HDFC BANK PARIVARTAN
A step towards sustainable progress

IMPACT ASSESSMENT REPORT

IMPACT ASSESSMENT OF FOCUSED DEVELOPMENT PROGRAMSMART CLASSROOM PROJECTS (P0614)

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Executive Summary

This report summarizes the findings of a one-year impact evaluation of HDFC Bank's Focused Development Project (FDP) which aimed to improve the quality of education in government schools in Jharkhand by developing infrastructure for smart classrooms.

Methodology:

A mixed-method approach using quantitative and qualitative data collection techniques was employed. A cross-sectional design was used, involving surveys and interviews with teachers, school staff, parents, and SMC members. Observation checklists were used to assess the infrastructure improvements in classrooms.

Key Findings:

Infrastructure:

While a majority of classrooms (53.3%) boasted painted walls, the analysis revealed notable variations in the upkeep of exterior walls across surveyed schools. This discrepancy underscores potential differences in maintenance practices and highlights the importance of consistent efforts to ensure a visually appealing and conducive learning environment. Regarding flooring, the completion rate was notably high (95.7%), with carpet flooring emerging as the preferred option among educators. The prevalence of carpet flooring suggests a deliberate choice aimed at enhancing comfort and acoustics within classrooms. However, while the completion of flooring was widespread, further attention may be needed to ensure the durability and longevity of these flooring materials, emphasizing the importance of ongoing maintenance efforts to preserve the quality of educational spaces.

Basic Amenities:

A vast majority of classrooms were equipped with essential features such as tube lights (97.6%), switchboards (99.0%), ceiling fans (95.2%), and grills (97.6%), which are fundamental for creating a conducive learning environment. However, despite the presence of these amenities, concerns arose regarding their functionality and maintenance. A significant percentage of classrooms reported issues such as non-working lights, malfunctioning switches, and fans that were not operational. These maintenance issues can adversely affect the learning experience by causing discomfort and disruptions during classroom sessions. Therefore, addressing these concerns through regular maintenance and repair efforts is crucial to ensure that classrooms remain functional and conducive to effective teaching and learning.

Teacher Perceptions:

A significant majority of teachers reported notable improvements following the implementation of the project, particularly in access to infrastructure and student attendance. With 51.2% of teachers indicating a significant improvement and 47.9% noting a slight enhancement in access to infrastructure, it suggests that the project effectively addressed deficiencies in infrastructure facilities. Moreover, the substantial increase in student attendance, reported by 90.6% of teachers, reflects the positive impact of the project on creating a conducive learning environment. Furthermore, teachers observed heightened student interest and participation in classroom activities, with 62.9% reporting a significant increase and 35.2% noting some extent of improvement. This indicates that the project has successfully engaged students more actively in the learning process. Additionally, improvements in academic performance were noted by a significant proportion of teachers, with 48.8% reporting a significant improvement and 46.9% indicating a slight enhancement. These findings collectively

highlight the project's effectiveness in enhancing access to infrastructure, increasing student attendance, fostering student engagement, and improving academic performance, underscoring its positive impact on the overall learning experience.

Overall, the Smart Classroom intervention has been successful in creating a more conducive learning environment and improving educational outcomes.

Recommendations:

- Prioritize regular maintenance of infrastructure to ensure its longevity and functionality.
- Maximize the use of Smart Classroom technology by providing teachers with training and support.
- Implement strategies to sustain improvements in student attendance and participation.
- Conduct ongoing monitoring and evaluation to track progress and adjust as needed.
- Secure sustainable funding and resources for infrastructure upgrades, technology, and teacher training.
- Foster collaboration with parents, community members, and stakeholders to ensure program success.
- By implementing these recommendations, schools can leverage the benefits of Smart Classrooms to create a lasting positive impact on student learning.

Chapter 1 Introduction to the study

1.1 Educational Status of the Children in India, with a focus in India

The education landscape in India, particularly in states like Jharkhand, presents a complex picture marked by both progress and persistent challenges. Despite significant efforts to improve access to education, a considerable portion of the population still faces barriers to quality learning. According to the Annual Status of Education Report (ASER) 2020[1], conducted by Pratham Education Foundation, school closures and the shift to remote learning have widened the digital divide, with many children lacking access to online education due to a lack of devices and internet connectivity (ASER Centre, 2021). This situation underscores the need for innovative solutions to ensure continuity in learning, especially for marginalized communities in states like Jharkhand.

In Jharkhand, various factors contribute to the educational challenges faced by children. The state's tribal population, constituting a significant proportion of its inhabitants, often encounters difficulties in accessing quality education due to geographical remoteness, socio-economic marginalization, and cultural differences. According to the District Information System for Education (DISE) 2019-20 report, Jharkhand has shown improvements in key education indicators such as enrollment rates and infrastructure development. However, issues such as teacher vacancies, inadequate facilities, and low learning outcomes persist, particularly in rural and tribal-dominated areas (Ministry of Education, Government of India, 2020)[2].

Moreover, the ASER survey highlights the impact of limited access to educational resources and infrastructure on foundational literacy and numeracy skills among children in Jharkhand. The closure of schools during certain periods and the lack of proper learning materials have further hampered the learning progress of students, especially those from marginalized backgrounds.

To address these challenges, various initiatives have been undertaken by the government, non-profit organizations, and community stakeholders. The Jharkhand government's efforts to improve infrastructure, recruit more teachers, and enhance the quality of education through innovative teaching methods are commendable steps in the right direction. Additionally, organizations like Pratham and UNICEF have been working closely with local communities to promote remedial education programs, teacher training workshops, and advocacy campaigns aimed at improving learning outcomes and ensuring inclusive access to education (UNICEF India, 2020)[3].

