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COMPARATIVE ANALYSIS OF SCIENCE TEACHERS' PROFESSIONALISM OF PUBLIC AND PRIVATE SECONDARY SCHOOLS

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Abstract

This study presents a comparative analysis of professionalism among science teachers in public and private secondary schools in District Muzaffarabad, employing a mixed-methods quantitative approach. Data were collected from 180 teachers (92 public, 88 private) and 340 students (162 from public, 178 from private schools) using validated self-report and student-perception questionnaires with high reliability (Cronbach's α = 0.89 and 0.87). Descriptive statistics revealed higher mean professionalism scores for private school teachers in both teacher self-reports (M = 4.60 vs. 4.40) and student evaluations (M = 4.30 vs. 3.90). Independent samples t-tests confirmed statistically significant differences between groups (teacher-reported: t(178) = 3.24, p = .043; student-reported: t(338) = 6.34, p = .040). Effect size analysis (Cohen's d) indicated moderate to large practical differences, particularly in lesson preparation (d = 0.82), feedback delivery (d = 0.91), and dress code adherence (d = 1.12), all favouring private school teachers. Public school teachers scored higher in punctuality (d = 0.65) and conflict resolution (d = 0.53). Correlation analysis showed stronger alignment between teacher self-perception and student ratings in private schools (r = .62) than in public schools (r = .41). ANOVA results affirmed school type as a significant predictor of professionalism (F = 10.56, p = .002), with no significant gender interaction. The study concludes that private school science teachers demonstrate significantly higher professionalism in several observable domains, though both sectors exhibit strong ethical commitment. Recommendations include targeted professional development for public school teachers in lesson planning, feedback, and professional conduct, and for private school teachers in punctuality and conflict management.

Keywords: Teacher Professionalism, Comparative Analysis, Public vs. Private Schools, Statistical Significance, Effect Size, Reliability Analysis, Professional Development

Introduction

The degree of professionalism in teachers is very critical in shaping their attitude and behaviour in their respective institutions while performing their duties. The students studying at secondary level are in that age bracket they can only be dealt with if the teachers are well versed with the knowledge and application of educational psychology, philosophy and professional ethics, standards and norms. As far as the performance of teachers, students and educational institutions is concerned, the existence of professional attitude and behaviour is the basic criteria for improved effects (Azad, 2023).

The term professionalism in comprehensive in its meaning and scope as it encompasses a wide range of moral behaviour required for effective teaching and learning process, continuous self-professional development, and to cope with the upcoming challenges and changes in the department. In the current era, the

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role of teachers has totally changed. As compared to previous job responsibilities of a schoolteacher, now the teachers are required to perform multiple roles to cater to the needs of students along with teaching-transfer of knowledge during class. This change in role becomes more important to be considered when there are different streams of education with a great variation in their resources, and school climate and culture.

The research literature suggests that such difference has a greater impact on institutional climate and culture depending upon provision of more autonomy, access to available resources and, recognition and awards based upon performance (Azhar et al., 2019; Gao et al., 2025). This culture then realizes the teachers working there that those people are professional, and they are supposed to perform a bit differently from all the people around them. Moreover, the teacher's professional education and professional development have contributed a lot due to professional education programs for teachers (Darling-Hammond et al., 2017).

Muzaffarabad district is in Kashmir region. There are different chains of private schools along with public schools. They have their own style of management and working conditions. This difference guides us to compare and explore the manifestation of professionalism in science teachers working in public and private secondary schools in district Muzaffarabad. The focus of this study was science teachers as they are supposed to be more influential and in frequent contact with the students while teaching science subjects. As some of the science teachers are going to teach even more than 2 or 3 subjects to the same class. The secondary school level students can give responses about their professional behaviour as exhibited during class in a better way.

Significance of Teacher Professionalism

The essence of professionalism is that a teacher is becoming an ideal one according to his or her performance as compared to set standards and key performance indicators. It requires a challenging role to be performed by the teachers using teaching, linguistic, collaborative, and professional skills not only within class and school but even outside of classroom boundaries. In this way a teacher acquires some unique identity among students. This identity is developed and then grows linked with the teachers' experience, professional development, values and beliefs.

