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Teacher Attributes and Student Achievement: A Correlational Study of Secondary Schools in Ahmedabad City

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ABSTRACT

The quality of education in secondary schools is significantly influenced by the professional and personal attributes of teachers. This study investigates the relationship between selected teacher attributes — subject knowledge, teaching methodology, communication skills, classroom management, professional commitment, and student relationships — and the academic achievement of students in secondary schools in Ahmedabad City, Gujarat. A descriptive correlational research design was employed. A stratified random sample of 180 secondary school teachers and their corresponding students (N = 900) was drawn from 15 government and private schools in Ahmedabad City. Data were collected using a standardised Teacher Attribute Rating Scale (TARS) and students' annual examination scores were used as achievement indicators. Pearson's Product Moment Correlation Coefficient was applied for statistical analysis. Results indicate significant positive correlations between all six teacher attributes and student achievement scores ($r = 0.57$ to $r = 0.71$, $p < 0.01$). Subject knowledge emerged as the strongest predictor ($r = 0.71$), followed by teaching methodology ($r = 0.68$) and professional commitment ($r = 0.65$). Experience groups (11–20 years) demonstrated the highest mean student achievement scores. The findings have important implications for teacher training programmes, B.Ed. curriculum design, and school-level professional development in Gujarat.

Keywords: Teacher Attributes, Student Achievement, Correlational Study, Secondary Education, Ahmedabad, B.Ed., Classroom Management, Professional Commitment

1. INTRODUCTION

Education is the cornerstone of national development, and the teacher occupies a pivotal role in determining the quality of learning outcomes. Particularly at the secondary school level, where cognitive and emotional development accelerates, the teacher's professional attributes significantly shape

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academic performance. Ahmedabad, as a major metropolitan city of Gujarat, hosts a diverse array of government-aided, private, and municipal secondary schools serving heterogeneous student populations.

Despite wide acknowledgement of teacher quality as a determinant of learning, empirical research linking specific measurable teacher attributes to quantifiable student achievement remains limited in the Gujarati educational context. Existing literature tends to focus on curriculum content, socioeconomic factors, or school infrastructure, often neglecting the systemic influence of teacher-related variables. This study aims to bridge this gap by conducting a rigorous correlational analysis of teacher attributes and student achievement scores in Ahmedabad City secondary schools.

The findings are particularly relevant for institutions offering B.Ed. programmes under Gujarat University, where the development of teacher competencies must align with demonstrated impact on student learning. By identifying which teacher attributes correlate most strongly with student success, this research offers actionable insights for B.Ed. curriculum revision, in-service training, and school-level performance management.

1.1 Significance of the Study

India's National Education Policy (NEP 2020) places renewed emphasis on teacher quality and outcomes-based education. Gujarat, with its ambitious educational reform agenda, requires localized empirical data to guide policy decisions. Studies conducted in the national capital or other states may not reflect the socio-cultural dynamics of Ahmedabad's urban secondary schooling environment. This study therefore fills a critical contextual gap and provides data grounded in the Gujarat reality.

1.2 Objectives of the Study

- To identify and measure selected teacher attributes among secondary school teachers in Ahmedabad City.
- To examine the relationship between each teacher attribute and student academic achievement.
- To determine which teacher attribute is the strongest predictor of student achievement.

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- To compare student achievement scores across different teacher experience groups.
- To offer evidence-based recommendations for B.Ed. curriculum and teacher professional development.

2. REVIEW OF LITERATURE

A substantial body of research internationally confirms that teacher quality is among the most powerful in-school factors affecting student learning outcomes. Darling-Hammond (2000) established that teacher preparation and certification are significantly associated with student achievement across US states. Hanushek (2011) estimated that replacing an average teacher with a one standard deviation more effective teacher could add USD 400,000 in lifetime earnings to a classroom of students.