Despite these efforts, much remains to be done to achieve universal access to quality education in Jharkhand and across India. Sustainable solutions require a multi-faceted approach encompassing infrastructure development, teacher capacity building, community engagement, and leveraging technology for inclusive learning. Collaboration between government agencies, civil society organizations, and private sector stakeholders is essential to address systemic challenges and create an enabling environment for every child to realize their right to education (UNESCO, 2020)[4].

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[1] ASER Centre. (2021). *Annual Status of Education Report (Rural) 2020*. Retrieved from https://img.asercentre.org/docs/Publications/ASER%20Reports/ASER%202020/Release%20Material/aser2020report.pdf

[2] Ministry of Education, Government of India. (2020). *District Information System for Education (DISE) 2019-20: Flash Statistics*. Retrieved from https://dise.gov.in/flashstatistics_2019-20/Flash%20Statistics%202019-20.pdf

[3] UNICEF India. (2020). *Education*. Retrieved from https://www.unicef.org/india/what-we-do/education

[4] UNESCO. (2020). *Global Education Monitoring Report: Inclusion and Education*. Retrieved from https://unesdoc.unesco.org/ark:/48223/pf0000373113

In conclusion, while strides have been made in advancing education in Jharkhand and India as a whole, significant disparities persist. Policymakers, educators, and stakeholders at all levels must prioritize inclusive and equitable education, particularly for marginalized communities, to ensure that every child has the opportunity to receive a quality education and achieve their full potential.

1.2 About HDFC Bank CSR

HDFC Bank is actively engaged in transforming the lives of millions across the nation through its Corporate Social Responsibility (CSR) endeavours. These initiatives form a part of 'Parivartan', an overarching program aimed at fostering sustainable development and empowerment within communities to drive economic and social progress. Through Parivartan, the bank endeavours to make a tangible impact by addressing key areas such as rural development, education, skill enhancement, livelihood improvement, healthcare, hygiene, and financial literacy.

Within the framework of Parivartan, projects are executed in collaboration with non-profit organizations, which implement these initiatives on the ground. One such initiative is the "Holistic Rural Development Project (HRDP)", which concentrates on rural development and addresses various needs of rural communities across multiple domains. This project is designed to bring about comprehensive changes and improvements in rural areas, thereby uplifting the standard of living and promoting sustainable development.

Additionally, the bank undertakes the "Focused Development Project (FDP)", which is tailored to address specific focus areas identified under Parivartan. These focus areas include rural development, education, skill development, livelihood enhancement, healthcare, hygiene, and financial literacy. The FDP projects are strategically designed to target specific challenges within these focus areas, thereby maximizing the impact of the bank's CSR efforts.

Through these initiatives, HDFC Bank strives to create meaningful and lasting change in the lives of individuals and communities across the country. By focusing on key areas of development and leveraging partnerships with non-profit organizations, the bank aims to drive positive social impact and contribute to the overall well-being and prosperity of society.

1.3 About the Program

HDFC Bank has pledged to establish 2500 smart classrooms nationwide as part of its commitment to promoting education. Within the framework of its Parivartan initiative, HDFC Bank has introduced an ambitious program aimed at implementing smart classrooms. Specifically, the bank has collaborated with the government education department to enhance educational infrastructure in 800 schools across Jharkhand. These initiatives fall under the purview of Focused Development Projects (FDP), which are geared towards ensuring the sustainability and effectiveness of smart classrooms in targeted areas.

The projects implemented under the Smart Classroom initiative include the following:

Project P0614 - Development of one Smart Classroom in 400 government schools across eight districts in Jharkhand

In Jharkhand, a significant portion of school-going children, approximately 80%, attend government schools, which predominantly cater to economically disadvantaged families. However, the quality of education in these schools often lags behind that of private institutions, thereby impacting the prospects of students. Smart classrooms have emerged as an effective tool for enhancing educational quality through the integration of modern technology. To address this issue, HDFC Bank, through its Parivartan initiative, has facilitated the renovation of smart classrooms in 400 government schools

across eight districts in Jharkhand. These districts include Bokaro, Chatra, Giridih, Hazaribagh, Purbi Singhbhum, Ranchi, Ramgarh, and Sahibgunj. Key activities undertaken as part of this project include wall painting, installation of window grills and collapsible gates, painting of doors and windows, application of anti-static polyvinyl sheets for floor matting, electrical wiring for power supply, installation of fans, bulbs, sockets, and more.

This initiative is guided by specific objectives:

- Promotion of Good Quality Education in Government Schools in Jharkhand by developing infrastructure for smart classrooms.
- Making Government Schools more attractive and equipped with good infrastructure and educational facilities for children.

Through these concerted efforts, HDFC Bank aims to contribute significantly to the enhancement of educational quality and accessibility in government schools across Jharkhand, thereby positively impacting the lives and futures of countless students.

