeful strategy for advancing inclusion in general education classrooms. Peer support arrangements have been established to improve social interactions for learners with severe disabilities while sustaining their educational engagement (Carter, 2017).

Efficiently implementing these measures needs paraprofessionals, well-trained and supported by special education teachers. Research shows that in an educational institution, peer-based support measures are more successful in developing connections between peers than individualized, adult-led support. The successful implementation of inclusive education deeply relies on teamwork among instructors. In preschool settings, approaches like peer coaching programs have shown potential for enhancing classroom quality and improving student-teacher connections. Additionally, interventions at the systems level that inspire social acceptance through cooperative games and activities centered on teamwork have proven effective in decreasing peer rejection in school classrooms. To strengthen support for inclusive education, it is compulsory to address the perceived requirements of instructors, including suitable professional development, better access to teaching assistants, and satisfactory resources (Brock et al., 2016).

3. METHODS

3.1 Research Methodology

Under the typology of interpretivism, a qualitative research design was used in the study. Interpretivism stressed understanding the personal interpretations and lived experiences of the participants in their unique environments (Alharahsheh & Pius, 2020). The purpose of this study was to explore the effects of EI teaching strategies to enhance resilience, science achievement, and support for students with disabilities. To address this complex phenomenon, the interpretivist perspective was appropriate (Junjie & Yingxin, 2022). Qualitative design endorsed a broad examination into the methods that students, teachers, and supporting staff see and endorse EI approaches in educational settings, giving consideration to their unique adaptations (Nickerson, 2022). Qualitative design permits investigators to discover in-depth the kinds of exclusive and personal paths that individuals traverse in arriving at their kind of reality (Pervin & Mokhtar, 2022).

3.2 Participants

Participants were recruited using purposive sampling to ensure representation of teachers, school staff, and students with disabilities actively engaged in science classrooms.

3.3 Inclusion criteria

The required criteria were that, teachers had a minimum of two years of teaching experience in science subjects and were currently teaching in inclusive classrooms. School staff members (administrators, support staff, and counselors) were included if they had direct involvement in science curriculum planning or student support services.

3.4 Exclusion criteria

This criterion included teachers without experience in inclusive settings and staff who had no direct engagement with science instruction. Students with mild to moderate disabilities who were enrolled in science classes were considered eligible to participate in focus groups; students with severe communication impairments were excluded unless guardians provided alternative communication supports.

3.5 Demographic Profile

The study involved 15 teachers, 13 staff members, and eight student focus groups. Teachers' average teaching experience was 8.2 years (range: 3-20 years), and 65% were female. Principals, special educators, and science coordinators were among the school staff who participated, with an average professional experience of 10.4 years. Student groups were mixed-gender and represented grades 6 to 10.

3.6 Data Collection Procedures

Semi-structured interviews were conducted with 15 special education teachers and 13 support staff members of the schools. Focus group discussions were conducted with eight student groups. Each group consisted of 4 students (with and without disabilities (Hennink & Kaiser, 2022). Utilizing the purposive sample selection technique guaranteed a complete understanding of the different viewpoints while attaining data saturation. Along with interviews and focus group discussions, in-depth data were also collected through observations and document analysis (Busetto et al., 2020). The structured observations were carried in class 9^{th} and 10^{th}. A pre-determined observation protocol was used in secondary science classrooms of selected schools (Adeoye-Olatunde & Olenik, 2021). During structured observation the implementation of EI strategies were documented. The interaction between teachers and students was also documented. Special attention was to check whether these EI teaching strategies are enhancing resilience and science achievement. Students' cooperation and the overall classroom environment was also documented (Kang & Hwang, 2021).

To know the common experiences of students regarding EI, resilience, science achievement and support to disable students, detailed focus group discussions were conducted (Yulianti & Sulistyawati, 2021). A number of documents were also analyzed. These documents included lesson plans, individual education plans (IEPs), and various school policies. With the help of these documents, we were able to put together a detailed accounting of the kinds of things that schools are doing both explicitly and implicitly to incorporate EI into the lives of students and teachers (Morgan, 2022).

This qualitative data was analyzed thematically. After collecting data from semi-structured interviews, focus group discussions, observations, and document analysis, the first stage was familiarization with the data. The familiarization stage involved numerous understandings of the data, assisting us to distinguish initial ideas and important components within the information (Lochmiller, 2021). The next stage was the coding process. We converted the data into open codes. The coding process was done only on data that were crucial, important, and relevant to the purpose of the study (Kiger & Varpio, 2020). The next stage was the development of the central and sub-themes. The corresponding codes were combined into broader categories. After that, a pattern and relationship were made among categories. These patterns and relationships were the basis of our data analysis report. Lastly, we critically analyzed the established and relevant themes (Majumdar, 2022). Analysis continued until thematic saturation was reached. Triangulation across interviews, focus groups, observations, and document analysis, as well as replicated data collection in multiple classrooms, enhanced the reliability of findings.

