



PUBLIC–PRIVATE PARTNERSHIPS AND SCHOOL EDUCATION QUALITY IN UTTARAKHAND: EVIDENCE FROM THE HANS FOUNDATION'S EDUCATIONAL INTERVENTIONS

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ABSTRACT

Background: Public-Private Partnerships (PPPs) are increasingly used to address challenges in the quality of school education, especially in geographically inaccessible and socio-economically disadvantaged areas. The objective of the study is to examine the role of PPP interventions in improving the quality of school education in Uttarakhand, especially the contribution of The Hans Foundation.

Method: The cross-sectional survey method was adopted in the study. Data were collected from 501 students and 251 teachers across 40 schools in four districts of Uttarakhand. For data analysis, descriptive statistics, structural equation modelling (SEM), multigroup analysis, impact-shaped analysis, ANOVA and factor analysis were used.

Results: In all six dimensions of educational quality in the students associated with PPP, better results were found. The overall standardised effect was 0.66 (95% CI: 0.56-0.76), with the most impact of digital literacy. The proportion of students with higher educational quality was 61.9 per cent in the PPP group, compared with 32.4 per cent in the non-PPP group. Teachers' reactions also confirmed positive results of PPP interventions. However, the digital divide emerged as a major challenge. The educational quality of students who were deprived of internet services was found to be 9.8%. The critical interaction between PPP and internet availability ($F = 7.42, p = 0.007$) indicates that digital access is important for the effectiveness of PPP. Also, there is a positive relationship between the PPP period and academic results ($\beta = 0.08$ per year, $p < 0.001$).

The study suggests that systematic, long-term PPP interventions can significantly improve the quality of school education in difficult, resource-limited areas. The experience of The Hans Foundation in Uttarakhand shows that NGO-government partnership can provide effective support to the public education system by improving digital literacy, academic collaboration, institutional capacity and learning opportunities. The study also highlights that sufficient digital infrastructure and long-term partnerships are essential to the partnership's greater effectiveness.

KEYWORDS: Public–Private Partnership; School Education; Educational Quality; NGO–Government Partnership; Digital Literacy; Uttarakhand; The Hans Foundation

1. INTRODUCTION

1.1 Background

Education is considered an important foundation for social development, economic progress, human capital building and personal empowerment. At the global level, Sustainable Development Goal 4 focuses on providing inclusive and equitable quality education and lifelong learning opportunities for all. Article 21A of the Constitution of India and the Right to Children to Free and Compulsory Education Act, 2009 have strengthened the legal basis for universal elementary education. National programmes like Sarva Shiksha Abhiyan and Samagra Shiksha have improved access to schools, enrolment, infrastructure and educational cooperation. However, now



the major focus of the education policy has shifted from merely ensuring access to schools to ensuring meaningful learning and quality education.

Despite improvement in school enrolment, there is still a significant gap in learning outcomes in India. It is evident from various large-scale educational assessments that enrolment or regular attendance alone does not ensure basic literacy and numeracy among students. Studies related to learning assessment in India have also stressed the need to assess the real competencies of students rather than just enrolment and school education years (Singh et al, 2021). In the present context, educational quality is not limited to reading, writing and computing alone, but also to capacities such as critical thinking, problem solving, creativity, digital literacy and practical use of knowledge. These challenges are more important in geographically inaccessible and socio-economically backward areas, where limited infrastructure, poor digital connectivity and lack of institutional capacity can influence students' educational opportunities. In this context, Public Private Partnership (PPP) can strengthen the public education system by providing additional academic, technical, managerial and institutional support. Studies indicate that PPP interventions can improve educational outcomes, although their effectiveness depends on the structure, implementation and local conditions of the programme (Ansari, 2024; Sandyopadhyay & Sharma, 2024). The study, presented in the same background, studies the PPP interventions in the school education of Uttarakhand, particularly the contribution of The Hans Foundation and its relationship with academic quality.

1.2 The Special Context of Uttarakhand

The educational conditions in Uttarakhand are special because of its hilly terrain, remote rural habitations, socio-economic diversity and uneven availability of educational resources. In remote hilly areas, difficult geographical conditions and isolation can affect students' regular access to schools, teachers, study material and other educational facilities. Recent studies on rural government schools in Uttarakhand also show that local social and institutional conditions affect inclusive and equitable education opportunities (Rangarajan et al., 2023).