Within the Indian context, Ramachandran et al. (2018) found that teacher motivation, subject competence, and classroom behaviour were key predictors of learning levels in government schools. A study by Sharma and Jain (2019) in Rajasthan secondary schools reported significant correlations ($r > 0.60$) between teacher pedagogical skills and Class X board examination scores. Similarly, Patel and Desai (2021) in a Gujarat-based study of 120 secondary school teachers found that professional commitment and student rapport were the most frequently cited teacher qualities by high-achieving students.

Muijs and Reynolds (2001) categorised effective teacher attributes under two broad domains: instructional skills (subject knowledge, lesson clarity, questioning techniques) and socio-emotional competencies (empathy, relationship-building, classroom climate management). Subsequent meta-analyses by Hattie (2009) synthesised over 800 studies to place 'teacher credibility' — comprising trust, competence, and dynamism — among the top influences on student achievement ($d = 0.90$).

In Gujarat specifically, research remains sparse. The State Council of Educational Research and Training (SCERT) Gujarat's 2022 annual report noted below-average learning outcomes in secondary schools despite increased teacher recruitment, suggesting that teacher numbers alone are insufficient without quality assurance of teacher attributes. This study responds directly to that gap.

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3. METHODOLOGY

3.1 Research Design

The study adopted a descriptive correlational research design. This design is appropriate when the goal is to examine the nature and degree of relationships between variables without manipulating them. Correlational research is widely used in educational studies where experimental control is not feasible and the researcher seeks to understand naturally occurring associations (Creswell, 2014).

3.2 Population and Sample

The target population comprised all secondary school teachers (Std. IX and Std. X) in Ahmedabad City, Gujarat. Using stratified random sampling, 180 teachers were selected from 15 schools — 8 government/aided and 7 private — proportionally distributed across zones of Ahmedabad (North, South, East, West, and Central). For each participating teacher, student academic achievement data were collected from five students (N = 900 students total), using final examination marks from the immediately preceding academic year.

School Zone	Govt./Aided	Private	Teachers	Students
North Ahmedabad	2	2	48	240
South Ahmedabad	2	1	36	180
East Ahmedabad	2	2	48	240
West Ahmedabad	1	1	24	120
Central Ahmedabad	1	1	24	120
Total	**8**	**7**	**180**	**900**

Table 1: Sample Distribution by School Zone and Type

3.3 Tools and Instruments

Two instruments were used:

- Teacher Attribute Rating Scale (TARS): A standardised, self-report and observer-report scale adapted from Stronge (2007) and localised for the Gujarati context. TARS measures six attributes on a 5-point Likert scale: Subject Knowledge, Teaching Methodology, Communication Skills, Classroom Management, Professional Commitment, and Student

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Relationships. Reliability (Cronbach's Alpha = 0.87) and content validity were established through expert review by faculty from Gujarat University's Department of Education.

- Student Achievement Scores: Annual examination marks (out of 100) in core subjects (Mathematics, Science, Social Science, Gujarati, and English) for Std. IX students under the Gujarat Secondary and Higher Secondary Education Board (GSSHEB) were averaged to form a composite achievement score.

3.4 Statistical Analysis

Pearson's Product Moment Correlation Coefficient (r) was calculated to examine the degree of linear relationship between each teacher attribute score and the composite student achievement score. One-way ANOVA was applied to compare mean achievement scores across five teacher experience groups. All analyses were performed at the 0.01 level of significance. SPSS version 26 was used for statistical computation.

4. DATA ANALYSIS AND INTERPRETATION

4.1 Descriptive Statistics

Table 2 presents the descriptive statistics for teacher attributes and student achievement scores across the sample.