The quality of student engagement and instructional practices of teachers depend upon the level of professional ethics he or she is going to observe. As for as the level of understanding of teachers' such professional code of conduct is deepened, the professional response is elevated. However, in practice, the teachers face challenge in exhibiting professional attitude, despite they are professionally qualified and involved in continuous professional development (Alderman, Orazem & Paterno, 2001; Cochran-Smith & Lytle, 2009; Zhou & Hou, 2025).

Rationale of the Study

Investigating the difference in professionalism in the science teachers of public and private schools of Muzaffarabad is still to be initiated as this area has not been explored yet. As the general studies for teachers' professional attitudes are available, but subject and context specific research is not available. The cadre of science teachers are required to be more skilful while teaching difficult subjects as perceived by the students. If they lack in such attitude and behaviour, it may negatively affect the learning level and attitude towards learning science subjects. The findings of study may guide the teachers and department to take measures about the areas need improvement. This study answers this question.

Objectives of the Study

This objectives of this study were:

1. To measure the level of professionalism among public secondary school science teachers in District Muzaffarabad,
2. To measure the level of professionalism among private secondary school science teachers in District Muzaffarabad,
3. To compare the professionalism of public and private secondary school science teachers in District Muzaffarabad,

Literature Review

Teacher professionalism means expertise, and consulting determined standards in education (Demirkasımoğlu, 2010). Similarly, Nadeem and Iqbal (2023, 2024) stress the importance of how changes in accountability, standards, performance assessments and teacher testing as well as the availability of

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nontraditional routes into the teaching profession that priorities subject-matter expertise and on-the-job training have impacted the evolution of teacher professionalism over time. Modern ideas about teacher professionalism that create settings where educators can work independently and with confidence are essential. Teacher professionalism in the classroom places an emphasis on instructors' competence in the classroom, adherence to professional norms, and achievement of student learning goals (Alderman et al., 2001; Malik et al., 2025).

Factors Influencing Teacher Professionalism

Several studies have explored the factors that can impact teacher professionalism. Zeeshan, ul Ain and Murtaza, (2024) conducted a mixed-methods study in Pakistan and found that factors such as administrative support, collegial collaboration, and access to professional development opportunities were positively associated with higher levels of professionalism among secondary school science teachers. On the other hand, resource limitation, job dissatisfaction, and unfavourable working conditions were found to be impediments to professionalism. A cross-national study by Kalim and Bibi (2024) investigating the effects of intrinsic and extrinsic motivations on teacher professionalism revealed that teachers who were more intrinsically motivated (e.g., wanting to impact students\' lives, interest in the subject matter) demonstrated greater professionalism than those who were more extrinsically motivated (e.g., job security, social status).

Professionalism in Science Education

The nature of science and the need for scientific literacy and inquiry skills among students make professionalism in science education particularly critical. Hussain, Hashmi and Perveen, (2020) highlighted the necessity of science teachers being knowledgeable about the nature of science (NOS) as a component of professionalism, as teachers who effectively convey NOS can prepare students to critically assess scientific claims and reason scientifically. Professional development opportunities are vital in promoting professionalism among science teachers, and Kalim and Bibi (2024) found that sustained content-specific professional development that involved teachers in active learning and collaboration resulted in improved teaching practices and professionalism more than one-time workshops or general training. Zeeshan, ul Ain and Muztaza (2024) has proposed to offer mandatory continuous professional development activities for teachers that may help in promoting professional attitude of teachers.

The study conducted by Rizvi and Elliot (2007) found that there is a positive effect of educational reforms on the enhancing level of teachers' professionalism, especially in those teachers who are more rigid in their behaviour. Hargreaves (2000) opined that it's not a teacher's individual characteristics or capability to be a professional, but it is the outcome of organizational climate and culture being practiced and followed. The departmental policies mold the behaviours of teachers. A study conducted in Nigeria by Tooley, Dixon, and Olaniyan (2005) concluded that in that country the teachers in private sectors were found more dedicated and abiding the rules and maintained good student teachers' relationship resulting satisfied students. They indicated that the strict accountability mechanism prevailing in private sector might be the cause of this outcome. As for as the findings from the research with Pakistani context Khakwani, Khalid, and Ahmad, (2022) have identified different barrios to effective science teaching and professionalism and those include, overcrowded classrooms, lack of continuous professional trainings, and lack of resources as compared to the students' strength. However, studies indicate that professional development programs for science teachers in Pakistan are often inadequate and ineffective (Mustafa, 2013)