Educational reforms provide new opportunities for students, but their socio-economic background may lead to academic inequalities (Joshi, 2025). The availability of digital facilities is also an important challenge, as vulnerable internet connectivity and limited technical resources can reduce the effectiveness of education delivered through digital means. These circumstances make it more challenging for students of remote and deprived communities to ensure quality education. Thus, Uttarakhand is an important area to study the quality of school education, digital access, teacher collaboration and prospects of improving educational equity through the PPP and NGO-government partnership.

1.3 The Rise of Public–Private Partnerships in Education

Public-private partnership (PPP) has emerged as an important tool to address the shortcomings related to access, quality, infrastructure, technical facilities and learning outcomes in school education. In the field of education, PPP means partnership between government institutions and private or non-government organizations for funding, management, cooperation or operation of educational services. Recent studies have shown that if the structure of the PPP programs is streamlined and supported by effective institutional arrangements, they can improve academic outcomes. However, their effectiveness may vary according to subject, student group and local implementation conditions (Ansari, 2024; Ali et al, 2024). Evidence available in India also shows that technology-based PPP programs can contribute to improving learning of students and their continuity in school (Bandyopadhyay & Sharma, 2024). The role of NGOs is particularly important in this arrangement. They can provide expertise, innovative teaching methods, community participation and additional educational resources. However, their effectiveness depends largely on better coordination and strong institutional linkages between NGO and the government (Robinson et al., 2024).

1.4 The Hans Foundation

The Hans Foundation is a non-governmental organisation that works to improve the availability of quality education and other essential services to disadvantaged and resourceless communities. The Foundation's vision in the field of education focuses on equity, inclusive education, academic cooperation, infrastructure, digital resources and overall development of students. The educational programs of THF include therapeutic teaching for students from rural and economically weaker areas, digital learning tools, study materials, career guidance and other developmental activities. Efforts have also been made by the Foundation to support teacher training, activity-based learning, digital classrooms and educational resources deficit schools in remote rural areas of Uttarakhand.



Recent studies on NGOs-Government Partnership underline the usefulness of such collaboration. According to Robinson et al. (2024), effective cooperation between NGOs and the government can be linked to better outcomes in education and other public services. Similarly, studies conducted in India suggest that technology-based PPP programs using digital resources with appropriate teaching methods can help improve learning outcomes (Bandyopadhyay & Sharma, 2024). The interventions in the study presented on the same basis are evaluated on the basis of six major dimensions of educational quality - education participation, cognitive skills, environmental awareness, career aspirations, social responsibility and digital literacy.

1.5 Research Objectives

This study has five specific objectives:

- (1) to establish a basic profile of the student population and investigate perceptions of the policy framework using SEM;
- (2) to investigate the relationship between students' background and satisfaction through multiple regression;
- (3) to analyse the Hans Foundation's institutional contribution across six domains using meta-analysis;
- (4) to analyse problems and challenges in providing quality education through PPP; and
- (5) to provide evidence-based policy recommendations.

2. RESEARCH METHODOLOGY

2.1 Research Design

The study uses a cross-sectional survey method using quantitative, descriptive and explanatory research design. Primary data was collected through structured questionnaires from students and teachers. This research design was used to study the role of public-private partnership (PPP) interventions in terms of improving the quality of school education. Along with this, the educational experiences and results of the respondents who had the PPP experience and who did not have the PPP experience were also compared.

2.2 Study Area and Sampling

The study was conducted in the state of Uttarakhand and covered four districts representing different geographical conditions of the state. From the plains, Haridwar and Udham Singh Nagar and Almora and Uttarkashi districts were selected from the hilly areas. Each district has 10 schools. A total of 40 schools were thus selected, including government, aided and private/non-help schools.

The final sample of the study included a total of 501 students. Out of these, 251 students had the experience of PPP programmes while 250 students did not have the experience of PPP. In addition, a total of 251 teachers were included in the study, including 78 teachers with PPP experience and 173 teachers with non-PPP experience. Thus, the study carried out a comparative study of respondents with PPP and non-PPP experience involving both student and teacher groups. The sample size was considered adequate considering the requirements of statistical analyses used in the study.

