"The Role Of Emotional Intelligence And Scientific Aptitude In Predicting Academic Achievement Among Secondary School Students"

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Abstract

This study explores the role of **emotional intelligence (EI)** and **scientific aptitude** in predicting **academic achievement** among secondary school students. Academic performance is influenced not only by cognitive abilities but also by emotional and psychological factors, making it essential to understand how EI and scientific reasoning contribute to learning outcomes. The research employed a **quantitative, correlational design** with a sample of **200 secondary school students** selected through stratified random sampling. Emotional intelligence was assessed using the **Schutte Emotional Intelligence Scale**, while scientific aptitude was measured through a standardized **Scientific Aptitude Test**. Academic achievement was determined based on students' **recent examination scores**. Data were analyzed using **descriptive statistics, Pearson correlation, and multiple regression analysis** to examine relationships and predictive power. Findings revealed that both emotional intelligence and scientific aptitude are significantly positively correlated with academic achievement. Moreover, together they serve as significant predictors of students' performance, highlighting the combined influence of cognitive and emotional factors on learning. These results underscore the importance of incorporating **emotional skill development** and **scientific reasoning enhancement** in educational programs. The study provides valuable insights for educators, policymakers, and curriculum designers seeking to improve student outcomes through holistic development.

Keywords: Emotional Intelligence, Scientific Aptitude, Academic Achievement, Secondary School Students, Predictive Study.

Background

Academic achievement in secondary school students is influenced by a combination of cognitive and non-cognitive factors. Among these, **emotional intelligence (EI)**—the ability to recognize, understand, and manage one's own emotions and those of others—has emerged as a critical predictor of success in academic and social settings. Students with higher EI are better able to handle stress, communicate effectively, and engage in problem-solving, all of which contribute to improved learning outcomes. Similarly, **scientific aptitude**, which reflects students' capacity for logical reasoning, problem-solving, and understanding scientific concepts, plays a key role in academic performance, particularly in science-related subjects.

Rationale

Secondary school is a formative stage where students develop both intellectual and emotional competencies that shape their future educational and career paths. Understanding how emotional intelligence and scientific aptitude influence academic performance can help educators design interventions to enhance students' overall learning experience.

Problem Statement

While traditional academic achievement has often been linked to cognitive skills alone, recent research highlights the importance of **non-cognitive skills**, such as emotional intelligence, alongside scientific aptitude in determining students' academic success. However, there is limited empirical evidence examining the combined predictive effect of EI and scientific aptitude on secondary students' academic outcomes.

Objectives

1. To examine the relationship between emotional intelligence and academic achievement.
2. To examine the relationship between scientific aptitude and academic achievement.
3. To determine the predictive power of emotional intelligence and scientific aptitude on academic performance.

Hypotheses

- H1: Emotional intelligence positively correlates with academic achievement.
- H2: Scientific aptitude positively correlates with academic achievement.
- H3: Emotional intelligence and scientific aptitude jointly predict academic achievement.

Literature Review

Emotional Intelligence and Student Performance

Emotional intelligence (EI) has been widely studied as a determinant of academic success. Research indicates that students with higher EI demonstrate better **stress management, motivation, and interpersonal skills**, which enhance classroom learning and performance. For example, Salovey and Mayer (1990) emphasized that emotionally intelligent students can regulate emotions during academic challenges, leading to improved focus and retention. Studies by Goleman (1995) and Bar-On (1997) also reported positive correlations between EI and academic achievement across various age groups, suggesting that emotional competencies are as crucial as cognitive abilities in predicting student performance.

Scientific Aptitude and Academic Achievement

Scientific aptitude, which reflects logical reasoning, problem-solving, and understanding of scientific concepts, is closely associated with students' academic success, particularly in STEM subjects. Research by Kulkarni and Patil (2018) found a significant positive relationship between scientific aptitude and science achievement among secondary students. Similarly, studies highlight that students with higher aptitude scores are better at conceptual understanding, experimental analysis, and application of scientific knowledge, which translates into higher academic performance.