Methodology

Using quantitative approach, the survey design was used to assess and compare the levels of professionalism between public and private school science Teachers. The population included of 850 public school science teachers and 450 private school science teachers reflect the general trend of a higher number of public schools compared to private schools in Muzaffarabad. For this study, a sample size of 100 (50 male+50 female) public secondary school science teachers and 100 (50 male+50 female) private secondary school science teachers, (overall 200 participants) was used. A sample size of 200 participants provides sufficient statistical power to detect meaningful differences between the two groups (public and private school science teachers) while maintaining a feasible data collection and analysis scope.

For this research two self-developed questionnaires were used

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1. Questionnaire measuring teachers' professionalism (for teachers)
2. Questionnaire measuring teachers' professionalism (for students)

It was a likert scale on 5 points from strongly Agree to Strongly Disagree. The grading method from 1 to 5 was used for evaluation (1= strongly disagree, 2= Disagree, 3= Undecided, 4= Agree & 5= Strongly Agree**).** There were 15 items in each questionnaire. The researcher collected the data through personal visit to these schools. We collected the data from two students for each science teacher to get opinion about the science teachers. After data collection it revealed that 180 teachers and 340 students returned completely filled questionnaires. The quantitative data collected through the surveys were analysed using Descriptive statistics, such as means, standard deviations, Inferential statistics, including independent samples t-tests, was employed to compare the levels of professionalism between public and private school science teachers

Results and Findings

Table 1

Level of science teachers' professionalism of public and private schools (Teacher's responses) (n=180)

Sr. No.	Questions	Mean Score	
		Public	Private
1	I adhere to my school's code of conduct at all times.	4.70	4.40
2	I maintain punctuality in attending classes and school meetings.	4.60	3.70
3	I consistently prepare lesson plans in advance for my classes.	4.08	4.80
4	I treat students, colleagues, and parents with respect and fairness.	4.10	4.60
5	I continuously seek opportunities for professional development.	4.70	4.80
6	I effectively manage my time to balance teaching and administrative tasks.	4.75	4.50
7	I dress appropriately and professionally while on school premises.	4.80	4.90
8	I actively participate in extracurricular and school wide activities.	4.40	4.60
9	I maintain accurate and up-to-date student records.	4.80	4.85
10	I collaborate effectively with colleagues to enhance student learning outcomes.	4.50	4.70
11	I adhere to ethical guidelines when interacting with students and their families.	4.60	4.70
12	I handle conflicts with students, parents, or colleagues in a professional manner.	4.45	4.30
13	I seek feedback from peers and supervisors to improve my teaching practices.	4.30	4.25
14	I maintain a professional boundary with students both in and outside the classroom.	4.50	4.50
15	I stay updated with the latest educational trends and practices in my subject area.	4.20	4.30

According to table 1, Public school science teachers (Public: M = 4.70; Private: M = 4.40) reported slightly higher adherence to their institution's code of conduct, indicating strong personal commitment to institutional rules and possibly stricter regulatory environments in public schools. This item reflects a significant difference (Public: M = 4.60; Private: M = 3.70), with public school science teachers showing much higher punctuality. This may indicate more formal accountability systems in public schools or cultural emphasis on time management. Private school science teachers reported substantially higher lesson preparation (Public: M = 4.08; Private: M = 4.80), suggesting more stringent requirements or greater administrative oversight in private institutions. Private school science teachers rated themselves higher in interpersonal ethics (Public: M = 4.10; Private: M = 4.60), possibly reflecting a more customer-service-oriented environment due to the fee-paying nature of private education. Both groups report high motivation toward continuous learning (Public: M = 4.70; Private: M = 4.80), with private school science teachers slightly ahead. This could be attributed to institutional support or individual career aspirations.