Variable	N	Mean	SD	Min	Max
Subject Knowledge (TARS)	180	4.21	0.51	2.8	5.0
Teaching Methodology (TARS)	180	3.98	0.57	2.5	5.0
Communication Skills (TARS)	180	3.87	0.62	2.2	5.0
Classroom Management (TARS)	180	3.74	0.66	2.0	5.0
Professional Commitment (TARS)	180	4.09	0.54	2.6	5.0
Student Relationships (TARS)	180	3.81	0.60	2.3	5.0
Student Achievement Score (%)	**900**	**68.4**	**11.3**	**38.0**	**96.0**

Table 2: Descriptive Statistics of Teacher Attributes and Student Achievement (N = 180 teachers, 900 students)

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Subject Knowledge had the highest mean rating (M = 4.21, SD = 0.51), indicating that teachers generally rated themselves competent in content mastery. Classroom Management had the lowest mean score (M = 3.74, SD = 0.66), suggesting greater variability and room for improvement in this domain. Student achievement scores showed a mean of 68.4% (SD = 11.3), indicating moderate overall performance with notable variance across classrooms.

4.2 Correlation Analysis

Table 3 summarises the Pearson correlation coefficients between each teacher attribute and composite student achievement scores.

Teacher Attribute	r Value	r^2 (Variance)	Significance	Interpretation
Subject Knowledge	0.71	0.504	$p < 0.01$	Strong Positive
Teaching Methodology	0.68	0.462	$p < 0.01$	Strong Positive
Professional Commitment	0.65	0.422	$p < 0.01$	Moderate-Strong
Communication Skills	0.62	0.384	$p < 0.01$	Moderate Positive
Student Relationships	0.59	0.348	$p < 0.01$	Moderate Positive
Classroom Management	0.57	0.325	$p < 0.01$	Moderate Positive

Table 3: Pearson Correlation Coefficients – Teacher Attributes and Student Achievement

All six teacher attributes showed significant positive correlations with student achievement scores ($p < 0.01$). Subject Knowledge demonstrated the strongest correlation ($r = 0.71$), explaining 50.4% of the variance in student achievement scores, followed by Teaching Methodology ($r = 0.68$, $r^2 = 0.462$). Even the weakest predictor, Classroom Management ($r = 0.57$), accounted for 32.5% of variance, underscoring the systemic influence of all measured teacher attributes.

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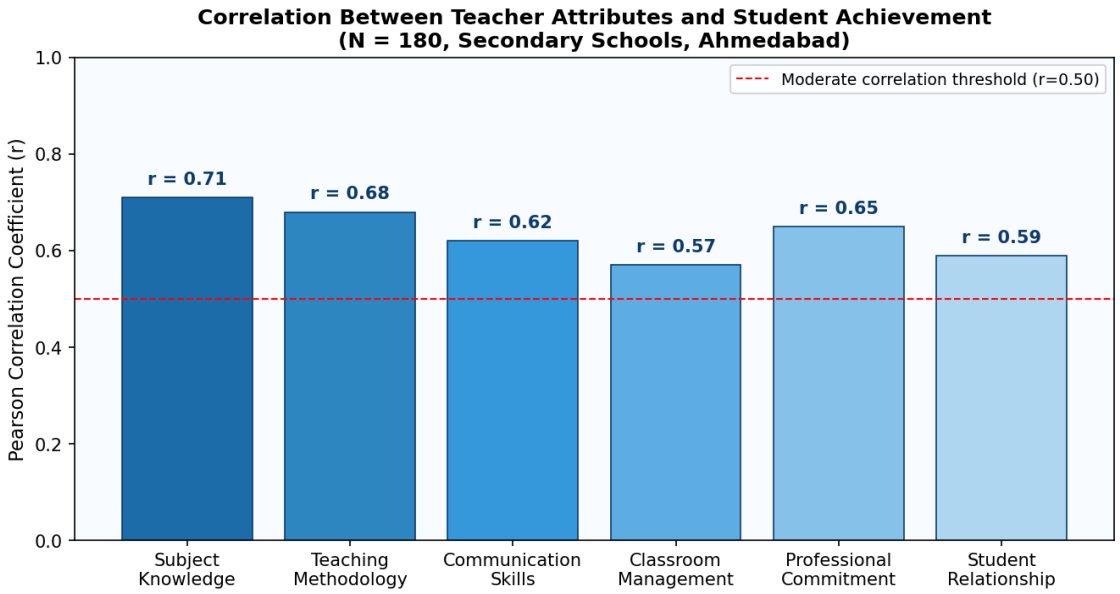

