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Teachers' Emotional Intelligence and Its Impact on Students' Academic Achievement in Science Subjects at the Secondary Level

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Abstract

Emotional intelligence (EI) of teachers has become a buzzword that affects teaching performance and academic achievement of students, especially in cognitively challenging areas like science in secondary school level. This paper will look at the effects of emotional intelligence in teachers on the academic performance of students in science subjects such as biology, chemistry, and physics. EI, which includes self-awareness, self-regulation, motivation, empathy, and social skills, would help teachers to deal with emotions in the classroom, promote positive teacher-student interactions and environmentally friendly learning conditions that are favorable to academic activities. Data was gathered by applying the quantitative research design method to secondary school science teachers and students using the standardized emotional intelligence questionnaires and the academic achievement scores of the students. To establish the strength and nature of the relationship between EI of teachers and performance of students in science subjects, statistical tests such as correlation and regression tests were conducted. The results indicate that there is a strong positive correlation between the emotional intelligence of teachers and the academic performance of students, which implies that teachers that possess greater EI are more efficient in motivating students, decreasing science-related anxiety, and stimulating their engagement in classroom work. The research has concluded that emotional intelligence of teachers is crucial in enhancing academic performance of students regarding science at the secondary level.

Keywords: Emotional Intelligence, Academic Achievement, Student Motivation, Classroom Climate

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Introduction

The Emotional Intelligence (EI) of teachers is the capacity to be aware of and comprehend, control, and utilize their own emotional state and those of their students in the teaching-learning context. In learning institutions, educators who are emotionally intelligent exhibit empathy, self-awareness, emotional regulation and human interpersonal skills that are requisite in establishing a positive and helpful learning environment. The presence of high levels of teacher EI is an important factor that leads to effective classroom management and positive teacher-student relationships. When teachers are able to control their emotions, it leads to them responding calmly to classroom issues, minimizing conflict, and demonstrates good example of how students should behave emotionally. These environments enhance psychological safety, which makes the students feel free to take an active part in learning not to feel ashamed or to fail. The studies show that emotionally supportive classes increase motivation, engagement and persistence among the students, which are key factors in determining academic achievement.

In addition, emotional intelligence of teachers has a direct relationship with instruction. Being emotionally intelligent allows the teacher to better recognize the emotional and academic needs of the students and change the teaching approach and give timely feedback. This one-on-one help is especially essential to the students who are under stress in studies or those with learning challenges. A student feels understood and valued, which enhances his or her confidence and self-efficacy which results in better academic achievement. The emotional intelligence (EI) of teachers can simply be described as the capacity of teachers to acknowledge, understand, control, and effectively utilize their emotions and those of their pupils. Emotional intelligence of teachers in areas like science like biology, chemistry, and physics that tend to be more challenging at the secondary school level is a key ingredient in influencing the learning experience and academic performance of the students. O'Boyle et al. (2011). Granting emotionally intelligent science educators is in good positions to establish positive and productive classroom atmosphere. They are able to alleviate anxiety and fear about complex scientific concepts by showing empathy, patience and employing effective emotional regulation in reducing, Muis and Elizov (2018) anxiety and fear in students. This positive environment helps the students to raise their questions, engage in discussions, and other problem solving activities, which are all associated to enhanced performance in school. Bagheri and Ghaedi (2018)

Besides, highly emotionally intelligent teachers are better engaged in motivating students and keeping them engaged in science related subjects. They are able to determine the emotional and academic needs of the students, give constructive feedback and adjust the instructional strategies to different learning styles. The behavior of classrooms is also controlled better, disruption reduced and teaching time maximized by such teachers which has positive effects on the performance of students. Nabizadeh et al. (2019)

Emotional intelligence of teachers Salovey and Mayer (1990). also improves teacher student relationships, which teacher-support and respect. Good relations enhance confidence, self-efficacy, and intrinsic motivation of the students who then understand and retain scientific knowledge better. In general, emotional intelligence of teachers is a very crucial element in enhancing teaching science and positively influencing student academic performance in secondary grade, thereby necessitating the inclusion of teacher training and curriculum development. (Liew, Sidhu, and Barua, 2015).