1.4 About the Implementation Agency

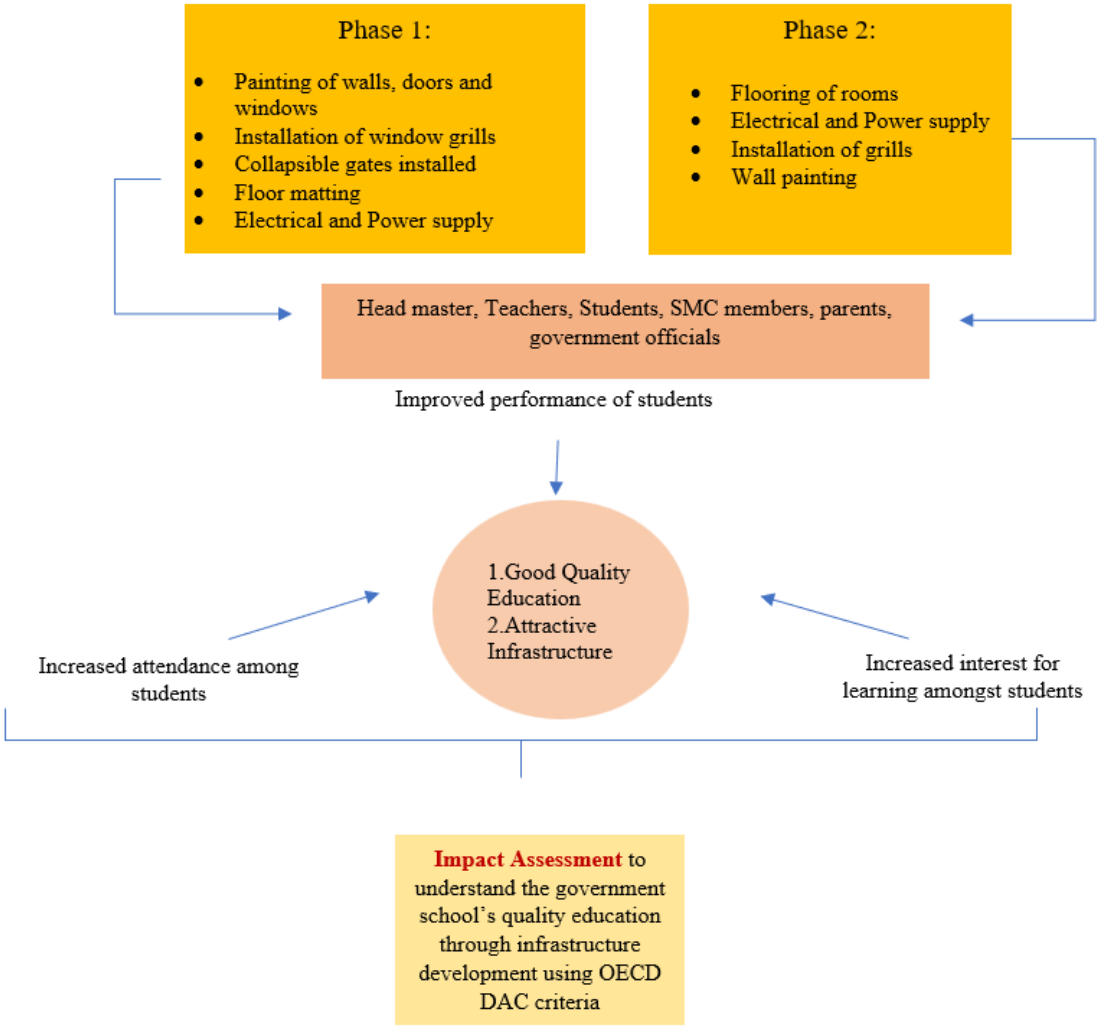
The implementation agency for Project P0614 is **Nav Bharat Jagriti Kendra**, which is entrusted with the task of developing one smart classroom in 400 government schools across eight districts in Jharkhand as part of Phase I. Nav Bharat Jagriti Kendra is a reputed non-profit organization known for its dedication to grassroots development and educational initiatives. With its expertise in rural development and education, the organization plays a crucial role in ensuring the successful execution of the project, including activities such as infrastructure development, technological integration, and capacity building for teachers and students.

Chapter 2 Overview of the Study Design

2.1 Overarching Evaluation framework

The overall objectives of the one-year program –Focused Development Program is aimed at promotion of good quality of education in government schools through developing infrastructure for smart classes and making government schools attractive and capacitated with good infrastructure and educational facilities to the children. Given the nature of the project implementation, HDFC Bank CSR has envisaged a result-based evaluation to monitor and assess the impact of the project.

The overarching framework of the proposed study is shown as under:



2.2 Research Design

Keeping in mind the nature and framework of the study, the proposed impact assessment adopted a **cross-sectional design using a mixed methods approach** of data collection. The combination of both quantitative and qualitative techniques helped the study for a comprehensive assessment, as quantitative tools would provide values to key efficiency and effectiveness indicators and qualitative tools help in getting insights and perceptions, along with a thorough review of the secondary data and existing literature pertaining to the need and impact of the program. The introduction of quantitative and qualitative tools provides a robust design that looks at the holistic assessment of the intervention, at different levels.

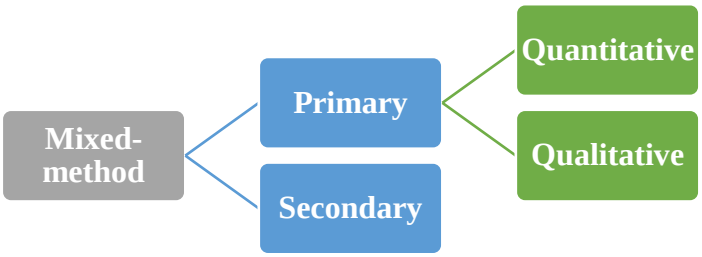


Figure 7 Research Design

Primary Research

Within the primary research component, while applying the mixed-method approach, both quantitative and qualitative tools have been brought in to ensure that the information leading towards the fulfilment of program objectives is effectively captured using a retrospective recall approach wherein data has been collected from the target respondents on the infrastructure development before (for creating the baseline data) and after the project implementation. Essentially these also involve structured interview schedules, In-depth Interviews and Focus group discussions.