2.3 Data Collection Instruments

The primary data for the study was collected through separate structured questionnaires prepared for students and teachers. The statements given in the questionnaire were measured at the Five-Point Likert Scale. Validity and reliability of data collection devices were also tested. The factor loadings were found between 0.62 and 0.81 in the Confirmatory Factor Analysis. The value of Average Variance Extracted was found to be greater than 0.50, confirming convergent validity. In addition, the differential validity of the devices was also tested. The Cronbach Alpha for both questionnaires received the value of $\alpha = 0.91$ indicating high internal cohesion and reliability. Thus, the questionnaires used in the study meet the required validity and reliability standards.

2.4 Data Analysis Techniques

The data collected was analyzed through appropriate statistical techniques. Descriptive statistics were used to present the demographic and educational characteristics of the respondents. Structural equation modeling was used to analyze the perceptions of the respondents to the PPP policy framework, while multiple regression analysis was done to identify key factors related to the satisfaction of the stakeholders.

Comparative effect-size analysis was used to assess the difference in different dimensions of educational quality between PPP experience and non-PPP groups. An interaction analysis and ANOVA were done to study the impact



of geographical, socio-economic and digital challenges. Finally, factor analysis was used to identify key dimensions of policy suggestions.

3. RESULTS

3.1 Student Population Profile

The demographic profile of 501 students involved in the study reflects their social, economic, educational and infrastructure situation. The total number of students was 67.1 while the distribution of students in different age groups was relatively balanced. The student participation in class 10 was highest at 21.8 per cent. According to the social category, 52.5 per cent of the students belong to the general category, 27.1 per cent to Other Backward Classes (OBCs), 12.8 per cent to Scheduled Castes (SC) and 6.8 per cent to Scheduled Tribes (STs). According to the economic situation, the family income of the students was varied. The highest 23.6% of the students were from families with a monthly income of between 5,000 and 10,000. There was also a significant difference in the educational status of parents. About 23.6% of mothers and 21.4% of fathers were illiterate. Availability of basic and digital facilities was relatively limited. 55.1 percent of the students did not have access to electricity, 56.3 percent of the smartphone and 55.1 percent of internet connectivity. In the study, 28.3 per cent of the students said that they get the primary support from parents while 15.6 per cent of the students do not get any study support. Overall, this framework of students reflects the socio-economic and digital inequalities existing in the field of study. These circumstances are critical reference factors while evaluating the effectiveness of PPP interventions in school education.

3.2 Policy Framework and Institutional Mechanism Perceptions

Table 1: Standardised Factor Loadings - Student Policy Framework

Item	Statement	Factor Loading (λ)	R ²	Interpretation
Q12	Programs well-organised and managed	0.76	0.58	Strongest indicator
Q3	Additional teachers/staff provided	0.75	0.56	Strong indicator
Q9	Students informed of benefits	0.74	0.55	Strong indicator
Q6	Partnership information displayed	0.73	0.53	Strong indicator
Q1	Awareness of partnership	0.72	0.52	Strong indicator
Q8	Transparency in implementation	0.71	0.50	Moderate indicator
Q4	Roles clearly defined	0.70	0.49	Moderate indicator
Q7	Management discusses programs	0.69	0.48	Moderate indicator
Q2	Objectives clearly communicated	0.68	0.46	Moderate indicator
Q10	Better coordination	0.67	0.45	Moderate indicator
Q5	Regular monitoring visits	0.65	0.42	Moderate indicator
Q11	Accountability for resources	0.64	0.41	Weakest indicator

Model Fit: CFI = 0.94, TLI = 0.92, RMSEA = 0.051, SRMR = 0.042; Cronbach's α = 0.91, CR = 0.93, AVE = 0.58

Table 1 indicates that all 12 items represent the PPP policy framework significantly. Their factor load is between 0.64 and 0.76, and all values are statistically significant ($p < 0.001$). The highest factor load was found to be 0.76 ($R^2 = 0.58$) of Q12. This was followed by 0.75 ($R^2 = 0.56$) of Q3 (availability of additional staff) and 0.74 ($r^2 = 0.55$) of Q9 (effective transmission of benefits). This shows that the well-organised conduct of programmes, the clear knowledge of the benefits from adequate staff and the PPP, particularly affects the students' perception. Awareness of participation, display of information, transparency, clarity of roles, discussion at management level, communication of objectives, coordination, monitoring and other factors related to accountability were also found acceptable. The factor weight and interpretation of Q11 (accountability) was the lowest ($R^2 = 0.41$). This indicates that students' perception of accountability can also be influenced by other external or institutional factors.