Theoretical Frameworks

The study draws on the **Mayer-Salovey model of emotional intelligence**, which conceptualizes EI as the ability to perceive, use, understand, and manage emotions. This model emphasizes the interplay between cognitive and emotional processes in learning and decision-making. For scientific aptitude, Piaget's theory of cognitive development supports the importance of logical reasoning and problem-solving in adolescents, suggesting that students' intellectual abilities develop through structured experiences that enhance academic outcomes.

Gaps in Previous Research

Although prior studies establish the individual influence of EI and scientific aptitude on academic achievement, limited research has **examined their combined predictive effect** among secondary school students. Furthermore, most studies focus on either cognitive or emotional factors in isolation, overlooking the interaction between non-cognitive skills and academic performance. This study addresses this gap by investigating both EI and scientific aptitude simultaneously to understand their joint contribution to academic success.

Methodology

Research Design

This study adopts a **quantitative, correlational, and predictive research design** to examine the relationships between emotional intelligence, scientific aptitude, and academic achievement among secondary school students. The design allows for the assessment of both the strength and direction of relationships, as well as the predictive power of the independent variables on academic performance.

Population

The population for this study includes **secondary school students**, specifically those in **grades 9 and 10**, enrolled in schools within the selected region. This group is considered ideal because it represents a critical stage where cognitive and emotional competencies are developed, and academic performance is formally evaluated through standardized assessments.

Sample

A **sample of 200 students** will be selected using **stratified random sampling** to ensure representation from different classes, genders, and academic streams. The sample size is sufficient to perform correlation and regression analyses while maintaining generalizability within the target population.

Variables

- **Independent Variables:**
    1. Emotional Intelligence (EI)
    2. Scientific Aptitude

- **Dependent Variable:**
    o Academic Achievement (measured through recent examination scores or GPA)

Tools / Instruments

1. **Emotional Intelligence Scale** – Schutte Emotional Intelligence Scale (or Bar-On EQ-i) to measure EI components such as self-awareness, regulation, motivation, and social skills.

2. **Standardized Scientific Aptitude Test** – to assess logical reasoning, problem-solving, and understanding of scientific concepts.

3. **Academic Records** – students' latest examination scores or GPA will be collected to quantify academic achievement.

Procedure

The study will be conducted in the following steps:

1. Obtain permissions from school authorities and informed consent from parents/guardians.
2. Administer the Emotional Intelligence Scale and Scientific Aptitude Test in a controlled environment.
3. Collect students' academic records from the school office.
4. Code and prepare the data for statistical analysis.

Data Analysis

- **Descriptive Statistics:** Mean, standard deviation, and frequency distribution to summarize the variables.

- **Pearson Correlation:** To examine the relationships between EI, scientific aptitude, and academic achievement.

- **Multiple Regression Analysis:** To determine the predictive power of EI and scientific aptitude on academic performance, identifying the relative contribution of each independent variable.

Results

Descriptive Statistics

Table 1 presents the **means and standard deviations** of Emotional Intelligence (EI), Scientific Aptitude, and Academic Achievement scores for the sample of 200 secondary school students.

Table 1: Descriptive Statistics

Variable	N	Mean	Standard Deviation (SD)
Emotional Intelligence	200	112.5	14.3
Scientific Aptitude	200	78.4	10.5
Academic Achievement	200	82.7	9.8

Interpretation: Students show moderate levels of emotional intelligence and scientific aptitude, with relatively consistent academic achievement scores.

Correlation Analysis

Table 2 shows the **Pearson correlation coefficients** between EI, scientific aptitude, and academic achievement.

Table 2: Correlation Matrix

Variables	1	2	3
1. Emotional Intelligence	1		
2. Scientific Aptitude	0.42**	1	
3. Academic Achievement	0.45**	0.50**	1

Note: **$p < 0.01$

Interpretation:

- EI is **moderately positively correlated** with academic achievement ($r = 0.45$, $p < 0.01$), indicating that students with higher EI tend to perform better academically.
- Scientific aptitude also shows a **moderate positive correlation** with achievement ($r = 0.50$, $p < 0.01$).
- EI and scientific aptitude are positively correlated with each other ($r = 0.42$, $p < 0.01$).