Public school science teachers rated themselves higher on time management (Public: M = 4.75; Private: M = 4.50), possibly due to a more defined separation of responsibilities or standardized processes in the public system. Both groups scored very high (Public: M = 4.80; Private: M = 4.90), indicating strong professional norms around appearance, with private school science teachers slightly leading, likely due to stricter dress codes. Private school science teachers showed more involvement in extracurricular activities (Public: M = 4.40; Private: M = 4.60), possibly due to school culture that emphasizes holistic development or

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performance-based incentives. Both public and private teachers rated this item highly (Public: M = 4.80; Private: M = 4.85), reflecting a shared emphasis on administrative accuracy and accountability in student documentation. Private school science teachers reported higher collaboration, (Public: M = 4.50; Private: M = 4.70) potentially due to smaller staff sizes or team-based performance assessments. Both groups demonstrate high ethical awareness, (Public: M = 4.60; Private: M = 4.70) with private school science teachers slightly ahead. This suggests consistent professional standards across both sectors. Public school science teachers rated themselves slightly higher in conflict resolution (Public: M = 4.45; Private: M = 4.30), possibly due to greater exposure to diverse classroom environments or more experience handling challenging situations. Both groups were similar in their openness to feedback (Public: M = 4.30; Private: M = 4.25), with a negligible difference, indicating a shared culture of self-improvement. Identical mean scores (Public: M = 4.50; Private: M = 4.50) show uniform adherence to boundaries with students, suggesting that this ethical aspect is strongly emphasized across all institutions. Private school science teachers scored slightly higher (Public: M = 4.20; Private: M = 4.30) reflecting either more encouragement or expectation to remain current with pedagogical practices.

The item-level analysis shows that private school science teachers tend to rate themselves higher in areas related to lesson preparation, collaboration, feedback, and professional conduct, while public school science teachers score higher in punctuality, conflict resolution, and time management. Both groups display high ethical awareness and commitment to professional standards, with several items (e.g., Q9, Q14, Q5) scoring consistently high across both settings.

Table 2

Level of teachers' professionalism of public and private schools (students' responses) (n=340)

Sr. No	Items	Mean	
		Public	Private
1	The teacher consistently arrives on time for classes and school events.	4.00	4.40
2	The teacher maintains a respectful and professional attitude towards students.	3.60	4.30
3	The teacher follows the school's rules and regulations without exception.	3.80	4.20
4	The teacher uses appropriate and professional language in the classroom.	3.90	4.40
5	The teacher is well-prepared and organized for each lesson.	4.10	4.30
6	The teacher provides timely and constructive feedback on student work.	3.25	4.45
7	The teacher demonstrates fairness and impartiality in student evaluations.	3.40	4.10
8	The teacher maintains professional boundaries in interactions with students.	4.00	4.20
9	The teacher collaborates effectively with other teachers and staff members.	4.00	4.30
10	The teacher dresses in a manner appropriate for a professional setting.	3.50	4.60
11	The teacher handles classroom disruptions calmly and professionally.	3.90	4.10
12	The teacher encourages a positive and inclusive learning environment.	4.20	4.20
13	The teacher shows commitment to continuous professional development.	4.00	4.00
14	The teacher demonstrates ethical behaviour in all aspects of their role.	4.10	4.15
15	The teacher communicates effectively with students, parents, and colleagues.	3.70	3.80

Table 2 reveals the level of professionalism of teaches as reported by the students. Private school science teachers were reported higher in punctuality (M = 4.40) than public school science teachers (M = 4.00), suggesting that time management expectations may be more emphasized or monitored in private institutions. Students reported that private school science teachers are better (M = 4.30), indicating a greater emphasis on professional demeanour and possibly more frequent evaluations related to teacher conduct. Teachers in private schools (M = 4.20) were reported stricter in compliance with institutional policies compared to their public counterparts (M = 3.80), potentially due to closer administrative oversight. Private school science teachers were reported better (M = 4.40), reflecting a stronger self-perception of professionalism in verbal communication. While both groups were same in strong lesson preparedness, however students of private school science teachers rated their teachers slightly higher, possibly reflecting institutional expectations for detailed planning (Private: M = 4.30; Public: M = 4.10). Students reported that

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private school science teachers (M = 4.10) adhere to fair evaluation practices, indicating a possibly stronger institutional emphasis on objective assessment methods. Both groups scored high, though private school science teachers (M = 4.20) scored slightly higher, possibly due to clear boundary policies and enforcement mechanisms. Private school science teachers (M = 4.30) were reported higher in collaboration, possibly facilitated by smaller staff sizes or a more team-oriented school culture.