Overall, the fit of the measurement model was found to be good ($CFI = 0.94$; $RMSEA = 0.051$), and its internal association was also high. In addition, $AVE = 0.58$ confirms adequate convergent validity. The results, therefore, show that the proposed PPP policy framework is reliable and valid, and students view its various components as interrelated aspects of institutional implementation.



3.3 Stakeholder Satisfaction with PPP Effectiveness

Table 2: Parsimonious Regression Model - Student Satisfaction

Variable	B	Std. Error	Beta	t-value	p-value
(Intercept)	0.312	0.094	---	3.32	0.001
Q14: Improved understanding	0.215	0.028	0.218	7.68	< 0.001
Q22: Learning environment improvement	0.193	0.031	0.194	6.23	< 0.001
Q23: Confident about academic performance	0.180	0.030	0.182	6.00	< 0.001
Q17: Adequate personal attention	0.152	0.029	0.154	5.24	< 0.001
Q21: Infrastructure improved after partnership	0.131	0.028	0.133	4.68	< 0.001
Q24: Would recommend this school	0.110	0.027	0.113	4.07	< 0.001
Q16: Innovative teaching methods	0.096	0.029	0.097	3.31	0.001
Q20: Parents satisfied	0.085	0.026	0.087	3.27	0.001
Monthly Income: >₹25,000	0.121	0.040	0.095	3.03	0.003
PPP Awareness (Yes=1)	0.092	0.038	0.067	2.42	0.016

Model Fit: $R^2 = 0.791$, Adjusted $R^2 = 0.786$, $F(10, 490) = 185.34$, $p < 0.001$

3.3 Factors Influencing Student Satisfaction

The final regression model is presented in table 2, which only includes factors that were found statistically significant ($p < 0.05$). The model explains 79.1 percent ($R^2 = 0.791$) of the change in overall satisfaction of students. The model is also statistically significant ($F = 185.34$, $p < 0.001$), indicating its strong explanatory capacity.

The improvement in understanding of subjects (Q14) in all factors was the most positive effect on student satisfaction ($B = 0.215$, $\beta = 0.218$, $p < 0.001$). This was followed by improvement in learning environments (Q22) ($B = 0.193$, $\beta = 0.194$, $p < 0.001$) and confidence to academic performance ($B = 0.180$, $\beta = 0.182$, $p < 0.001$). It is evident that better learning, conducive academic environment and academic confidence of students are vitally linked to their satisfaction.

In addition, personal attention (Q17), improvement in infrastructure (Q21), willingness to recommend schools (Q24), innovative teaching methods (Q16) and parents satisfaction (Q20) were also found to have significant positive relationships with student satisfaction. The level of satisfaction among students of families with monthly income above 25,000 was relatively high ($B = 0.121$, $\beta = 0.095$, $p = 0.003$), indicating that socio-economic status is also associated with students' educational experiences.

Similarly, awareness of PPP was also found to have a significant positive relationship with student satisfaction ($B = 0.092$, $\beta = 0.067$, $p = 0.016$). This indicates that the level of satisfaction is higher among students who have better knowledge of PPP activities and their objectives.

In contrast, the influence of gender, age, caste and religion was not found statistically significant. Overall results show that academic reforms, better learning environments, students' confidence, institutional collaborations and socio-economic conditions are key factors for student satisfaction in PPP based schooling.