Thus, comprehensive study tools were developed including both quantitative and qualitative tools to provide holistic understanding of program impact in the intervention states. While the quantitative tools also provide values to key outcome and impact indicators whereas, qualitative tools would help to answer the "whys" and the "how's" and the underlying factors behind the impact created.

Creating baseline: To measure impact of the project, ideal scenario is to have a baseline data or a benchmark prior to the intervention exposure. Due to paucity of a baseline data of the Focused Development Program, the study will try to create baseline data *ex post* using recall method. However, recall methods have problems with respect to recall bias or sometimes telescoping of major events or expenditures etc. Variables in the study tools will be carefully crafted so that the recall bias is minimised and shall concentrate on few impact variables that are easier to "visualise" and "recall". For examples, "school infrastructure", "student performance", "student grade", etc. The researchers will be using probes related to key events to juggle the memory of the respondents. It may be noted that preliminary survey using recall methods shall not be a stand-alone measure, but shall be triangulated to validate reliability of reconstructed baseline data, with field observations and in-depth interviews.

Secondary Research

Under the secondary research component, an intensive and critical review of secondary data has been carried out by the research team. Secondary research is done during the inception phase to develop a

sound understanding of the programme, basis of which tools are formulated. The component of secondary research focuses on review of the existing literature related to infrastructure development and good quality education, participation and attendance of children in schools, effectiveness of digital classrooms on students learning outcomes. The multiple sources of collection of data mired through the quantitative and qualitative approaches are proposed to lead to the triangulation of the data to bring forth a holistic understanding of the program.

2.3 Sampling Design for Impact Evaluation

Quantitative Sample Size Estimation

In line with the objectives and the expected outcomes of the study, a two-sample formula was proposed to estimate the sample size for the evaluation. Formulae used to estimate the sample size (n):

$$N = D[Z_{1-\alpha}\sqrt{2}P(1-P) + Z_{1-\beta}\sqrt{P_1}(1-P_1) + P_2(1-P_2)]^2 \div (P_2 - P_1)^2$$

Here,
N = the required sample size
D= design effect (1)
P_1 = schools capacitated with good infrastructure estimated at 50% (0.500)
P_2 = the proportion expected at the time of survey (0.60) *
$Z_{1-\alpha}$ = the z-score corresponding to a significance level (1.96);
$Z_{1-\beta}$ = the z-score corresponding to the power (0.80)

Figure 8 Sample size calculation

*Statistically significant to measure 10% of change in key variable of interest

(Note: The estimated sample size obtained using the above two-sample formulae i.e., approx. 403)

By using these formulae, and accounting for 10% non-response rate, the minimum sample required for the assessment would be approximately 432 schools being representative of the total schools in the project. In the proposed study, the target schools would be selected using "In-proportion sampling" where proportionate sample of schools will be considered for the study.

Table 1 Quantitative Sample Estimation

State (Jharkhand)	Schools in each district	No. of schools achieved
Hazaribagh	56	30
Bokaro	56	30
Chatra	56	30
Giridih	56	30
Purbi Singhbhum	56	30
Ranchi	56	30
Ramgarh	56	19
Sahibgunj	28	15
Total	**420**	**214**

Selection of Samples

From the sample size, a single random sampling method was used to select the target schools from the list provided by HDFC Bank CSR team. Further, from the selected schools, one teacher was selected randomly as target respondents for the study.

Additionally, an observation of the schools was carried out by the field investigators from the sampled schools mentioned above to assess the current status of infrastructure development activities that were carried out in intervention schools.

Qualitative sample size estimation

In line with the RFP following sample covered:

Table 3 Qualitative Sample Estimation

Respondents	Tool Administered	Total sample
SMCs	Focus-Group Discussion	10
School Staff (Administrative, Support, Clerical Staff)	In-depth Interviews	20
Education Officer (District/Block)	In-depth Interviews	10
Parents	In-depth Interviews	40
Total		**80**

Chapter 3: Findings of the Study

3.1 Observation Checklist:

Observation checklists are crucial for ensuring a thorough and focused evaluation during infrastructure changes in schools, especially when creating "smart classrooms." These checklists act as a roadmap, guiding observers towards key aspects while eliminating the overwhelm of trying to remember every detail. Their benefits are threefold: maintaining consistency across evaluations, enabling focused data collection, and providing a framework for easy adaptation to specific program goals. Developing a checklist involves first understanding the program's objectives, then defining key areas for observation (lighting, paint, etc.), establishing clear observation criteria, and incorporating a rating system for subjective aspects

Infrastructure:

Wall painting*:*

Wall painting in schools as part of making them smart classrooms involves enhancing the aesthetic appeal and functionality of classroom spaces through the application of paint on interior and exterior walls.

	Frequency	%
No	98	46.7%
Yes	112	53.3%

Table 2 Walls painted inside

Among the total number of classrooms surveyed, 53.3% had painted walls, while 46.7% did not. This suggests that there is a relatively even distribution between classrooms with painted walls and those without. The presence of painted walls can contribute to the aesthetics and conducive learning environment within classrooms. Furthermore, it is important to note that the activity of painting the walls took place 18 months before the impact assessment. Therefore, a higher percentage of observations stating that the walls have been painted indicates that the smart classroom has been maintained in an adequate condition.

	Frequency	%
1	9	4.3%
2	2	1.0%
3	3	1.4%
4	192	92.6%
5	1	0.5%

Table 3 Number of walls painted

The majority of rooms (92.6%) had all four walls painted. A small percentage of rooms had fewer walls painted, with 4.3% having only one wall painted, 1.0% having two walls painted, and 1.4% having three walls painted. Only one room (0.5%) had five walls painted. Overall, most rooms had all four walls painted, indicating a consistent approach to wall painting in the observed classrooms.