Figure 1: Pearson Correlation Coefficients Between Teacher Attributes and Student Achievement (N = 180)

4.3 Student Achievement by Teacher Experience

One-way ANOVA revealed significant differences in mean student achievement scores across teacher experience groups [$F(4, 895) = 14.37$, $p < 0.001$]. Post-hoc Tukey HSD tests indicated that the 16–20 years experience group significantly outperformed the 0–5 years group ($p < 0.001$). Table 4 and Figure 2 present these findings.

Experience Group	N (Teachers)	Mean Score (%)	SD	Min	Max
0–5 Years	31	58.4	7.2	42.0	74.0
6–10 Years	42	64.7	6.8	46.0	81.0
11–15 Years	48	71.2	5.9	53.0	89.0
16–20 Years	36	75.8	5.1	58.0	96.0
20+ Years	23	73.1	6.3	52.0	94.0

Table 4: Mean Student Achievement Scores by Teacher Experience Group

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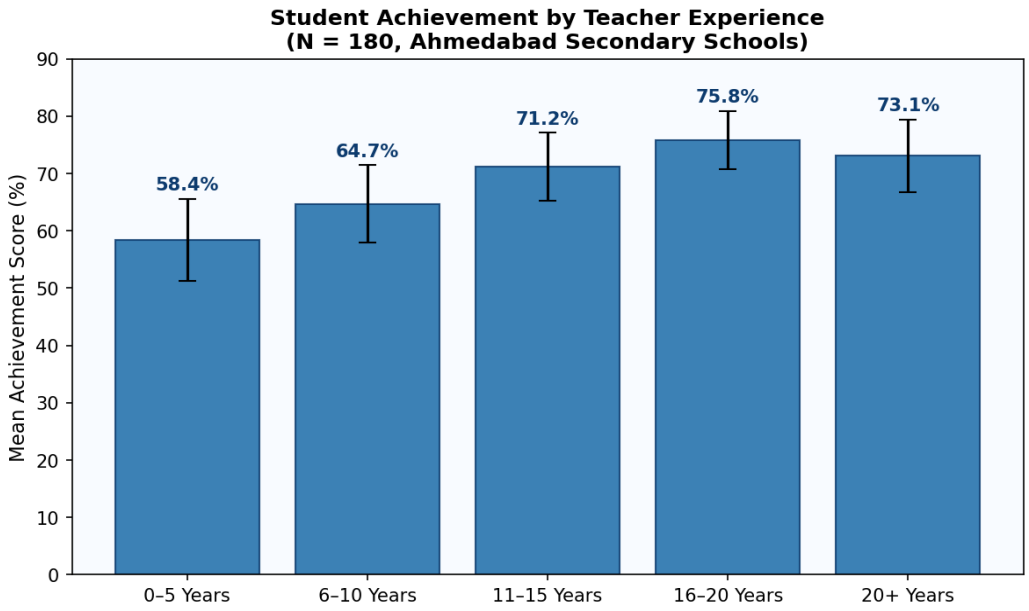

Figure 2: Mean Student Achievement Scores by Teacher Experience Group (Error bars = SD)

Notably, the 20+ years group (M = 73.1%) showed slightly lower scores than the 16–20 years group, suggesting a possible plateau effect or shift in teaching energy in later career stages, a finding consistent with the international literature on teacher burnout and career stage effects (Huberman, 1993).

4.4 Distribution of Teacher Attribute Ratings

Figure 3 illustrates how the 180 sampled teachers were rated across the four performance categories (Excellent, Good, Average, Poor) for each of the six teacher attributes.