3.4 Hans Foundation's Institutional Contribution

Table 3: Meta-Analysis Summary - THF Impact on Academic Quality

Domain	THF Mean (SD)	Non-THF Mean (SD)	Mean Difference	Cohen's d	95% CI	I ²
Academic Engagement	4.12 (0.78)	3.62 (0.96)	+0.50	0.57	0.47-0.67	12%
Cognitive Skills	4.23 (0.71)	3.65 (0.91)	+0.58	0.71	0.61-0.81	8%
Environmental Awareness	4.05 (0.82)	3.47 (0.99)	+0.58	0.64	0.54-0.74	10%
Career Aspirations	4.18 (0.74)	3.64 (0.94)	+0.54	0.64	0.54-0.74	9%
Social Responsibility	4.08 (0.79)	3.56 (0.97)	+0.52	0.59	0.49-0.69	11%
Digital Literacy	4.25 (0.69)	3.68 (0.89)	+0.57	0.72	0.62-0.82	7%
Overall Academic Quality	4.15 (0.74)	3.60 (0.93)	+0.55	0.66	0.56-0.76	10%

Note: All t-tests significant at $p < 0.001$; Random-effects model used for overall estimate; THF $n=251$, Non-THF $n=250$



Table 3 shows that the academic results of the students associated with The Hans Foundation (THE) programs were found to be better in all six dimensions of educational quality than non-THE students. The overall standardized impact size between the two groups was $d = 0.66$ (95% CI: 0.56-0.76), indicating a moderate to high level difference. The most impact on digital literacy in six dimensions ($d = 0.72$) was observed. It was followed by cognitive skills ($d = 0.71$). The results show that the out-of-the-box programmes are particularly positively linked to the digital efficiency of students and high-level learning skills. Environmental awareness ($d = 0.64$) and career aspirations ($d = 0.64$) also found significant differences. Similarly, there was a moderate but significant difference between social responsibility ($d = 0.59$) and academic engagement ($d = 0.57$). The impact sizes of all the six dimensions found relatively low differences, indicating that the positive outcomes associated with the thrust are generally consistent in different areas of academic quality. In addition, the variability of students belonging to the THE was relatively low ($SD = 0.69$ 0.82) while in non-THE students it was found to be $SD = 0.890.99$. Overall, the findings show that the correlation with the THE programs is positively related to better outcomes in various dimensions of educational quality, with the most significant difference in digital literacy and cognitive skills.

Table 4 presents the proportion of students achieving high academic quality.

Domain	THF (%)	Non-THF (%)	Absolute Difference	Relative Improvement
Academic Engagement	61.4%	34.8%	+26.6%	+76.4%
Cognitive Skills	63.7%	32.4%	+31.3%	+96.6%
Environmental Awareness	58.9%	30.0%	+28.9%	+96.3%
Career Aspirations	60.2%	33.2%	+27.0%	+81.3%
Social Responsibility	59.4%	31.6%	+27.8%	+88.0%
Digital Literacy	64.9%	31.2%	+33.7%	+108.0%
Overall Academic Quality	61.9%	32.4%	+29.5%	+91.0%

Table 4 shows that there is a clear difference in the level of high academic quality between The Hans Foundation and non-THF students. In terms of overall academic quality, students with 61.9 percent thresholds achieved high quality, while in non-THF students it was only 32.4 percent. Thus, the difference between the two groups was 29.5 percent and the relative difference between the two groups was about 91.0 percent.

Most of the differences were seen in digital literacy. While 64.9 per cent of students belonging to THF achieved higher levels, the ratio was 31.2 per cent for non-THF students. The gap between the two groups was 33.7%. Similarly, in cognitive skills, 63.7 per cent of students belonging to THF were in the higher quality category, while in non-THF groups it was 32.4 per cent. The students involved in academic engagement, environmental awareness, career aspirations and social responsibility were also found to have better results. Overall, in all six academic dimensions, the ratio of THF-linked students to higher educational quality was consistently found to be higher. The relative difference in different dimensions was between 76.4 percent and 108.0 percent. In practice, about 30 additional students achieved high overall academic quality in every 100 students belonging to the THF compared to the non-THF group. These results indicate that thrust programmes are positively associated with improving the educational quality in Uttarakhand. However, given the cross-sectional nature of the study, it would be more appropriate to understand these results as statistical relationships rather than direct causative effects.

3.5 Problems and Challenges in PPP Implementation

Table 5 presents the integrated challenge ranking from both student and teacher perspectives.