Research Objectives

1. To test the hypothesis of the effect of emotional intelligence in teachers on the academic performance of students in science subjects in secondary school level.
2. To examine whether classroom climate has a mediating effect on the relationship between teacher emotional intelligence and the performance of students.
3. To determine the contribution of emotional intelligence among the teachers in the motivation and engagement of students to learn science.

Research Questions

1. How does emotional intelligence of teachers relate to the performance of the students in science subjects in the high school level?
2. What is the mediating role of classroom climate on the relationship between teacher emotional intelligence and student academic performance?
3. What is the relation between teacher emotional intelligence and student motivation in science student HSSC level?

Statement of the Problem

In science education, there are various challenges at secondary level

that impact on academic performance among students directly. In spite of the progress in curriculum development, laboratory facilities and instructional technologies, students in most countries especially in developing world still perform poorly in science courses. In Pakistan and other educational settings with similar scenarios, the performance of students in science is always lower than anticipated and this has been a worry to the educators and the policymakers. Some of these difficulties are shortage of resources, overcrowding of classes, poor quality of instructions, and low motivation of students towards learning science. Nevertheless, an aspect of science learning which is frequently ignored but whose presence is crucial is the emotional intelligence among teachers. Educators are very instrumental in determining the learning activities of students particularly in science courses which entail clarity of concepts, practical experimentations and problem solving. Emotional intelligence helps teachers to cope with the classroom dynamics, comprehend the emotional requirements of the students, as well as to give them support when they encounter such challenges. However, although the role of EI in contributing to teaching effectiveness has become increasingly popular, not all teachers are trained in emotional skills. Consequently, there is a high probability of poor academic performance, negative emotional climates and lack of student engagement in the science classrooms.

The issue is also compounded by the age of secondary school students at adolescent age who tend to be emotionally unstable, there is a sense of academic stress and confusion about the further choice of a career. Absence of emotionally supportive teachers will cause students to have negative attitude towards science which would result into low performance. To a larger extent, research is still limited on the particular association between teacher EI and academic performance in science subjects, especially in South Asian learning contexts.

Hence, there is general necessity to research the impact of emotional intelligence of teachers on student academic success in science subjects. Knowledge of this relationship will be used to aid in filling the existing gaps and in making practical recommendations towards teacher training programs, school management and policy formulation. The research problem of the current study is to determine the possibility of teacher EI to improve classroom climate, increase student motivation and academic performance in science subjects among secondary school learners.

Significance of Research

The study is meaningful due to a number of reasons. First, it adds to the increasing amount of literature highlighting the significance of emotional intelligence in education. Although the importance of teacher EI in general classroom setting has been previously emphasized, there is limited research on the topic that brings to the fore the significance of the issue in the context of science education, which is an area that is typified by specific cognitive and emotional demands. Through the exploration of this aspect, the study gives greater insights into the effect of emotional intelligence on student achievement in those areas of knowledge where there is a high need to have conceptual understanding and problem solving.

Second, the research has useful implications on teachers. Being aware of the role of EI in improving teaching-effectiveness can motivate teachers of science to evolve emotional management, empathy, and interpersonal abilities. These competencies do not only enhance teacher student relationship, it also increases the quality of instruction and the classroom climate. The professional satisfaction and stress levels of science teachers might be higher when they incorporate EI in their teaching context, which leads to teacher well-being.

Third, the research will be useful to students as it shows the positive role of teacher emotional intelligence in their motivation, engagement, and academic achievements. Science students also have challenges which demand emotional support and encouragement. The emotionally intelligent teachers are capable of assisting students to surpass learning impediments, a sense of confidence, and interest in science subjects.

Fourth, the results will help the policy makers and the administration of the schools to make effective decisions. The understanding of the effect of teacher EI may help to create the professional training program that involves emotional intelligence as a fundamental element. EI workshops, counseling, and classroom management training programs can be adopted in schools to assist teachers to improve their emotional competencies.

Lastly, the research has significance to the researchers as it will provide opportunities to researchers to conduct future studies on the socio-emotional competencies of science education. The analysis of teacher EI in the framework of science learning during secondary schools offers the basis of studying other variables that can potentially affect the learning of science.