Several strategies were implemented to improve the robustness and reliability of the results from the study. A deliberate collection of data using multiple methods formed the foundation upon which the study stands. This multi-method data collection strategy incorporated interviews, observations, and document analysis. Moreover, this triangulation technique was employed to validate and corroborate the research findings (Sullivan-Bolyai & Bova, 2021).

In addition, to ensure the accuracy of our findings, we shared preliminary results with participants in the study. This step, called member checking, offered participants the opportunity to verify whether our interpretations were correct and to provide any added information that would ensure our final reporting was as accurate as possible (Riazi et al., 2023). The research included complete narratives that provided comprehensive and detailed accounts of the study's setting, participants, and outcomes. These accounts were intended to make the study more relatable, more directly comparable to other situations, and thus more transparent in its implications and recommendations. The researchers kept track of their self-awareness by using a research log. This helped us understand how they and their preconceived ideas and stances might be influencing the investigation. The study's outcomes were fortified and made reliable and authentic by these strategies (Coker, 2021). Before beginning the study, ethical clearance was secured by institutional review board. The study was conducted according to the local legislation and institutional requirements. Written informed consent for participation in this study was obtained (Mirza et al., 2023).

3.7 Attrition and Data Saturation

No participants withdrew from the study, and all scheduled interviews and focus groups were completed. Data

collection continued until data saturation was achieved.

4. Statistical Analysis

The data analysis began with examining the data collected through interviews, focus group discussions, observations and document analysis. These data collection techniques gave a close look at how emotional intelligence (EI) was used in real classroom situations. Watching the lessons helped uncover both visible and hidden aspects of how EI works in practice. Observation allowed us to see the real interactions between teachers and students, as they happened. A structured observation guide was used to record important details and capture any special moments that took place in the EI-based science lessons. The main focus of this analysis was to understand which EI strategies were used and how they affected students and classroom learning.

Strategies to Enhance EI, Resilience, Science Achievement, and Support for Students with Disabilities (Based on Classroom Observations)

We recognized several strategies that effectively build EI and resilience, enhance science achievement, and support students with disabilities through classroom observation techniques. Teachers who ensured an inclusive and supportive learning environment implemented these strategies. The strategies we observed are listed below:

Strategies to Enhance EI:

Teachers regularly and reliably incorporated activities such as “emotion circles”, shown in Figure 1. In these circles, students were encouraged to share feelings and to recognize various emotions in themselves and in others. This, of course, is self- and other-emotional recognition. It is self- and other-empathy making, or what is commonly called "an emotionally safe space." Role-playing was employed by teachers to facilitate an understanding of the myriad of perspectives involved in a given situation. This technique was especially valuable in helping the class manage the conflicts that arise between individuals. It promoted social awareness. It was observed that teachers gave consistent positive feedback to students, and this was helping the students build self-esteem and recognize their strengths, which is a part of EI. Mindfulness practices, like deep breathing and guided visualization, were part of the daily curriculum. Observations from these practices were used to assess the next steps in the development of stress management and self-regulation skills for students.

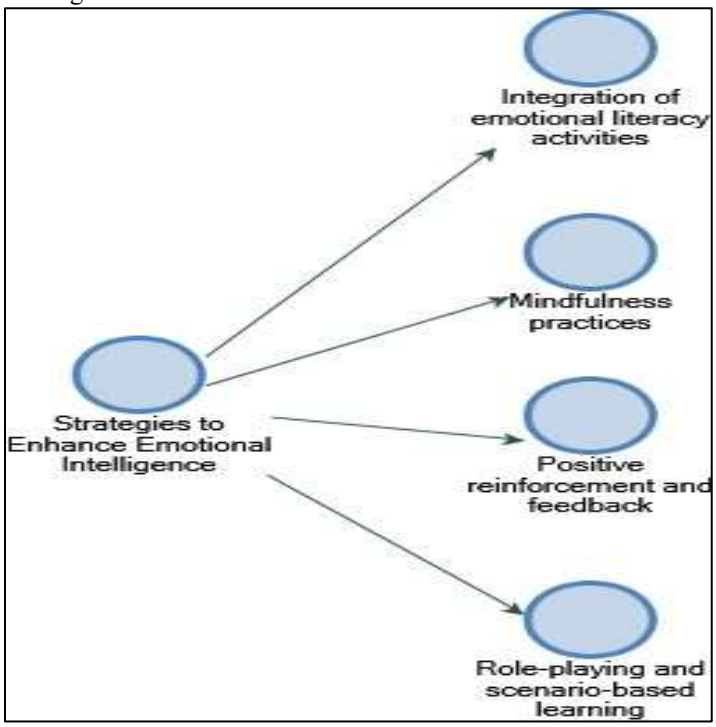

Figure 1. Main and Sub Themes: Strategies to Enhance EI.