	Frequency	%
Yes, all of them are painted	46	41.1%
Yes, but the paint has faded	54	48.2%
No, the walls have not improved	5	4.5%
Others	7	6.3%

Table 4 Walls are painted or not

Based on the data provided, it was observed that 41.1% of schools have undergone painting, while 48.1% have been painted but show signs of fading color. A smaller percentage, 4.5%, indicates that walls in some schools have not seen any improvement.

Flooring of room:

Out of all the schools, flooring has been completed in the classrooms (95.7%), while only 4.3% schools have not done flooring. Of the schools where flooring has been completed, the majority (83.1%) opted for carpet flooring. Additionally, smaller percentages of schools chose cement tile work (1.5%), ceramic tile (2.5%), and wooden floors (5.0%). A further 8.0% of schools selected other types of flooring options.

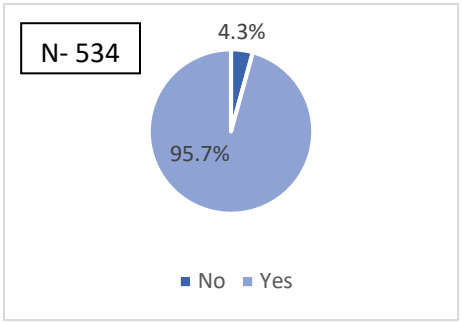


Figure 1 Flooring of the room

Basic Amenities:

Installation of Tube lights:

	Frequency	%
No	5	2.4%
Yes	205	97.6%
Total	210	100%

Table 5 Availability of tube lights

Among the total observations, 97.6% of the rooms were equipped with tube lights, while only 2.4% lacked them. This suggests that the vast majority of rooms were adequately equipped with tube lighting fixtures.

	Frequency	%
1	2	1%
2	4	2%
3	1	0.5%
4	5	2.4%
5	17	8.3%
6	172	83.9%
7	4	2%

Table 6 Number of tube lights

Most rooms (83.4%) are equipped with six tube lights, making it the predominant configuration. Additionally, 8.3% of rooms feature five tube lights, with smaller proportions having varying numbers of tube lights, including four, seven, or eight. Rooms with one, two, or three tube lights are relatively rare, each comprising less than 3% of the total.

	Frequency	%
Yes, all of the work	157	76.6%
No, some of them don't work	41	20%
No, none of them work.	7	3.4%

Table 7 Functionality of tube lights

While the majority of rooms (76.6%) benefitted from fully functional tube lights, a significant portion (20.0%) had some lights inoperable. This highlights the need for targeted maintenance efforts to ensure consistent and adequate lighting across all classrooms.

	Frequency	%
0	134	65.4%
1	25	12.2%
2	14	6.8%
3	6	2.9%
4	5	2.4%
5	6	2.9%
6	15	7.3%

Table 8 Number of tube lights that do not work

The majority of rooms (65.4%) reported that none of the tube lights were non-functional. Among the rooms where tube lights were not working, the distribution varied: 12.2% reported one non-functional tube light, 6.8% reported two, 2.9% reported three, and 2.4% reported four non-functional tube lights. Additionally, 2.9% of rooms reported five non-functional tube lights, and 7.3% reported six non-functional tube lights. Overall, the majority of rooms did not have any non-functional tube lights, but there were instances where multiple tube lights were not working, suggesting a need for maintenance and repair.

Electrification:

Electrification plays a pivotal role in the modernization and effectiveness of smart classrooms. With electricity, these classrooms can power a wide array of technological tools and devices essential for interactive learning experiences. Out of the classrooms surveyed, 99.0% have a switch and connection board installed, with only 1% lacking one. Regarding switch functionality, the majority (87.5%) reported that all switches were operational, while 12.0% stated that only some worked. Additionally, a small fraction (0.5%) indicated that none of the switches were functional. Among the classrooms where some switches do not work, the majority (78.4%) reported that none of them were functional. Additionally, 12.0% mentioned

Image 1 Switch boards

one non-working switch, while smaller percentages reported two (5.8%), three (2.4%), four (1.0%), or five (0.5%) non-functional switches.

Installation of ceiling fans:

	Frequency	%
No	10	4.8%
Yes	200	95.2%

Table 9 Availability of ceiling fans

In the surveyed classrooms, ceiling fans were present in 95.2% of them, while 4.8% lacked this feature. The majority of rooms (79.0%) had two ceiling fans installed, with smaller percentages having different numbers of fans. Specifically, 9.5% had one fan, 2.0% had three fans, 7.5% had four fans, and 1.0% each had five, six, or eight fans. Regarding functionality, 64.0% of rooms had two operational ceiling fans, while 18.5% had only one fan working, and 8.0% had none operational. Additionally, varying percentages of rooms had different numbers of fans in working condition, ranging from 2.0% for three fans to 0.5% for five, six, or seven fans. The data also showed that 93.0% of rooms reported clean and well-maintained ceiling fans, while 7.0% mentioned fans that were not in such condition. Regarding fan functionality, 79.0% of rooms reported all fans working properly, 13.5% reported only some working correctly, and 7.5% reported none working as intended.

Image 2 Ceiling fans

	Frequency	%
Yes	186	93.0%
No	14	7.0%

Table 10 Fans clean and well maintained

Installation of Grills:

	Frequency	%
No	5	2.4%
Yes	205	97.6%

Table 11 Availability of Grills

Among the rooms surveyed, 97.6% have grills installed, while only 2.4% lack them. Among the observed rooms, 72.2% close properly with ease, while 21.5% require some effort to close. However, in 5.9% of the cases, the doors do not close properly.