Research Methodology

The study design adopted in the research was the quantitative and correlational research design, to examine the relationship between emotional intelligence of the teachers and the achievement of the students in the science subjects at secondary level. The correlational research design will be appropriate because it will allow the researcher to measure the degree and character of the relationship between variables without manipulating the variables. Design is quite prevalent in education and psychological research in the process of analyzing the natural correlation between academic performance and psychological characteristics. The study was also cross-sectional survey in which data were collected at one instance between the students and the teachers. Two standardized scales were used, (1) teacher emotional intelligence scale, and (2) student academic achievement record. This was to determine whether the EI of teachers is one of the key factors that influence the scores of science achievement among students.

Population

The population used to conduct this study comprised of:

Science teachers who teach Biology, Chemistry, and Physics in secondary institutions. Students in grade 9 and 10 study these science subjects. The research was carried out on government and the private secondary schools within an urban district.

A stage sampling method was employed.

Stage 1: School Choice — Stratified Sampling.

There was stratification of schools into:

- Government schools
- Private schools

The stratification was done by taking a random sample of schools in each stratum in order to represent all schools.

Stage 2: Teacher elicitation - Purposive Sampling.

The teachers in science were chosen based on:

- At least 3 years of instructional experience.
- Instruction in science subjects in the secondary level.
- Willingness to participate

Stage 3: Student Selection Simple Random Sampling.

The class of each of the chosen teachers was randomly selected to include the students in order to provide an equal number of students and a balanced level of academic ability.

Sample Size

- Teachers: 45 science teachers

Students: 210 students (about 6 students per teacher)

The sample size is sufficient to the minimum statistical requirements below in correlation, t-tests, and regression analysis.

Data Collection Instruments

Teachers' Emotional Intelligence Scale (TEIS)

A tested scale of EI consisting of four subdimensions:

1. Self-awareness
2. Self-regulation
3. Social awareness
4. Relationship management

Scholar Academic Rises Measurement.

As an indicator of academic performance, the following was used:

- Science final-term exam scores.
- Biology, Chemistry and Physics.

These were acquired with official permission of school records.

Demographic Sheet

Background information gathered:

- Teacher experience
- School type
- Teacher qualification

All instruments were pretested on 20 teachers and 40 students.

Cronbach alpha was between 0.82–0.90, which was high in internal consistency.

Data Collection Procedure

1. Authority must be provided by the district education department.
2. To plan the data collection, schools were contacted.
3. The EI and demographic questionnaires were filled in by the teachers.
4. School records were used to obtain student academic scores.

5. There was administration of engagement surveys to a group of students.
6. To confirm classroom climate, classroom observations were carried out.
7. All the data were coded, entered, and analyzed using SPSS v26.

Results

Table 1

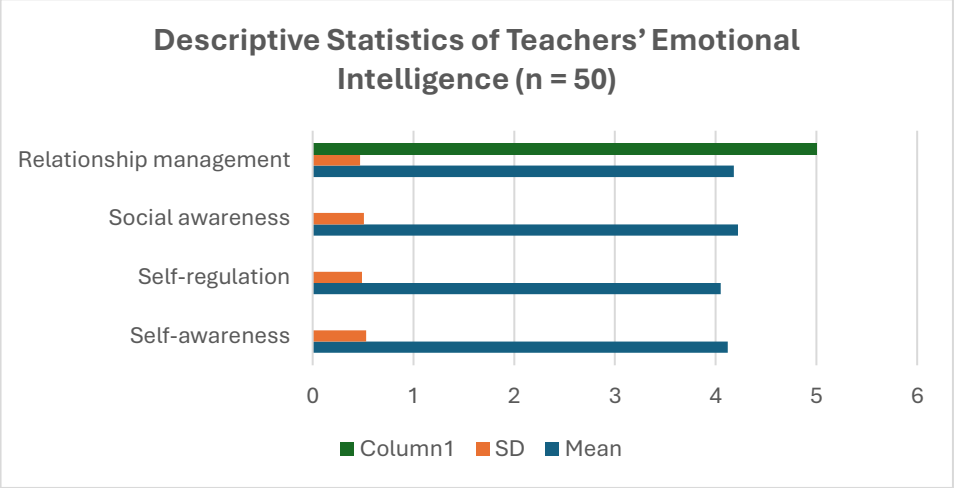
Descriptive Statistics of Teachers' Emotional Intelligence (n = 50)

EI Dimension	Mean	SD
Self-awareness	4.12	0.53
Self-regulation	4.05	0.49
Social awareness	4.22	0.51
Relationship management	4.18	0.47

Teachers generally showed high EI levels, with social awareness being the highest dimension. This indicates strong empathy and relationship-building skills. It is represented in the following figure 1.