Rank	Challenge Category	Student Evidence	Teacher Evidence	Integrated Severity	PPP Mitigation Capacity
1	Digital Divide (Internet, Smartphone, Electricity)	F=25.67, $\eta^2=0.049$; 9.8% quality deficit	F=35.67, $\eta^2=0.125$; THF reduces anxiety by 1.27 points	Critical	High (with infrastructure)
2	Geographical Isolation (Distance, Terrain)	F=8.24, $\eta^2=0.047$; 13.1% quality deficit	F=18.76, $\eta^2=0.070$; Persistent concern (3.45-3.82)	Critical	Medium (needs remote solutions)



3	Socio-economic Deprivation (Income, Parental Education)	F=8.24, $\eta^2=0.063$; 15.8% income gap; 15.2% maternal education gap	Indirect via community engagement (F=22.18)	Critical	Medium-High (scholarships, awareness)
4	Teacher Capacity Gap (Digital Pedagogy Training)	Not directly measured	F=28.45, $\eta^2=0.102$; THF reduces anxiety by 1.16 points	High	High (PPP training effective)
5	Administrative Support Gap	Not directly measured	F=24.32, $\eta^2=0.089$; THF reduces anxiety by 1.03 points	High	High (PPP enables innovation)
6	Community Engagement Gap	Maternal education gap: 15.2% deficit	F=22.18, $\eta^2=0.082$; THF reduces anxiety by 0.80 points	Medium-High	Medium (needs continued effort)
7	Resource Availability	Study support matters (F significant)	F=16.54, $\eta^2=0.062$; THF reduces anxiety by 0.94 points	Medium	High (PPP provides resources)

Note: Interaction effects: PPP $\times$ Internet (F=7.42, $p=0.007$); PPP $\times$ Smartphone (F=5.59, $p=0.018$); PPP $\times$ Electricity (F=4.45, $p=0.035$); PPP $\times$ Income ($p=0.145$, not significant)

Table 5 presents the major challenges in providing quality education through PPP interventions based on evidence from students and teachers. The results show that digital divide is the most important challenge. The educational quality of students who did not have internet facility was found to be 9.8% lower. Teachers-based analysis also showed a clear effect ($F = 35.67$, $\eta^2 = 0.125$). In addition, the statistical significance of PPP Internet interaction ($F = 7.42$, $p = 0.007$) indicates that sufficient digital convenience plays a vital role in enhancing the effectiveness of PPP interventions. Geographic isolation emerged as the second major challenge. Students who travelled more than 5 km to reach the school showed a decline of 13.1%. This result shows that distance, difficult geographical conditions and school access problems still affect educational opportunities, despite the help being available through PPP.

Socio-economic conditions were also found to be an important factor affecting educational quality. The difference between lower and higher income class students was 15.8%. Similarly, based on the level of maternal education, the gap between 15.2% was observed. However, the PPP income interaction was not statistically significant ($p = 0.145$). This indicates that the relationship between participation in PPP and academic results is not significantly different in different income classes.

Teachers and institutional factors were also found to be important for the effectiveness of PPP interventions. The impact of teacher capacity gaps was important ($F = 28.45$, $\eta^2 = 0.102$). Similarly, the lack of administrative co-operation ($F = 24.32$, $\eta^2 = 0.089$). These results indicate that there are ample possibilities of teacher training, capacity building and strengthening institutional and administrative cooperation under the PPP interventions.

In addition, community engagement also emerges as an important area that needs constant attention. Overall, the results show that the success of the PPP depends not only on financial or institutional cooperation but also on factors such as digital access, geographical ease, socio-economic conditions, teacher capacity, administrative cooperation and community engagement. Hence, it is necessary to implement the PPP-based educational programmes with a multi-faceted approach to local conditions.



4. DISCUSSION

4.1 Policy Framework Perceptions

The findings indicate that students and teachers view the implementation of the PPP as an integrated institutional framework, not as separate activities. It supports institutional approach in which formal arrangements, rules, coordination and accountability collectively influence the implementation of the programme. At the same time, the differences between students and teachers reflect the importance of stakeholders approach. The student programme values the direct visible outcomes like organization, staff availability and communication, while teachers focus more on coordination, monitoring and formal procedures.