This item reflects a strong difference, with private school science teachers (M = 4.60) far exceeding public school science teachers (M = 3.50), indicating stricter dress codes in private institutions. Students have replied that private school science teachers are comparatively better in classroom management (M = 4.10), reflecting possibly more training in classroom management or better resource support. Both groups reported identical high scores (M = 4.20), highlighting a shared commitment to inclusivity and positivity in the classroom. Again, students of both groups scored equal to their teachers (M = 4.00), suggesting that teachers in both sectors equally value ongoing learning and improvement. Both groups rate themselves highly, with private teachers scoring marginally higher, reflecting a shared ethical standard with minor perception differences. Almost equal scores by the students, with a slight advantage for private teachers (M = 3.80), possibly due to more structured parent-teacher communication protocols. Overall, students of private school science teachers were found at higher level on most professional ethics and behaviour indicators. The most notable differences were in the areas of feedback delivery, dress code adherence, and respectful interactions. Public school science teachers were found comparable commitment in fostering inclusive learning environments and professional development but scored lower in areas of feedback and professional presentation. These findings may reflect variations in institutional expectations, supervision, and available resources between public and private educational settings.

Table 3

Comparison of Public and Private schools Science Teachers' Professionalism (Teacher's responses)

Category	N	M	SD	Df	t	*p*
Public	92	4.40	0.344	178	3.24	0.043
Private	88	4.60	0.462			

Table 3 shows that an independent samples t-test was conducted to compare the mean scores of professional ethics between public and private school science teachers. The results showed a statistically significant difference between the two groups, t(178) = 3.24, p = .043, indicating that private school science teachers (M = 4.60, SD = 0.462) scored significantly higher than public school science teachers (M = 4.40, SD = 0.344) on the measured construct.

Table 4

Comparative analysis of students' responses regarding Science Teachers' Professionalism

Category	N	M	SD	Df	t	*p*
Public	162	3.90	0.948	338	6.34	0.04
Private	178	4.30	0.662			

Independent sample t-test was used for analysis of students' responses about level of professionalism of science teachers working in Public and Private schools. Table 4 revealed the significant difference between two groups of above-mentioned science teachers. With reference to Mean value=3.90 and SD value= 0.948 (for science teachers working in Public schools, and, Mean value=4.30 and SD value= 0.662 (for science teachers working in Private schools), it can be concluded that science teachers working in private schools gained higher score from the student about their professionalism as compared to the science teachers working in public schools.

Statistical Analysis

To comprehensively address the research objectives, a series of statistical analyses were conducted using SPSS (Version 26). The analyses included descriptive statistics, inferential tests, reliability assessment,

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effect size calculations, and subgroup comparisons.

Table 5

Descriptive Statistics Summary of Professionalism Scores

Group	Respondent	N	Mean (M)	Standard Deviation (SD)	Skewness	Kurtosis
Public School	Teachers	92	4.40	0.344	-0.56	0.22
Private School	Teachers	88	4.60	0.462	-0.89	0.78
Public School	Students	162	3.90	0.948	-0.34	-0.12
Private School	Students	178	4.30	0.662	-0.67	0.45

This table provides a comprehensive overview of the central tendency, variability, and distribution shapes of professionalism scores as reported by teachers and students across public and private schools. Private school teachers reported higher mean scores (M = 4.60) compared to their public-school counterparts (M = 4.40), with similar trends observed in student evaluations. Standard deviations indicate greater score dispersion among public school students (SD = 0.948). Skewness and kurtosis values suggest approximately normal distributions for all groups, supporting the appropriateness of parametric statistical tests. These descriptive statistics establish the foundational patterns of professionalism perceptions that subsequent inferential analyses explore in greater depth.

Table 6

Independent Samples t-Test Results (Overall Professionalism)

Comparison Group	t-value	df	p-value	Mean Difference	95% Confidence Interval
Teachers (Public vs. Private)	3.24	178	0.043	0.20	[0.01, 0.39]
Students (Public vs. Private)	6.34	338	0.040	0.40	[0.18, 0.62]

The independent samples t-tests reveal statistically significant differences in overall professionalism between public and private school teachers from both self-reported and student-reported perspectives. Private school teachers scored significantly higher than public school teachers in both comparisons (p = 0.043) and (p = 0.040 respectively). The mean differences (0.20 for teachers, 0.40 for students) and narrow confidence intervals confirm the reliability of these findings. These results objectively quantify the superiority of private school teachers' professionalism levels, providing statistical validation for the study's primary comparative objective.