Strategies to Enhance Resilience:

Teachers in several ways cultivated resilience, shown in Figure 2. They encouraged a growth mindset by using phrases such as "mistakes help us learn" to reframe challenges as opportunities for growth. They engaged students in collaborative problem-solving tasks that simulated real-world challenges and built resilience by teaching students to persist and adapt when facing difficulties. Teachers also did much to foster the emotional side of resilience by creating a strong sense of belonging in the classroom. They achieved this by developing trusting relationships with students, creating peer support groups, and by providing emotional and academic assistance in a variety of ways. Finally, teachers celebrated resilience as a way to achieve success by honoring both the process and the product.

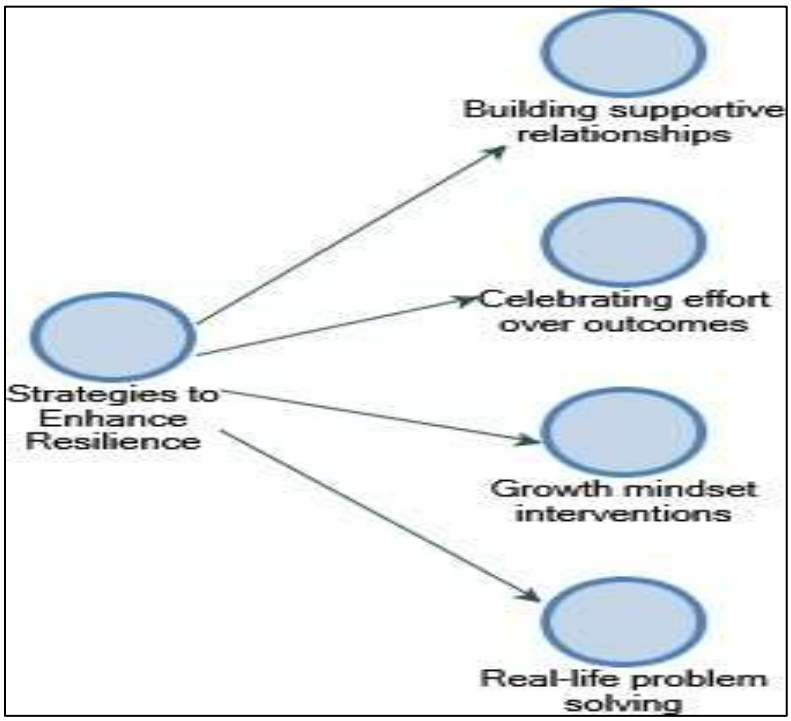

Figure 2. Main and Sub Themes: Strategies to Enhance Resilience

Strategies to Enhance Science Achievement:

The real-world relevance of science was emphasized by the integration of hands-on activities, shown in Figure 3. Experiments, model-building, and group projects made science concepts both tangible and relatable to students. Engagement and comprehension increased when students participated in these kinds of activities. Teachers encouraged students to ask questions, speculate, and work through concepts largely on their own. This method didn't just deepen understanding. It also seemed to promote the kind of critical thinking that is the hallmark of successful science learning. Yet even the most sophisticated experiments build only so much understanding if a classroom is equipped with nothing more than a tour of the periodic table.