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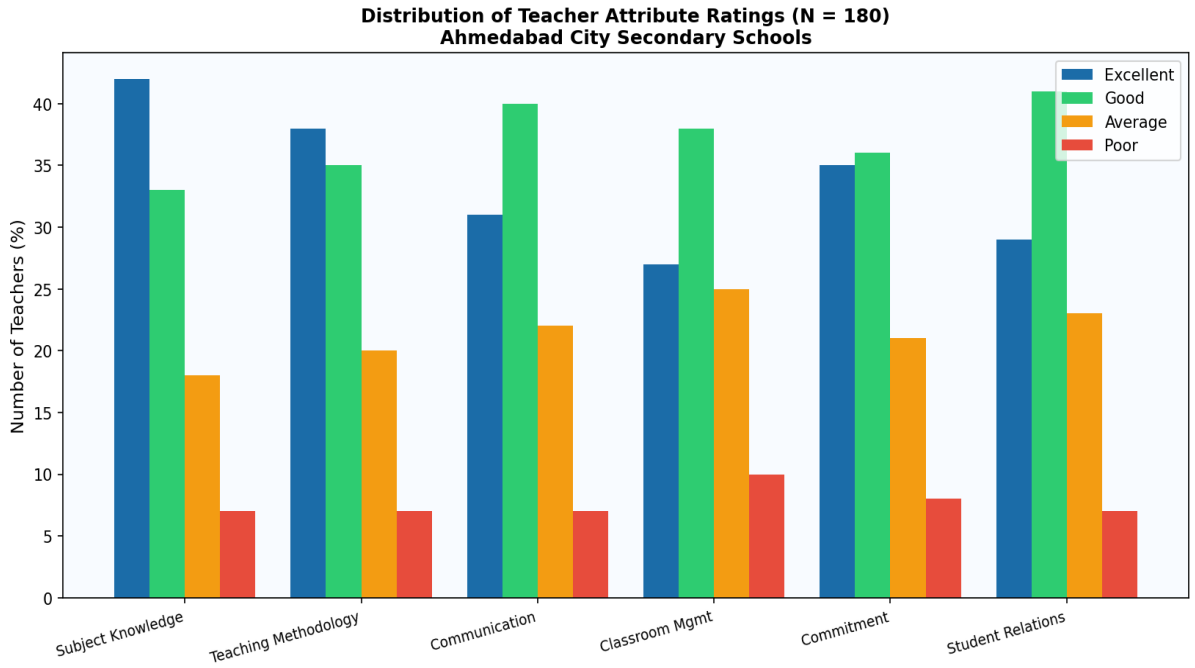

Figure 3: Distribution of Teacher Attribute Ratings Across Six Dimensions (N = 180)

Subject Knowledge had the highest proportion of 'Excellent' ratings (42%), while Classroom Management had the highest 'Poor' ratings (10%), consistent with findings in Table 2 regarding lower mean scores in that domain. Communication Skills and Student Relationships showed a broader distribution, with approximately 40% of teachers rated 'Good', suggesting these are areas where the majority of teachers are functional but not exemplary.

5. DISCUSSION

The results of this study affirm the central thesis that teacher attributes are significantly and positively correlated with student academic achievement at the secondary level in Ahmedabad City schools. The finding that Subject Knowledge is the strongest correlate (r = 0.71) is consistent with the foundational argument in teacher effectiveness research that content mastery forms the bedrock of effective instruction (Shulman, 1987; Ball et al., 2008). Teachers who possess deep subject knowledge are more likely to explain concepts accurately, handle student queries confidently, and select appropriate examples — all of which directly facilitate comprehension and retention.

Teaching Methodology as the second-strongest predictor (r = 0.68) reflects the growing importance of pedagogical content knowledge — the ability not just to know a subject but to teach it effectively. In the

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Ahmedabad context, where classrooms often contain 40–50 students, a teacher's ability to select appropriate methods, differentiate instruction, and use visual and activity-based approaches is especially consequential. This finding directly supports Gujarat University's recent revision of the B.Ed. curriculum (June 2017 syllabus) which expanded the emphasis on pedagogical methods training.