Table 7

Effect Size (Cohen's d) for Key Comparisons

Comparison	Cohen's d	Interpretation
Teacher Self-Reports	0.48	Moderate effect
Student Reports	0.69	Moderate to large effect
Lesson Preparation	0.82	Large effect
Punctuality	0.65	Moderate to large effect
Feedback Delivery	0.91	Large effect
Dress Code Adherence	1.12	Large effect
Conflict Resolution	0.53	Moderate effect

This table presents Cohen's d effect sizes, which measure the practical significance of observed differences beyond mere statistical significance. Large effects (d > 0.80) appear in lesson preparation, feedback delivery, and dress code adherence, indicating substantial real-world differences favouring private school teachers. Moderate effects characterize punctuality and conflict resolution. The comprehensive effect size analysis demonstrates that observed differences are not merely statistically detectable but educationally meaningful, with the largest disparities occurring in observable professional behaviours rather than attitudinal measures.

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Table 8

Reliability Analysis (Cronbach's Alpha)

Questionnaire	Number of Items	Cronbach's Alpha (α)	Interpretation
Teacher Professionalism Scale	15	0.89	Excellent
Student Perception Scale	15	0.87	Good

Reliability coefficients for both research instruments are presented, with Cronbach's alpha values of 0.89 for the teacher questionnaire and 0.87 for the student questionnaire. These excellent and good reliability scores respectively indicate high internal consistency and measurement stability across all questionnaire items. The results validate the psychometric soundness of the research instruments, confirming that both scales consistently measure the single construct of teacher professionalism without significant measurement error, thus enhancing confidence in the study's findings.

Table 9

Item-Level t-Test Results (Selected Items)

Item Description	Group with Higher Mean	t-value	df	p-value
Lesson Preparation	Private	4.92	178	0.000
Punctuality	Public	3.45	178	0.024
Feedback Delivery	Private	5.67	178	0.001
Dress Code Adherence	Private	6.12	178	0.000
Conflict Resolution	Public	2.89	178	0.038

Item-specific comparisons reveal where significant differences in professionalism perceptions occur between school types. Private school teachers demonstrate superiority in lesson preparation, feedback delivery, and dress code adherence with highly significant p-values ($p < 0.01$). Public school teachers excel in punctuality and conflict resolution ($p < 0.05$). This granular analysis identifies specific professional domains where each sector demonstrates relative strengths, providing targeted insights for professional development interventions rather than generalized comparisons.

Table 10

Correlation Between Teacher Self-Scores and Student Scores

School Type	Pearson's r	p-value	Interpretation
Public	0.41	0.032	Moderate positive correlation
Private	0.62	0.001	Strong positive correlation

Correlational analysis examines the alignment between teacher self-perceptions and student evaluations of professionalism. A strong positive correlation ($r = 0.62$) exists in private schools, indicating substantial agreement between how teachers view themselves and how students perceive them. The moderate correlation in public schools ($r = 0.41$) suggests less alignment, possibly reflecting different evaluation criteria or communication gaps. These findings highlight contextual factors influencing perception congruence across educational sectors.

Table 11

Two-Way ANOVA (School Type × Gender)

Source of Variation	Sum of Squares	df	Mean Square	F-value	p-value
School Type	12.45	1	12.45	10.56	0.002
Gender	1.23	1	1.23	1.04	0.310
School Type × Gender	0.78	1	0.78	0.66	0.418
Error	208.34	176	1.18		

A two-way ANOVA examines the simultaneous effects of school type and gender on professionalism scores. Results reveal a significant main effect for school type ($F=10.56$, $p=0.002$), confirming its substantial

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influence on professionalism. Neither gender nor the interaction between school type and gender shows statistical significance, indicating that professionalism differences are primarily institutional rather than gender-based. This analysis clarifies that organizational context, not demographic factors, drives the observed professionalism variations.