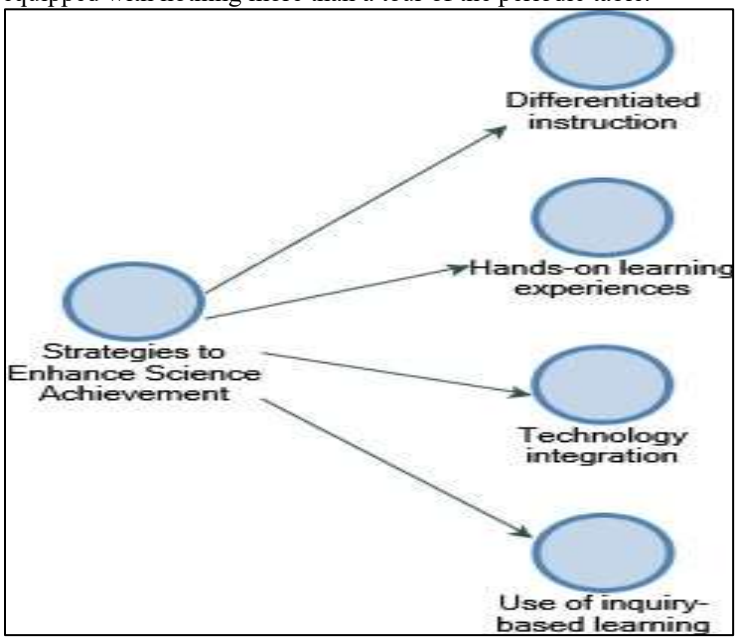

Figure 3. Main and Sub Themes: Strategies to Enhance Science Achievement

Strategies to Support Students with Disabilities:

Individualized Education Plans were developed and put into place by teachers for students with disabilities, shown in Figure 4.

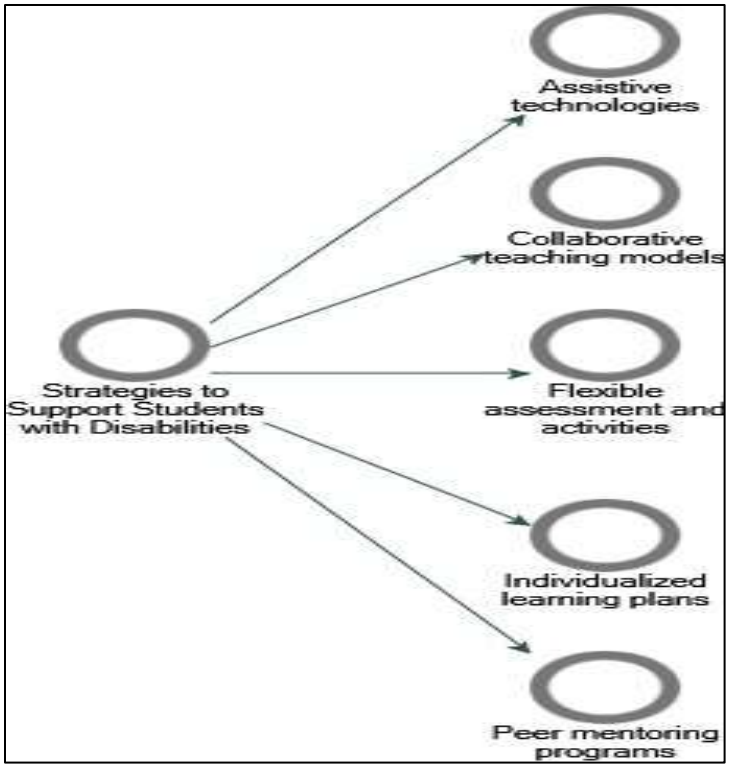

Figure 4. Main and Sub Themes: Strategies to Support Students with Disabilities

These plans were focused on the particular needs of the targeted individuals and were observed to provide a level of support and accommodation that was necessary for the students to function adequately in the general classroom. Special education teachers worked in tandem with general education teachers in a co-teaching environment that was more friendly and inclined toward the students in the special education program. These practices enable students with disabilities to learn alongside their peers within the general education classroom. Co-teaching refers to two or more educators sharing the responsibility for teaching a diverse group of students in one classroom. Following this premise, co-teaching can also be thought of as sharing the space, kids, and the responsibility for making a difference in the learning of the students in that space.

Strategies to Enhance EI, Resilience, Science Achievement, and Support for Students with Disabilities (Based on Interview Data)

The interview data was analyzed thematically, capturing key themes and sub-themes along with participants' rich narratives. Their perspectives offer insights into the implementation of EI strategies in inclusive science classrooms. Table 1 presents the main themes and sub-themes identified from the data collected through interviews.

Table 1. Main and Sub Themes: Strategies to enhance EI, Resilience, Science achievement and Support for students with disabilities (Interview Data)

S.No.	Main Themes	Sub Themes
1.	EI Strategies for Enhancing Resilience	1.1: Building Growth Mindset 1.2: Promoting Self-Awareness and Self-Management
2.	Opportunities and Challenges in Supporting Students with Disabilities	2.1: Leveraging Assistive Technologies 2.2: Addressing Resistance and Misconceptions 2.3: Collaborating Across Roles
3.	Impact of EI-Based Practices on Classroom Dynamics	3.1: Improved Teacher-Student Relationships 3.2: Enhanced Peer Interactions 3.3: Managing Conflicts

Teachers and support staff use EI strategies to nurture a growth mindset, helping students embrace challenges and persist through difficulties.