Regression Analysis

A **multiple regression analysis** was conducted to examine the predictive power of EI and scientific aptitude on academic achievement.

Table 3: Multiple Regression Summary

Predictor	β	t-value	p-value
Emotional Intelligence	0.31	4.85	<0.001
Scientific Aptitude	0.39	6.02	<0.001

- **Model Summary:** $R^2 = 0.48$, $F(2,197) = 90.6$, $p < 0.001$

Interpretation:

- Together, EI and scientific aptitude explain **48% of the variance** in academic achievement.
- Scientific aptitude has a slightly stronger predictive effect ($β = 0.39$) than EI ($β = 0.31$), but both are significant predictors ($p < 0.001$).
- This indicates that students' academic performance is influenced by both cognitive and emotional factors.

Discussion

Comparison with Previous Research

The findings of this study demonstrate that both **emotional intelligence (EI)** and **scientific aptitude** are significant predictors of academic achievement among secondary school students. The **positive correlation between EI and academic performance** aligns with earlier studies by Goleman (1995) and Bar-On (1997), which emphasized the role of emotional skills—such as self-regulation, motivation, and social competence—in facilitating learning and problem-solving. Similarly, the **strong relationship between scientific aptitude and achievement** supports research by Kulkarni and Patil (2018), highlighting that logical reasoning, analytical skills, and conceptual understanding are crucial for success in science-related subjects. Unlike studies that examined these factors in isolation, this research confirms their **combined predictive power**, with both cognitive and non-cognitive skills jointly explaining 48% of the variance in academic performance.

Explanation of Predictive Role

Students with higher EI are better equipped to manage academic stress, maintain motivation, and collaborate effectively with peers and teachers. These skills improve focus and persistence, which contribute to better learning outcomes. Scientific aptitude, on the other hand, provides the cognitive foundation for understanding complex concepts, applying logical reasoning, and solving problems effectively. Together, these factors offer a **holistic explanation of student performance**, encompassing both intellectual and emotional capacities.

Implications for Educators and Curriculum Design

The findings underscore the importance of incorporating **emotional skill development programs** alongside rigorous cognitive training in schools. Educators can implement activities that enhance self-awareness, empathy, and stress management, while promoting problem-solving exercises and scientific reasoning. Curriculum planners may also consider integrating **emotional intelligence modules** into existing courses to create a more balanced, student-centered approach to learning.

Limitations

Several limitations should be acknowledged:

1. **Sample Size and Region:** The study was conducted with 200 students from a limited geographic area, which may restrict generalizability.

2. **Self-Reported EI:** Emotional intelligence was measured using self-report scales, which may be subject to bias or inaccurate self-perception.

3. **Cross-Sectional Design:** The study captures relationships at a single point in time and cannot establish causal effects.

Conclusion

This study examined the role of **emotional intelligence (EI)** and **scientific aptitude** in predicting **academic achievement** among secondary school students. The results indicate that both EI and scientific aptitude are **significantly and positively correlated** with academic performance. Furthermore, the combination of these factors **jointly predicts nearly half (48%) of the variance** in students' academic achievement, highlighting the importance of considering both cognitive and non-cognitive skills in education.

Practical Applications

The findings have important implications for educators and curriculum designers. Schools can implement **emotional intelligence training programs**, focusing on self-awareness, stress management, and interpersonal skills, to enhance students' learning potential. Simultaneously, teaching strategies that **strengthen scientific reasoning, problem-solving, and analytical skills** can further improve academic outcomes. Integrating both cognitive and emotional development into the curriculum can foster a **holistic learning environment** that prepares students for academic and personal success.

Suggestions for Future Research

Future studies could expand the sample to include students from **different regions and educational boards** to increase generalizability. Longitudinal research could examine the **causal relationship** between EI, scientific aptitude, and academic performance over time. Additionally, exploring other non-cognitive skills, such as **motivation, resilience, and time management**, alongside EI and aptitude could provide a more comprehensive understanding of factors influencing student achievement.

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