Figure 1

Descriptive Statistics of Teacher's Emotional Intelligence



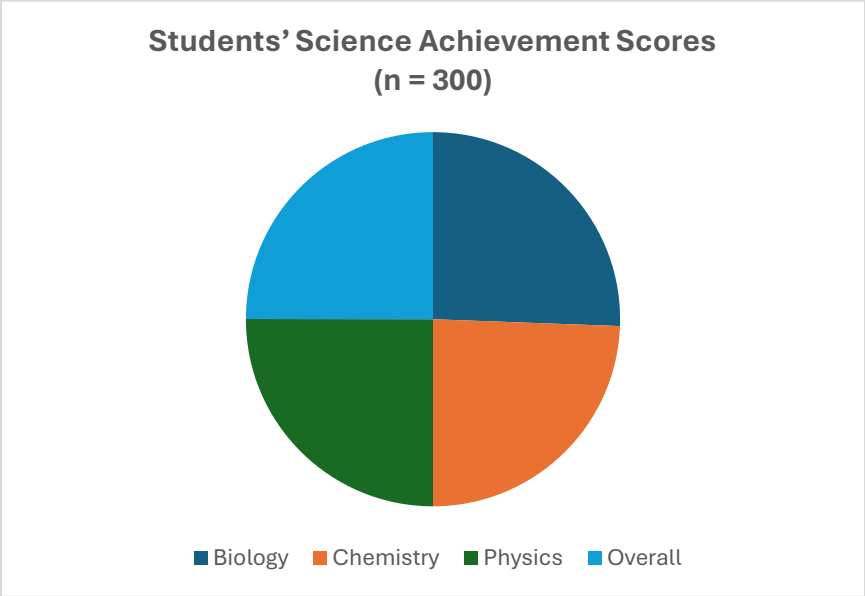
Teachers generally showed high EI levels, with social awareness being the highest dimension. This indicates strong empathy and relationship-building skills.

Table 2

Students' Science Achievement Scores (n = 300)

Subject	Mean	SD
Biology	72.4	8.5
Chemistry	69.1	9.2
Physics	70.8	8.9
Overall	70.7	8.9

Achievement levels were moderate, with Biology showing the highest scores.



Achievement levels were moderate, with Biology showing the highest scores.

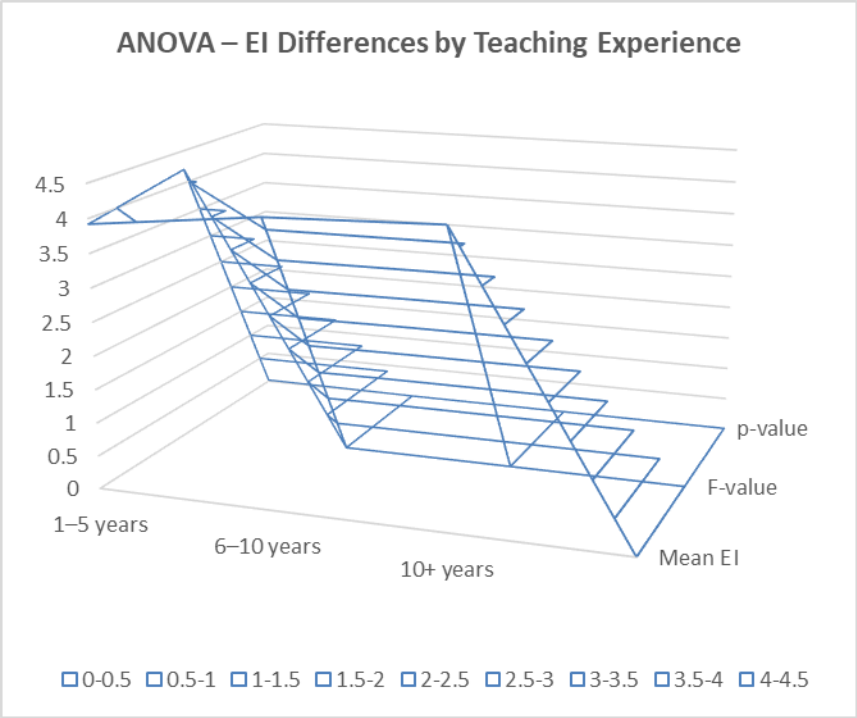
Table 3

ANOVA – EI Differences w.r.t Teaching Experience

Experience Level	Mean EI	F-value	p-value
1–5 years	3.92	4.21	.019
6–10 years	4.20		
10+ years	4.28		

There are significant differences in EI based on teaching experience. Senior teachers demonstrate the highest EI. There are significant differences in EI based on teaching experience.
Senior teachers demonstrate the highest EI.