"We often encourage students to see challenges as opportunities to grow, especially in science experiments where failures are common." (Teacher)

"A student once said, 'I can't do this,' but after we reframed it as 'I can't do this yet,' the shift in their attitude was remarkable." (Counselor)

"Science is full of trial and error, so I make sure students understand that mistakes are part of discovery." (Teacher)

"When students achieve something they thought they couldn't, I highlight their effort and remind them of their growth." (Special Educator)

EI strategies empower students to understand and regulate their emotions, enhancing their resilience and focus in the classroom.

"We teach students to identify what they're feeling and how to manage those emotions before they escalate." (Paraprofessional)

"For example, a student who often gets frustrated in group activities learned to use positive self-talk to stay calm." (Special Educator)

"Students now recognize when they need a break and can request one instead of acting out." (Teacher)

"Simple techniques like journaling have helped students process their emotions and focus better in class." (Counselor)

Assistive technologies provide significant opportunities for inclusivity, making learning more accessible and equitable for students with disabilities.

"Using apps that convert text to speech has been a game-changer for students who struggle with reading." (Special Educator)

"One student loved the visual science simulations, which helped them grasp concepts they couldn't before." (Teacher)

"Interactive whiteboards let us cater to diverse learning needs by displaying visual aids alongside verbal explanations." (Paraprofessional)

"Technology isn't just a tool; it's a bridge that connects students with disabilities to the broader classroom experience." (Counselor)

Misconceptions about the relevance of EI in science teaching and inadequate professional development contribute to resistance among educators.

"Some teachers think EI strategies are too 'soft' and don't align with rigorous science teaching." (Teacher)

"It's hard to convince colleagues that these strategies are not just for students with disabilities but benefit everyone." (Counselor)

"We need more training to see these strategies as integral, not extra work." (Special Educator)

"Resistance often stems from a lack of understanding, but once they see the results, opinions change." (Paraprofessional)

Effective collaboration among educators and support staff enhances the application of EI strategies and supports diverse learners.

"The collaboration between science teachers and support staff has made a big difference in managing diverse needs." (Special Educator)

"When we plan lessons together, we're able to address both academic and emotional needs." (Teacher)

"Having regular meetings helps us stay aligned and tackle challenges as a team." (Paraprofessional)

"Collaboration isn't just helpful; it's essential for creating an inclusive learning environment." (Counselor)

EI strategies strengthen the teacher-student bond, fostering an environment of trust and support.

"Building trust with students has made them more willing to seek help when they're struggling." (Teacher)

"I've noticed that students open up more when they feel the teacher genuinely cares." (Paraprofessional)

"EI practices make us more attuned to students' needs, which improves our connections." (Counselor)

"Students say things like, 'I feel safe here,' which shows how much they value being understood." (Special Educator)

EI strategies promote empathy and teamwork, improving peer relationships and inclusivity in science classrooms.

"Group activities are great for breaking barriers between students with and without disabilities." (Teacher)

"Students now support each other more, even outside class. They've become more empathetic." (Counselor)

"When students work together on science projects, they realize the value of diverse perspectives." (Paraprofessional)

"I've seen students who were once isolated become key contributors in group discussions." (Special Educator)

Conflict resolution strategies rooted in EI reduce disruptions and foster a collaborative classroom environment.

"Teaching students to articulate their feelings has reduced arguments and improved problem-solving." (Teacher)

"Now, when conflicts arise, students try to understand each other instead of reacting negatively." (Special Educator)

"We've equipped students with tools like 'I-statements,' which they use effectively during disagreements." (Counselor)

"Conflict resolution has become a part of their learning, making the classroom a more positive space." (Paraprofessional)

The interview data, validated through member checking and corroborated by focus groups, highlights the integral role of EI strategies in enhancing resilience, supporting students with disabilities, and fostering positive dynamics in

inclusive science classrooms. Participants' diverse perspectives illustrate both opportunities and challenges, offering a comprehensive view of the practical application and impact of these strategies.

Strategies to Enhance EI, Resilience, Science Achievement, and Support for Students with Disabilities (Based on Focus Group Discussions)

The focus group discussions involved students with and without disabilities, focusing on their perceptions of EI strategies implemented in the classroom. Feedback was collected on the strategies' impact on resilience, science achievement, and support for students with disabilities. Responses were mixed, indicating that while some strategies were appreciated, others were inadequately implemented, limiting their effectiveness. Table 2 presents the main themes and sub-themes identified from the data collected through focus group discussions.