Recent research also underlines that stakeholder participation and effective governance are critical to the performance of PPP regimes (Uddin et al., 2023; Mahajan et al., 2023). The study identified a gradual relationship - clarity of the regulatory framework agreement role coordination monitoring accountability training indicates that interlinked institutional procedures are required for effective PPP implementation. In particular, the strong relationship between surveillance and accountability ($\beta = 0.76$) indicates that systematic surveillance is important to strengthen transparency and accountability in partnership-based programs.

4.2 Stakeholder Satisfaction

The findings suggest that academic reform is the strongest predictor of student satisfaction. This indicates that students give more importance PPP interventions primarily when they see real and meaningful improvement in learning. The supportive learning environment and high academic confidence also contribute significantly to student satisfaction, while the role of infrastructure is helpful but relatively less effective. Recent research also shows that learning environments, efficiency development and institutional collaborations are important determinants of student satisfaction (Dai et al., 2024; Mayo et al., 2024).

Significantly, there was a statistically significant positive relationship with student satisfaction of PPP awareness (PPP awareness) ($\beta = 0.065$, $p = 0.023$). This indicates that clear and effective communication about PPP related activities can help students understand and recognize the benefits of these interventions. Although higher income class students expressed greater satisfaction, the impact of gender, caste and religion was not found statistically significant after controlling the factors related to partnership.

4.3 The Hans Foundation's Contribution

The findings indicate that The Hans Foundation has a positive relationship with academic quality in all six dimensions studied. The standardised effect size of students ($d = 0.66$) and teachers ($d = 0.72$) indicates that there was a meaningful difference between groups associated with f and not linked to THF. The ratio of students with high academic quality also increased from 32.4% to 61.9%.

The most difference was found in digital literacy ($d = 0.73$) indicating the importance of technology-based interventions to improve learning opportunities. This conclusion is in line with the evidence that technology-enabled PPP initiatives can help improve learning outcomes of students when digital resources are aligned with appropriate academic collaboration (Bandyopadhyay & Sharma, 2024). Large effects were also found in career planning ($d = 1.21$), internet-based learning ($d = 1.18$) and interest in STEM subjects ($d = 1.14$). Teachers' perceptions also support these findings, especially with regard to digital infrastructure ($d = 0.83$).

Overall, results indicate that properly planned and effectively implemented PPP interventions can contribute significantly in improving academic quality and learning opportunities. However, the intensity of impact in different educational dimensions may vary. It shows that the impact of PPP programmes should also be evaluated on specific dimensions such as digital literacy, career planning, internet based learning, STEM interest and digital infrastructure, not just on the basis of overall educational quality.

4.4 Challenges and Barriers

The study findings showed the digital divide as the most important obstacle to the effectiveness of PPP programs. The educational quality of students who did not have access to internet was found to be 9.8 percent lower. Also, the critical interaction of PPP X Internet ($F = 7.42$, $p = 0.007$) indicates that better digital connectivity strengthens the benefits from PPP programs. This conclusion supports the fact that technology-based PPP programs are more effective when appropriate educational collaborations are also made available with digital resources. Geographical



distance and durability also emerged as an important challenge. The educational quality of students covering more than 5 km distance upto the school was found to be 13.1%. Similarly, significant differences were also found based on socio-economic status. On the basis of family income, the difference was 15.8 per cent and on the basis of mother's educational status 15.2 per cent. However, the interaction of PPP income was not statistically significant ($p = 0.145$). This indicates that the educational benefits associated with PPP are not significantly different between different income classes. In addition, the positive relationship between the duration of PPP program and the educational quality ($\beta = 0.08$ per year, $p < 0.001$) was found, indicating that long-term participation may be associated with better educational outcomes than short-term programs. Overall, the findings suggest that supplementary investment in digital infrastructure, educational access to remote areas and long-term institutional cooperation is essential to enhance the effectiveness of PPP programs.

5. CONCLUSION

The study provides empirical evidence that public-private partnership (PPP) is positively associated with the quality of school education in Uttarakhand, especially in the context of academic programs run by The Hans Foundation. Students associated with f-supported programs showed better results than non-thf students in different dimensions of educational quality. The overall standardized impact size for students was found to be $d = 0.66$ and $d = 0.72$ for teachers, indicating significant differences between the two groups. Similarly, the ratio of students with high overall academic quality was 61.9 percent in the THF group, while in the non-THF group it was 32.4 percent.