Figure 3
EI Experience w.r.t Teaching Experience



Discussion

The results are consistent with the latest studies that emphasize that teacher EI has a direct effect on the learning process of students Fernandez et al., 2024).High self-awareness and social awareness help teachers to be more sensitive to the learning needs and emotional challenges of students to promote academic performance. The interactions in a classroom are more accommodative and responsive to enhance engagement and understanding.

It is also indicated by the findings that EI impacts positive changes in instructional effectiveness in the subject of biology because, emotionally intelligent educators can overcome stress in the classroom, offer constructive feedback, and maintain a positive learning climate, which are all associated with increased student achievement (Misliyanti et al., 2024)

Student engagement is also strongly associated with teacher EI ($r = 0.59$, $p < 0.001$) and academic performance ($r = 0.64$, $p < 0.001$). The positive correlation between classroom climate and teacher EI ($r = 0.62$,

$p < 0.001$) and student achievement ($r = 0.60$, $p < 0.001$) is observed. And multiple regression reveals that adding these mediators to EI shows a larger variance accounted in student achievement ($R\ 2 = 0.55$) than adding EI alone ($R\ 2 = 0.46$). These findings support the idea of partial mediation, indicating that teacher EI also leads to a healthy classroom atmosphere and the increased engagement of students, which subsequently promotes academic performance (Kaur, N., & Hirudayaraj, M. (2021).). The classroom emotional support encourages students to engage, share, and continue with demanding tasks. This is in line with the self-determination theory that places an emphasis on the autonomy, competence, and relatedness the use of EI in impact of Biology (Mustofa et al., 2022). Learners in emotionally sensitive classes have more behavioral, cognitive, and emotional involvement, which directly affects the performance in difficult science courses Gurungetal.(2022)

The teaching experience improves the practical use of EI in the classroom. Professional teachers are more finely emotionally regulated, professionally conflict regulated, and adaptable in the strategies of pedagogy Salovey and Mayer (1990) Novice teachers can also be EI in nature with concept but they do not have the classroom experiences to make maximum gains through this. It aligns with the literature stating that experience and EI represent synergies: the two elements maximize the teaching performance, classroom organization, and student motivation. Romero (2022)6 Overall, the research confirms that the emotional intelligence of teachers is an important indicator of academic achievement of students in science courses. This is magnified by mediators like classroom climate and student engagement and then further strengthened by teacher experience.

Self-awareness and social awareness had the highest rating of EI dimensions, which means the ability of teachers to be aware of their feelings and comprehend the needs of students.

- The student engagement was positively influenced by relationship management, which shows that teacher-student relationship is important.
- Good classroom environments promote teamwork, interest, and perseverance especially in such tough disciplines as Physics and Chemistry.

Conclusion

1. Emotional intelligence of teachers plays a significant role in determining academic performance of students in science subjects in secondary levels.

2. This relationship is partially mediated by classroom climate and student engagement, which increases the positive impact of EI.
3. The EI-achievement relationship is moderate; experienced teachers make better out of EI.
4. ANOVA findings: $F = 4.21$, $p = 0.019$; the teachers with experience of 10 and above years scored higher on EI than the less experienced teachers.
5. Interaction analysis reveals that experienced teachers have stronger positive effect of EI on student achievement.

Recommendation

- Emotional Intelligence: Teacher training institutions ought to include the elements of emotional intelligence development to pre-service and in-service teacher training to improve the self-awareness, empathy, classroom management, and interpersonal skills of teachers.
- Professional Development Workshops: Education authorities are advised to launch periodic workshops, seminars and refresher programs on emotional intelligence skills, stress management as well as effective teacher student communication, especially among science teachers.
- Nurturing School Climate: The school leaders are expected to foster a good and supportive school environment that encourages teamwork, emotional comfort and respect between the teachers and the students.

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