Table 2. Main and Sub Themes: Strategies to enhance EI, Resilience, Science achievement and Support for students with disabilities (Focus Group Discussions)

S.No.	Main Themes	Sub Themes
1.	EI Strategies for Enhancing Resilience	1.1: Building Growth Mindset 1.2: Promoting Self-Awareness and Self-Management
2.	Opportunities and Challenges in Supporting Students with Disabilities	2.1: Leveraging Assistive Technologies 2.2: Addressing Resistance and Misconceptions 2.3: Collaborating Across Roles
3.	Impact of EI-Based Practices on Classroom Dynamics	3.1: Improved Teacher-Student Relationships 3.2: Enhanced Peer Interactions 3.3: Managing Conflicts

While students recognize the effort to promote a growth mindset, inconsistent implementation, and lack of individualized support undermine its effectiveness. Feedback indicates a gap between rhetoric and practice.

"I like how we're told to keep trying, but sometimes it feels like the teacher doesn't notice when we actually improve." (Student with a disability)

"We hear a lot about not giving up, but it's frustrating when we don't get help to figure out why we failed." (Student without a disability)

"I don't feel like the teacher believes in my abilities, even though they say I should believe in myself." (Student with a disability)

"It's hard to think of failure as learning when we are scolded for mistakes." (Student without a disability)

Although self-awareness strategies are introduced, their sporadic use limits students' ability to internalize and apply them. Students express a desire for more consistent and meaningful engagement with these strategies.

"The calming techniques help me sometimes, but we don't practice them enough to remember how to use them." (Student with a disability)

"I don't really understand why we're asked to reflect on our feelings—it feels awkward in the middle of class." (Student without a disability)

"Sometimes I wish we had more time to talk about managing stress, but it seems rushed." (Student with a disability)

"When I feel frustrated, I don't know if the teacher really notices or cares." (Student without a disability)

Students appreciate the potential of assistive technologies but express frustration with their inconsistent integration into lessons. Technical issues and lack of training diminish their usefulness.

"The science simulations on the computer are cool, but we don't use them as much as we could." (Student with a disability)

"I think the tools are helpful, but some of us don't even know how to use them properly." (Student without a disability)

"Sometimes, the technology doesn't work, and the teacher just moves on instead of fixing it." (Student with a disability)

"We have devices, but they don't always feel like they're part of the actual lesson." (Student without a disability)

Students observe resistance among educators, suggesting that some teachers lack confidence or commitment in applying EI strategies, which impacts the classroom atmosphere.

"I feel like some teachers don't understand how to help students like me." (Student with a disability)

"It's obvious when a teacher is uncomfortable using these strategies, and it makes the class awkward." (Student without a disability)

"We're told to ask for help, but not all teachers seem open to giving it." (Student with a disability)

"Sometimes it feels like they just do these strategies because they have to, not because they care." (Student without a disability)

Students value collaboration between educators and support staff but note its inconsistency. A lack of coordination creates confusion and limits the impact of EI strategies.

"I wish there was more teamwork between our teachers and the special education staff." (Student with a disability)

"Sometimes, we get mixed messages because different staff members don't seem to be on the same page." (Student without a disability)

"It's confusing when support staff aren't involved in the science lessons—they should be part of it." (Student with a disability)
"We feel supported when the teacher and aides work together, but that doesn't always happen." (Student without a disability)

Students highlight the importance of teacher-student relationships but note variability in teachers' attention and responsiveness, which affects their sense of being valued.

"It feels good when the teacher listens to us, but that doesn't happen all the time." (Student with a disability)
"Some teachers are really nice and supportive, but others seem too busy to notice us." (Student without a disability)
"I like when the teacher checks in with us, but it doesn't happen as much as I wish." (Student with a disability)
"Sometimes it feels like only the loud or smart kids get attention." (Student without a disability)

Peer interactions are seen as valuable but unevenly successful. Lack of teacher facilitation during group activities limits the full potential of inclusive practices.

"Group projects help us work together, but not everyone participates equally." (Student with a disability)
"I like helping my classmates, but sometimes they don't take it seriously." (Student without a disability)
"Some peers are really supportive, but others don't seem to care about including everyone." (Student with a disability)
"It's awkward when the teacher doesn't step in to make sure everyone is treated fairly." (Student without a disability)

While conflict resolution strategies are appreciated, students feel they are underutilized or insufficiently supported, leaving gaps in their practical application.