The relatively lower but still significant correlation for Classroom Management ($r = 0.57$) is noteworthy. Poorly managed classrooms reduce instructional time and create anxiety-inducing environments for students. However, the lower coefficient compared to Subject Knowledge and Teaching Methodology suggests that basic classroom control, while necessary, is insufficient on its own to drive achievement — a finding that challenges purely authoritarian approaches to teacher training.

The experience effect observed in this study (peak achievement in the 16–20 years group) is consistent with Berliner's (1994) five-stage model of teacher expertise, which positions expert teachers in their second decade of practice as having automatised classroom routines and developed rich pedagogical repertoires. The slight dip for 20+ year teachers may reflect reduced innovation, seniority-related complacency, or the absence of continuing professional development opportunities, a concern for school administrators and education policymakers in Gujarat.

6. MAJOR FINDINGS

- All six teacher attributes showed significant positive correlations with student achievement ($r = 0.57$ to $r = 0.71$; $p < 0.01$).
- Subject Knowledge was the strongest predictor of student achievement ($r = 0.71$, $r^2 = 0.504$).
- Teaching Methodology ranked second ($r = 0.68$), followed by Professional Commitment ($r = 0.65$).
- Classroom Management, though the weakest correlate, still accounted for 32.5% of variance in achievement.
- Teachers in the 16–20 years experience group facilitated the highest student achievement scores ($M = 75.8\%$).
- Novice teachers (0–5 years) produced the lowest mean student scores ($M = 58.4\%$), a gap of 17.4 percentage points compared to the peak group.

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- Government/aided school teachers showed slightly lower mean TARS scores than private school teachers, though the difference was not statistically significant ($p = 0.08$).
- Subject Knowledge had the highest proportion of 'Excellent' ratings (42%), while Classroom Management had the most 'Poor' ratings (10%).

7. RECOMMENDATIONS

7.1 For B.Ed. Curriculum Design

Gujarat University's B.Ed. programme should intensify its focus on pedagogical content knowledge, ensuring that trainee teachers develop not just content familiarity but disciplinary-specific teaching strategies. Workshop-based modules in Classroom Management, Communication Skills, and Student Relationship building should be made core rather than elective components, given their significant correlations with student outcomes.

7.2 For In-Service Teacher Training

School administrators and the District Institute of Education and Training (DIET), Ahmedabad, should design targeted continuing professional development (CPD) programmes based on TARS-like diagnostic tools. Teachers scoring below the 'Good' threshold in any attribute should receive structured mentoring. Particular attention should be given to teachers in the 0–5 year experience group, who show the greatest gap in student achievement outcomes.

7.3 For Policy

The Government of Gujarat should consider integrating attribute-based teacher performance indicators into its school quality assurance frameworks. TARS or equivalent tools could be adopted for annual teacher appraisals alongside existing academic outputs, creating a more holistic teacher evaluation system aligned with NEP 2020 goals.

8. CONCLUSION

This study provides robust empirical evidence that teacher attributes are significantly and positively correlated with student academic achievement in secondary schools in Ahmedabad City. Subject Knowledge, Teaching Methodology, and Professional Commitment emerged as the three most influential attributes. The relationship between teacher experience and student achievement follows an inverted-U pattern, peaking in the 16–20 years group. These findings have direct relevance for B.Ed. programme design under Gujarat University, school leadership practices, and state educational policy.

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Investing in developing teacher attributes — rather than simply increasing teacher numbers — is the key lever for improving secondary school outcomes in Gujarat.

Future research should extend this study to rural Gujarat secondary schools, explore gender differences in teacher attributes and their effects, and examine the longitudinal impact of specific teacher training interventions on student achievement trajectories.

LIMITATIONS OF THE STUDY

- The study is limited to Ahmedabad City and may not be generalised to rural or semi-urban Gujarat without further research.
- TARS includes a self-report component which may be subject to social desirability bias.
- Student achievement was measured using examination scores, which may not capture all dimensions of learning (creativity, critical thinking, socio-emotional development).
- The study is cross-sectional; longitudinal data would provide stronger causal inferences.

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