Insights:

Infrastructure:

The analysis of infrastructure facilities, particularly focusing on wall painting and flooring, reveals important insights into the condition of classrooms aimed at becoming smart classrooms. Regarding exterior wall painting, the data shows variations in maintenance practices, with approximately 32.4% of outside walls fully painted, 29.0% somewhat painted, and 38.6% not painted at all. This indicates a need for consistent painting efforts across observed areas to enhance aesthetic appeal and durability. In terms of interior wall painting, 53.3% of classrooms had painted walls, contributing to a conducive learning environment. Most classrooms (91.4%) had all four walls painted, suggesting a consistent approach to interior wall painting. However, concerning the quality of wall painting, while 41.1% of schools have undergone painting, 48.2% show signs of fading paint, indicating potential maintenance issues. Regarding flooring, the completion rate was high (95.7%), with carpet flooring being the most popular choice (83.1%), followed by other options such as cement tile work, ceramic tile, and wooden floors. These findings underscore the importance of regular maintenance and upkeep to ensure that classrooms meet the standards required for effective learning environments.

Basic Amenities:

The analysis of basic amenities in classrooms, including tube lights, electrification, ceiling fans, and installation of grills, provides valuable insights into the infrastructure of educational spaces. The data indicates that the vast majority of classrooms are equipped with essential features such as tube lights (97.6%), switchboards (99.0%), ceiling fans (95.2%), and grills (97.6%). However, there are notable issues regarding functionality and maintenance. While most classrooms have functioning tube lights (76.6%), a significant portion experiences issues, with 20.0% having some non-operational lights. Similarly, although switchboards are present in nearly all classrooms, a notable percentage (12.0%) report issues with switch functionality. Regarding ceiling fans, while the majority are operational (79.0%), a considerable number of classrooms (8.0%) have none of the fans working correctly, indicating maintenance gaps. Additionally, there are concerns about cleanliness and maintenance, with 7.0% of classrooms reporting unclean or poorly maintained fans. Regarding grills, while most classrooms have them installed, there are issues with door functionality in 5.9% of cases. Overall, these findings underscore the importance of regular maintenance and upkeep to ensure that classrooms provide a conducive environment for teaching and learning.

3.2 Teachers perception:

Access to Infrastructure:

	Frequency	%
Inadequate	80	37.6%
Adequate	120	56.3%
Excellent	13	6.1%
Total	213	100.0%

Table 12 Availability of infrastructure facilities in the school before the Smart Classroom project

A significant portion, accounting for 37.6% of the responses, described the infrastructure as inadequate, indicating deficiencies or insufficiencies in the facilities.

> ***"There was no equipment earlier."***
>
> ***-Excerpt from IDI with school staff, Sahibganj***

On the other hand, 56.3% of teachers considered the infrastructure to be adequate, implying that while there might have been some areas for improvement, the overall provision of facilities met the basic requirements. A smaller proportion, comprising 6.1% of the responses, rated the infrastructure as excellent, suggesting that some schools had exceptionally well-equipped facilities even before the Smart Classroom project commenced.

	Frequency	%
Yes, significant improvement	109	51.2%
Yes, slight improvement	102	47.9%
No change	2	0.9%
Total	213	100.0%

Table 13 Any noticeable improvements in access to infrastructure facilities after the Smart Classroom project

A significant majority of teachers, comprising 51.2%, reported experiencing significant improvements in access to infrastructure facilities. Additionally, 47.9% of teachers mentioned slight improvements. Only a negligible proportion, accounting for 0.9% of the responses, indicated that there was no change in access to infrastructure facilities post-implementation of the Smart Classroom project. Overall, the findings suggest that the project has had a positive impact on enhancing access to infrastructure facilities in the surveyed schools.

Attendance and Participation

The vast majority of teachers, constituting 90.6%, noted a rise in student attendance following the implementation of Smart Classrooms. Conversely, only a small fraction, comprising 3.3% of teachers, reported a decrease in student attendance, while 6.1% mentioned that attendance levels remained unchanged. Among

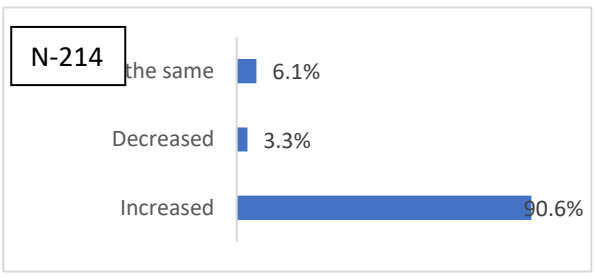


Figure 2 Any change in student attendance since the introduction of Smart Classrooms

the reasons attributed to the increase in student attendance, 54.3% of teachers highlighted heightened curiosity and enthusiasm for learning. These findings underscore the potential positive impact of Smart Classrooms on student attendance within the surveyed schools.

> ***"Yes, we have received feedbacks that students are keener on attending classes now as compared to before."***
>
> ***-Excerpt from a FGD with SMC members, Hazaribagh***

	Frequency	%
Yes, significantly	134	62.9%
Yes, to some extent	75	35.2%
No change	2	0.9%
Decreased interest	2	0.9%
Total	213	100.0%

Table 14 Interest and participation in classroom activities after the implementation of Smart Classrooms

A significant majority of teachers, constituting 62.9%, observed a notable increase in students' interest and participation in classroom activities following the implementation of Smart Classrooms. Additionally, 35.2% of teachers noted some extent of improvement in student engagement. However, a negligible proportion of teachers, comprising 0.9%, reported no change or a decrease in student interest and participation. These findings suggest that the introduction of Smart Classrooms has positively influenced students' engagement and involvement in classroom activities, as perceived by the teachers.