"I like learning how to handle conflicts, but we don't practice it enough." (Student with a disability)
"The teacher tells us to talk it out, but sometimes they don't guide us on how to do it." (Student without a disability)
"It helps when the teacher mediates conflicts, but they don't always notice them happening." (Student with a disability)
"We're told to resolve things ourselves, but not everyone knows how to do that." (Student without a disability)

The focus group discussions reveal that EI strategies, while present in classroom settings, are inconsistently implemented. Students acknowledge the potential of these strategies to foster resilience, improve science achievement, and support peers with disabilities but express frustration with gaps in their application. These findings highlight the need for better training, consistent practices, and stronger collaboration among educators to maximize the impact of EI-based teaching.

4.1 Document Analysis

The focus of the document analysis was on materials like lesson plans, teaching guidelines, school policies, Individualized Education Plans (IEPs), and other relevant documentation situated within the classrooms. The aim was to assess the extent to which EI strategies are formally embedded into the teaching and governing practices of the classrooms and whether the practices in these arenas align with the goals of the study to foster resilience, improve science achievement, and support students with disabilities.

4.2 Key Findings Identified in Document Analysis

Strategies for EI were occasionally included in lesson plans and teaching materials. For example, while some plans mentioned activities like reflective journaling or group discussions, these were not consistently applied across different subjects or classrooms. In science lessons, problem-solving and collaborative learning strategies were present but without any references to the EI principles on which they were supposed to be based. Overall, this review found that EI was not part of the instructional design conversation. This aligns with the feedback we received from students and educators indicating very uneven EI strategy implementation.

Students with disabilities have Individualized Education Plans (IEPs) that specify accommodations, such as extended time for tasks and assistive technologies. Yet, there remains a significant lack of focus—if not an outright absence—on EI strategies. Rarely, if ever, do IEPs include goals that pertain to any of the following; self-awareness, self-management, responsible decision-making, or relationship skills. In like manner, school-wide policies and plans tend to concentrate on academic achievement, with little to no mention of the emotional or social intelligence of students with disabilities. Documentation acknowledges the need for differentiated instruction. What these plans don't mention, and what the plans for the students don't seem to integrate, is a more holistic approach that serves the whole child, not just the part of him that thinks in academic terms.

Some documents contained exercises specifically designed to help the students develop resilience. These were often reflections on what had happened in the challenges of a certain science experiment or were some other type of "big idea" moment. However, these activities were inconsistently found in the documents and applied inconsistently by the teachers. Sometimes they were in the lesson and sometimes not. And the overall teacher guidance provided by their project was sometimes good and sometimes vague about when to do what. The documents, overall, didn't strongly send the message that they were trying to help teachers be more consistent in including resilience-building activities in their teaching.

Reviewed policies and guidelines offered scant guidance on teacher collaboration with special educators and support staff. They rarely mentioned the EI of personnel and its application to inclusive classrooms. Professional development efforts targeted the variety of instructional techniques necessary to address the diverse needs of the students and overtly focused less on the fostering of emotional and social skills that would enable the students to succeed. When we probe

the lack of emphasis on these partnership components, we may uncover some systemic barriers that preclude the effective implementation of EI strategies in the classrooms.

Resources about assistive technologies appeared to be old and likely of little use to teachers. Many lacked clear models to help them understand what these technologies were, how they could amply assist students, and why they might be necessary. As a result, most just did not use them, and some even told students they were not allowed to use the tools. This reluctance also stemmed from a lack of comfort with the idea of not just using the tool but first using the technology to first persuade faculty that the tools were worth using.

Several gaps appeared to be present when it came to the formal integration of EI strategies in classroom practices. The analysis of these documents revealed a few components that seemed to be in better shape. Resilience-building, for example, is a part of the school's overall approach, as are assistive technologies. But they and several other components do not come close to representing a comprehensive or consistent implementation of EI strategies. The above-mentioned components succeed or fail based largely on the individual educators who happen to be in the classroom at a given time. And even when components of a decent model are present (like "collaboration among educators"), emphasis on that component is often in such a vague and latitudinal state as to render it virtually ineffective.

5. DISCUSSION

This study aimed to investigate the perceived value, implementation, and experience of EI strategies in inclusive science classrooms. It specifically asked three research questions. The first was, "How do teachers perceive and implement EI strategies to enhance resilience and learning outcomes in science classrooms?" It then asked, "What challenges and opportunities do teachers and support staff encounter when applying EI strategies to support students with disabilities?" Finally, the study explored, "How do EI-based teaching practices shape 'classroom' interactions, particularly when it comes to 'peer' relationships, in inclusive science classrooms?" The answers to these questions reveal a complex interplay between policy, practice, and perception, highlighting both ample successes and some significant areas for improvement.