The most impact ($d = 0.73$) on digital literacy in various dimensions of educational quality. The results reflect the importance of digital learning facilities in remote and hilly areas. Important interactions between PPP experience and internet availability ($F = 7.42$, $p = 0.007$) also suggests that sufficient digital infrastructure and internet facilities are essential to get better benefits of PPP programs. In addition, the positive relationship between the duration of thepp program and the educational quality ($\beta = 0.08$ per year, $p < 0.001$). This indicates that long-term partnership is linked to better academic outcomes.

The findings of the study are also important from the point of view of academic equality. The interaction of PPP income was not statistically significant ($p = 0.145$). This indicates that the relationship between PPP and academic results is not significantly different in different income classes. However, structural challenges like geographical distance, inaccessible terrain and socio-economic backwardness continue to persist, which are not possible only throughpp programmes.

Overall, the study concludes that long-term, well-organized and effective NGO-Government partnerships can provide significant support to the public school education system. This requires strengthening of digital infrastructure, teacher capacity building, effective institutional coordination and community engagement. THF experience in Uttarakhand provides useful policy base for other rural, hilly and resource-limited areas of India for PPP based educational programs. In future, such initiatives must priorities long-term partnerships, better digital connectivity, educational access to remote areas, institutional capacity building and equitable educational opportunities.

6. RECOMMENDATIONS

Based on the findings of the study, the following recommendations are made in Uttarakhand to make Public Private Partnership (PPP) more effective, inclusive and sustainable in the field of school education.

6.1 Recommendations for Policymakers

The PPP programmes should be expanded in rural, remote, hilly and educationally backward areas in a phased manner. Priority should be given to schools where infrastructure, digital resources and learning facilities are lacking. The study findings have found a positive relationship between long-term PPP experience and better academic outcomes. Hence, emphasis should be laid on operating the PPP programmes for a longer period. At the same time, necessary financial flexibility can be provided to implementing institutions under transparent monitoring and accountability mechanism.

Digital infrastructure should be given special priority. Efforts should be made to ensure availability of regular power supply, internet connectivity, smart classrooms and digital devices for economically weaker students.



Remote learning facilities, community learning centres and other local need based options can be developed for remote areas. The possibility of residential or hostel facilities, as required, should also be considered for students living in more distance from the school. In addition, teacher training and continuous professional development should be made an important part of the PPP programmes.

6.2 Recommendations for The Hans Foundation

The Hans Foundation (THF) should further strengthen communication, coordination, monitoring and accountability in its academic programmes. The objectives, activities, available resources and achievements of the partnership should be made available to students, teachers, parents and school management committees in regular and simple manner.

In view of the positive results related to digital literacy, THF should expand technology-based learning programs. Digital learning material, especially for remote areas, which can be operated on low internet data and can be used offline. Successful digital learning models can be documented and implemented in other schools in a phased manner.

Long-term partnerships with selected schools should be prioritized to sustain educational reforms. The capacity of local teachers should be developed through regular training, certification programme, peer learning and teacher learning communities.

6.3 Recommendations for School Administrators

The school administration should ensure transparency and regular information in the activities related to PPP. Information relating to participation programmes, available resources, responsibilities of various stakeholders and progress should be displayed at the principal place in the school and updated from time to time.

Regular coordination between teachers, parents, school management committees and PPP implementation institutions should be developed. Ensure active participation of parents in school improvement related activities and provide them with clear information on educational opportunities and facilities available through PPP. Schools should also keep a transparent record of resources and their use through PPPs. More attention should be given to career awareness, digital learning, academic cooperation and student consultation, especially for students of higher classes. Regular career awareness programmes and necessary educational and career-related information should be provided to students of classes 8 to 12.

Overall, the study recommendations make it clear that the effectiveness of the PPP is not only dependent on financial support or material resources, but also equally important for long-term partnerships, digital access, teacher capacity building, transparent governance and active community participation. Through effective coordination between the Government, NGOs, schools, teachers, parents and local communities, the PPP programmes can be made more effective, inclusive and sustainable to the geographical and educational needs of Uttarakhand.

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