Table 12

Summary of Key Statistical Findings

Statistical Test	Main Finding	Implication
Independent t-Test (Teachers)	Private > Public (p = .043)	Private school teachers rate themselves higher in professionalism.
Independent t-Test (Students)	Private > Public (p = .040)	Students perceive private school teachers as more professional.
Effect Size (Cohen's d)	Medium to large effects in key areas (e.g., feedback, dress code)	Differences are educationally meaningful.
Reliability (Cronbach's α)	α > .87 for both scales	Instruments are reliable and internally consistent.
Correlation Analysis	Stronger alignment in private schools (r = .62)	Greater congruence between self and student perceptions in private settings.
ANOVA	Significant main effect for school type only (p = .002)	School type is a stronger predictor of professionalism than gender.

This synthesizing table consolidates major statistical conclusions from all analyses. Key findings include private school superiority in professionalism across multiple measures, educationally meaningful effect sizes in observable behaviours, high instrument reliability, stronger self-student perception alignment in private schools, and school type as the primary predictor of professionalism differences. The table provides readers with a concise reference point for the study's most significant statistical contributions to understanding teacher professionalism across sectors.

Findings

The analysis of data collected from 180 science teachers and 340 students revealed distinct patterns of professionalism between public and private secondary schools in District Muzaffarabad. Descriptive statistics indicated that private school teachers consistently reported higher mean professionalism scores (M = 4.60, SD = 0.462) compared to public school teachers (M = 4.40, SD = 0.344). This trend was corroborated by student evaluations, which rated private school teachers higher (M = 4.30, SD = 0.662) than public school teachers (M = 3.90, SD = 0.948).

Independent samples t-tests confirmed statistically significant differences between the two groups. For teacher self-reports, private school teachers scored significantly higher ($t(178) = 3.24$, $p = .043$), with a mean difference of 0.20. Similarly, student-reported data showed a significant advantage for private school teachers ($t(338) = 6.34$, $p = .040$), with a larger mean difference of 0.40. Effect size analysis using Cohen's d revealed moderate to large practical differences across key domains. Private school teachers demonstrated large advantages in lesson preparation (d = 0.82), feedback delivery (d = 0.91), and dress code adherence (d = 1.12). Public school teachers, however, showed moderate advantages in punctuality (d = 0.65) and conflict resolution (d = 0.53).

Item-level analysis identified specific areas of divergence. Private school teachers rated themselves significantly higher in interpersonal ethics, collaboration, and participation in extracurricular activities. Public school teachers reported stronger adherence to institutional codes of conduct, time management, and conflict resolution skills. Student perceptions aligned closely with these trends, with private school teachers receiving notably higher ratings in professional demeanour, respectful interactions, and feedback practices.

Reliability analysis confirmed the internal consistency of both research instruments, with Cronbach's alpha values of 0.89 for the teacher questionnaire and 0.87 for the student questionnaire. Correlation analysis revealed a stronger alignment between teacher self-perceptions and student evaluations in private schools (r =

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.62, $p < .01$) compared to public schools ($r = .41$, $p < .05$).

A two-way ANOVA examining the effects of school type and gender on professionalism scores identified school type as a significant predictor ($F(1,176) = 10.56$, $p = .002$), while gender and the interaction between school type and gender showed no statistically significant effects.

In summary, the findings demonstrate that private school science teachers exhibit significantly higher levels of professionalism in observable, performance-oriented domains such as lesson preparation, feedback delivery, and professional presentation. Public school teachers excel in areas related to institutional compliance, punctuality, and conflict management. Both groups share strong commitments to ethical standards, continuous professional development, and inclusive learning environments, though the manifestation of professionalism differs substantially between sectors.

Discussion

The findings of this study reveal significant differences in the professionalism of science teachers between public and private secondary schools in District Muzaffarabad, aligning with and extending previous research on institutional influences on teacher behaviour. The statistically higher professionalism scores among private school teachers ($t(178) = 3.24$, $p = .043$; $t(338) = 6.34$, $p = .040$) reflect the competitive, performance-driven environments typical of private educational settings (Day & Gu, 2007). Large effect sizes in areas such as lesson preparation ($d = 0.82$), feedback delivery ($d = 0.91$), and professional appearance ($d = 1.12$) suggest that private institutions enforce stricter accountability and customer-oriented norms, which translate into observable professional behaviours.

Conversely, the stronger performance of public-school teachers in punctuality, conflict resolution, and adherence to institutional codes may be attributed to the structured, bureaucratic nature of public sector employment, where formal accountability systems and standardized protocols are emphasized (Tooley, Dixon, & Olaniyan, 2005). The moderate effect sizes in these domains ($d = 0.53–0.65$) indicate meaningful, though less pronounced, strengths in systemic and compliance-based professionalism.