The study showed that teachers do value EI strategies, but their implementation is erratic and often superficial, reflecting a gap between documented policies and observed practices confirmed across multiple data sources, but their implementation is erratic and often superficial. Observational data indicated that some teachers used practices like collaborative learning and reflection but did not systematically embed them into their routines (Ononye et al., 2022). We also talked with the teachers in more detail to get a sense of what they were doing and why. Focus groups with students made clear that they often saw teachers using some EI strategies but with substantial inconsistencies. We also found scant evidence of EI being explicitly integrated into either lesson plans or school policies. These findings made it clear to us that if EI is going to help in the way we think it can, then much clearer (for both teachers and students) and much more consistent guidelines (for within the classroom and across the school) are necessary (Trigueros et al., 2020).

Students with disabilities need more help than what they are currently getting. This was identified as a main area of concern, according to the observations and focus group discussions conducted. Even though assistive technologies and accommodations are present, their use, and the stylized integration of them into the teaching environment, is very inconsistent (Halimi et al., 2021). Educators haven't received enough professional development to comfortably discuss the level of EI necessary to support a student with a disability. Even when we take a look at the evidence presented to us, it becomes clear that there's a heavy focus on academic accommodations and not nearly enough attention given to how a student might be feeling on any given day when they might be dealing with a disability. Despite the fact that it's far from perfect, the evidence strongly suggests that the technologies and environment that have the potential to create a very inclusive space are there. It's the outside factors that are holding them back (Hwang & Kim, 2023).

The research uncovered that EI strategies influenced classroom dynamics positively, but their potential was not completely realized. Observations and focus groups uncovered that group activities and conflict resolution exercises often improved peer interactions and fostered empathy. But students expressed a good amount of frustration with inconsistent teacher facilitation that sometimes allowed inequities or conflicts to persist (MacCann et al., 2020). The interviewed teachers acknowledged the importance of these strategies in improving relationships among students, but they pointed out that their enough time and resources needed to carry out the strategies consistently was lacking. They emphasized that the absence of structured plans and even simple directives left them in a difficulty (García-Martínez et al., 2022).

All data sources clearly indicate the disconnection between strategies that are documented and their real-world application. The policies and lesson plans of schools acknowledge the need for differentiated instruction, inclusivity, and EI. Yet the policies and plans don't prioritize them and instead leave staff to follow the letter of the law and work with EI concepts when they can (Collado-Soler et al., 2023). Teachers use their individual interpretations of the documents as a base to work with EI principles; as a result, the effectiveness of EI in the schools is highly variable. Student feedback indicates that they want EI principles to be a more consistent part of their lives at school. Document analysis and interviews point to a lack of training and collaboration around EI concepts as the obvious and unfortunate gap in the effective use of EI in schools. To tackle these problems, schools should create complete frameworks to

integrate EI into teaching practices. They need to provide ongoing professional development that helps teachers execute these plans (Cuartero & Tur, 2021).

6. CONCLUSION

In this study, the authors explored the role of EI strategies in fostering resilience, improving science achievement, and supporting students with disabilities in inclusive classrooms. They found something surprising; there is not a singular, well-defined pathway to the positive impacts these strategies can have on students' academic and emotional growth, as well as classroom dynamics. Many teachers mentioned EI and its importance to the work they do but were unsure of its concrete application on a daily basis. The study paints a pretty clear picture; support for students with disabilities is an area quiet underdeveloped, support for teachers is rarely mentioned, and other noted dynamic was the almost subsistence-level presence of conflict resolution strategies that form a crucial bridge to EI. These findings highlight a significant problem with the teaching strategies employed in these academic settings.

7. Recommendations

Clear policies emphasizing EI are a requisite in today's educational institutions. When institutions prioritize EI, the effects are felt across many sectors—most notably with the student population, who are the ultimate beneficiaries of such intelligent policymaking. Policies should not just merely "mention" the concept of EI. Rather, they should serve as a vehicle through which an institutional investment in EI can be delivered. "Resilience, improved science achievement, and the support of students with disabilities" are the stated priority areas of the aforementioned policies.

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Ethical Approval/Institutional Review Board Statement: The studies involving humans were approved by Institutional Review Board (IRB), University of Education, Lahore, by letter no. 47-18/CMS, dated 2 August 2023. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

Informed Consent Statement: Written informed consent was obtained from the individual(s), and minor(s)' legal guardian/next of kin, for the publication of any potentially identifiable images or data included in this article.

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Data Availability

All the data has been provided in the manuscript.

Conflicts of Interest: The authors confirm that they do not have any known financial interests or personal relationships that could have in influenced the results or interpretation of their work as reported in this paper.

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