	Frequency	%
Increased participation in discussions	67	31.5%
Enhanced collaboration among students	44	20.7%
Greater enthusiasm for learning	83	39.0%
More active involvement in group activities	12	5.6%
Other (please specify):	7	3.3%
Total	213	100.0%

Table 15 Any specific improvements in student engagement and participation during classroom activities

The above data shows that teachers have observed various improvements in student engagement and participation during classroom activities since the implementation of Smart Classrooms. Specifically, 31.5% of teachers noted increased participation in discussions, indicating a higher level of interaction among students. Furthermore, 20.7% of teachers reported enhanced collaboration among students, suggesting improved teamwork and communication skills. Additionally, 39.0% of teachers observed greater enthusiasm for learning among students, indicating heightened interest and motivation. Moreover, 5.6% of teachers noted more active involvement in group activities, demonstrating

> ***"Yes, it is very much, our child's interest has increased after sending them to smart classroom".***
>
> ***-Excerpt from IDI with Parents, Sahibganj***

increased participation in collaborative tasks. Finally, 3.3% of teachers mentioned other specific improvements not covered by the provided options. Overall, these findings reflect positive changes in student engagement and participation, encompassing various aspects of classroom activities.

Impact on Academic Performance:

	Frequency	%
Significant Improvement	104	48.8%
Slight Improvement	100	46.9%
No Change	7	3.3%
Decline	2	0.9%
Total	213	100.0%

Table 16 Any improvement in the academic performance of students since the introduction of Smart Classrooms

The teachers have observed improvements in the academic performance of students following the implementation of Smart Classrooms. Specifically, 48.8% of teachers reported a significant improvement in academic performance, while 46.9% noted a slight improvement. Only a small proportion, comprising 3.3% of teachers, reported no change in academic performance. Additionally, 0.9% of teachers observed a decline in academic performance. Overall, the majority of teachers perceived positive changes in students' academic performance after the introduction of Smart Classrooms.

	Frequency	%
Improved academic performance	84	39.4%
Increased attendance	105	49.3%
Enhanced grades	18	8.5%
No significant changes	3	1.4%
Decline in academic performance, attendance, or grades	3	1.4%
Total	213	100.0%

Table 17 Changes observed in students' academic performance, attendance, and grades since the introduction of Smart Classrooms

The above data indicates various positive changes observed in students' academic performance, attendance, and grades following the introduction of Smart Classrooms. Among the surveyed teachers, 39.4% reported improved academic performance among students. Additionally, 49.3% noted an increase in student attendance, while 8.5% observed enhanced grades. A small percentage, comprising 1.4% of teachers, reported no significant changes in these aspects, while another 1.4% noted a decline in academic performance, attendance, or grades. Overall, the majority of teachers perceived positive effects on students' academic outcomes after the implementation of Smart Classrooms.

According to the responses, 86.4% of teachers perceived an improvement in the overall grades of students following the implementation of Smart Classrooms. A smaller proportion, comprising 12.2% of respondents, indicated that the grades remained the same. Only 1.4% of teachers reported a decline in students' overall grades. This suggests that the introduction of Smart Classrooms may have positively impacted students' academic performance, as perceived by the majority of teachers.

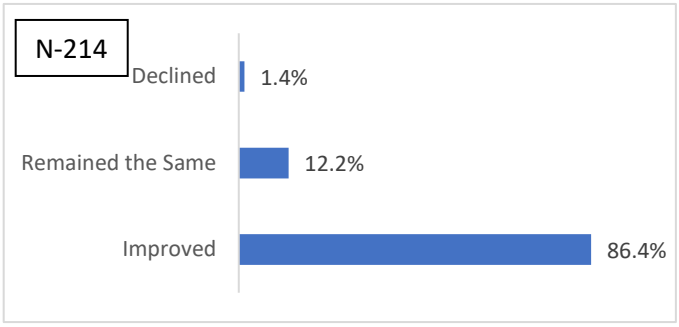


Figure 3 Rating the overall grades of students before and after the Smart Classroom implementation

Overall Effectiveness of Intervention:

	Frequency	%
Highly Effective	98	46.0%
Moderately Effective	99	46.5%
Slightly Effective	12	5.6%
Ineffective	4	1.9%
Total	213	100.0%

Table 18 effectiveness of Smart Classroom intervention in enhancing the teaching-learning process

As per the feedback provided, 46.0% of teachers deemed the Smart Classroom intervention highly effective in improving the teaching-learning process. Similarly, 46.5% of teachers regarded it as moderately effective. A smaller subset, comprising 5.6% of teachers, found it slightly effective, while only 1.9% considered it ineffective. This indicates that the majority of teachers view the Smart Classroom intervention positively, with most finding it either highly or moderately effective in enhancing the teaching-learning experience.

	Frequency	%
Enabled more interactive teaching	59	27.7%
Facilitated multimedia-based content delivery	85	39.9%
Improved lesson planning and organization	45	21.1%
Enhanced student engagement	19	8.9%
Other (please specify	5	2.3%
Total	213	100.0%

Table 19 Impact of Smart Classroom on teaching methods and delivery of content

Among the responses, 27.7% of teachers reported that it enabled more interactive teaching methods. Additionally, 39.9% mentioned that it facilitated multimedia-based content delivery. Furthermore, 21.1% stated that its improved lesson planning and organization, while 8.9% noted enhanced student engagement. A small portion of teachers (2.3%) provided other specific impacts not covered by the provided options. Overall, these findings highlight the diverse ways in which the implementation of Smart Classrooms has influenced teaching methods and content delivery.

"We usually check for attendance in the classroom and compare it with the previous record to measure the effectiveness."