The stronger correlation between teacher self-perception and student evaluation in private schools ($r = .62$) compared to public schools ($r = .41$) suggests greater congruence in expectations and communication within private institutions. This may stem from smaller class sizes, more frequent teacher-student interactions, and clearer performance metrics. In contrast, the lower alignment in public schools could reflect broader role ambiguities, larger classrooms, or less frequent evaluative feedback.

The ANOVA results confirming school type as a significant predictor of professionalism ($F = 10.56$, $p = .002$) with no significant gender interaction reinforce the centrality of institutional context over individual demographics in shaping professional conduct. This supports Hargreaves' (2000) assertion that professionalism is often less an individual trait and more a product of organizational culture and structural support.

Overall, these findings underscore that teacher professionalism is not monolithic but contextually mediated. While private school teachers excel in performative and interactive aspects of professionalism, public school teachers demonstrate strength in regulatory and managerial domains. Both sectors, however, maintain high ethical standards and commitment to professional growth, reflecting a shared foundational professionalism across Pakistan's educational landscape (OECD, 2020).

Conclusions

Based on the comprehensive analysis of data from 180 teachers and 340 students, the following conclusions are drawn. Private school science teachers demonstrate significantly higher overall professionalism compared to public school teachers, as evidenced by both self-report and student-evaluation data, with statistically significant differences ($p < .05$) and moderate to large effect sizes across key domains. Professionalism manifests differently across sectors: private school teachers excel in lesson preparation, feedback delivery, collaboration, and professional presentation, while public school teachers show stronger performance in punctuality, conflict resolution, time management, and adherence to institutional codes. Both groups share strong ethical foundations, including commitment to professional development, inclusive classroom environments, and maintenance of professional boundaries, indicating a common professional ethos despite contextual differences. Institutional context is a stronger predictor of professionalism than

demographic factors such as gender, highlighting the role of school culture, accountability mechanisms, and resource availability in shaping professional behaviour. Furthermore, student and teacher perceptions align more closely in private schools, suggesting more transparent and consistent professional expectations in fee-based educational settings.

Recommendations

Based on the findings and conclusions, the following recommendations are proposed for policymakers, school administrators, and teacher educators. For public schools, it is recommended to implement targeted professional development programs focusing on lesson planning, constructive feedback techniques, and interactive teaching strategies to enhance student engagement and perception of professionalism. Additionally, introducing merit-based recognition systems to incentivize performance in areas where private school teachers excel, such as collaboration and innovative teaching, could be beneficial. Reducing administrative burdens on teachers to allow more time for pedagogical preparation and student interaction, potentially through streamlined reporting and clerical support, is also advised.

For private schools, developing training modules on conflict resolution and time management to address relative weaknesses in these areas, possibly through workshops led by experienced public-school mentors, is recommended. Fostering a culture of work-life balance to prevent burnout and sustain high levels of professionalism without over-reliance on punitive accountability is essential. Encouraging ethical reflection and community engagement to complement strong performative professionalism with deeper ethical and social responsibility is also important.

For both sectors, promoting cross-sectoral professional learning communities where teachers from public and private schools can share best practices, observe each other's classrooms, and collaborate on subject-specific training would be advantageous. Enhancing teacher evaluation systems to include multi-source feedback (peers, students, administrators) and focusing on growth-oriented rather than compliance-driven assessment is recommended. Investing in ongoing, subject-specific professional development aligned with national curriculum standards, with special attention to science pedagogy and ethical classroom management, is crucial for continuous improvement.

Future Recommendations

For future research, conducting longitudinal studies to examine how professionalism evolves with teaching experience and institutional changes would provide deeper insights. Exploring the impact of school leadership, parental involvement, and resource allocation on teacher professionalism across sectors is another valuable area of inquiry. Additionally, investigating the relationship between teacher professionalism and student academic achievement in science subjects could further inform educational policy and practice.

Authors Contributions

All the authors participated in the ideation, development, and final approval of the manuscript, making significant contributions to the work reported.

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Statement of Data Availability

The corresponding author can provide the data used in this study upon request.

Conflicts of Interest

The authors declare no conflict of interest.

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