-Excerpt from an IDI with an Education Officer, Hazaribagh

	Frequency	%
Facilitated interactive multimedia presentations	96	45.1%
Encouraged collaborative learning activities	58	27.2%
Provided opportunities for hands-on learning experiences	47	22.1%
Fostered peer-to-peer interaction	7	3.3%
Other (please specify)	5	2.3%
Total	213	100.0%

Table 20 Contribution of Smart Classroom initiative to a more interactive and dynamic learning environment

Specifically, 45.1% of respondents mentioned that it facilitated interactive multimedia presentations, allowing for engaging and visually stimulating learning experiences. Additionally, 27.2% noted that it encouraged collaborative learning activities, fostering peer-to-peer interaction and teamwork among students. Moreover, 22.1% reported that the initiative provided opportunities for hands-on learning experiences, enabling students to actively engage with the material. A small percentage of respondents (3.3%) mentioned that it fostered peer-to-peer interaction, while 2.3% provided other specific contributions not covered by the given options. Overall, these findings underscore the multifaceted role of Smart Classrooms in creating a more interactive and dynamic learning environment.

	Frequency	%
Very positively	127	59.6%
Somewhat positively	76	35.7%
Neutral	5	2.3%
Negatively	5	2.3%
Total	213	100.0%

Table 21 Contribution of Smart Classroom intervention in achieving the desired outcomes in terms of education quality and student engagement

A majority of respondents, comprising 59.6%, reported that the intervention had a very positive impact. Additionally, 35.7% mentioned that it had a somewhat positive effect. Only a small proportion of respondents, accounting for 2.3%, expressed a neutral stance, while another 2.3% indicated a negative impact. Overall, the findings suggest that the Smart Classroom intervention has been predominantly viewed as beneficial for enhancing education quality and student engagement.

"It is a good way to solve the problems of traditional education".

-Excerpt from IDI with School Staff, Bokaro

Insights:

The data gathered from teachers regarding the implementation of Smart Classrooms reveals several key insights into its impact on various aspects of education. Firstly, a substantial portion of teachers perceived a significant improvement in access to infrastructure facilities following the Smart Classroom project. This suggests that the initiative has effectively addressed deficiencies in infrastructure, with a majority reporting noticeable enhancement. Moreover, teachers overwhelmingly reported positive changes in student attendance and participation since the introduction of Smart Classrooms. The majority noted an increase in both attendance and engagement, attributing it to heightened curiosity and enthusiasm for learning among students. Furthermore, the Smart Classroom initiative has been associated with improvements in academic performance, attendance, and grades. Teachers observed significant enhancements in students' academic achievements, with a notable proportion reporting improvement in grades. Teachers also highlighted the effectiveness of Smart Classrooms in enhancing the teaching-learning process. The majority considered the intervention to be highly or moderately effective, emphasizing its role in enabling more interactive teaching methods, facilitating multimedia-based content delivery, and improving lesson planning and organization. Additionally, the Smart Classroom initiative has contributed to creating a more interactive and dynamic learning environment, as reported by teachers. It has facilitated interactive multimedia presentations, encouraged collaborative learning activities, and provided opportunities for hands-on learning experiences. Overall, teachers perceive the Smart Classroom intervention positively, attributing it to improvements in education quality and student engagement. The initiative has addressed infrastructure shortcomings, enhanced student participation, and positively impacted academic outcomes, underscoring its significance in modern educational settings.

Conclusion:

The analysis of infrastructure facilities and the implementation of Smart Classrooms in educational settings provide invaluable insights into the enhancement of learning environments and educational outcomes. These findings shed light on the critical importance of addressing maintenance and upkeep issues in classrooms to ensure a conducive atmosphere for teaching and learning.

Infrastructure is a cornerstone of effective education delivery, and the data underscores the significance of maintaining and upgrading these facilities. The findings reveal variations in the maintenance practices of exterior wall painting, with a significant proportion of outside walls either fully or somewhat painted. However, a concerning percentage of outside walls were reported to be unpainted, indicating a need for consistent painting efforts across observed areas to enhance aesthetic appeal and durability.

Similarly, interior wall painting plays a crucial role in creating a conducive learning environment. While a majority of classrooms had all four walls painted, issues with the quality of painting were evident, with a significant percentage showing signs of fading paint. This underscores the importance of regular maintenance to ensure that classrooms remain visually appealing and conducive to learning. Flooring is another essential aspect of classroom infrastructure, and the data indicates a high completion rate, with carpet flooring being the most popular choice. However, the findings highlight the need for regular maintenance to preserve the quality and longevity of flooring materials.

The implementation of Smart Classrooms has brought about significant positive changes in various aspects of education, as perceived by teachers. The initiative has not only enhanced access to infrastructure facilities but also facilitated interactive and dynamic learning experiences. Multimedia presentations, collaborative activities, and hands-on learning opportunities have all contributed to creating engaging and effective learning environments.

One of the most notable impacts of Smart Classrooms has been on student attendance, engagement, and academic performance. Teachers overwhelmingly reported an increase in student attendance and participation, attributing it to heightened curiosity and enthusiasm for learning. Furthermore, improvements in academic performance, attendance, and grades were observed, highlighting the effectiveness of the Smart Classroom intervention in enhancing education quality.

Teachers also emphasized the role of Smart Classrooms in improving the teaching-learning process. The initiative has enabled more interactive teaching methods, facilitated multimedia-based content delivery, and improved lesson planning and organization. These changes have contributed to creating a more engaging and effective learning environment for students.

In conclusion, the implementation of Smart Classrooms has been instrumental in enhancing the teaching-learning process and improving education quality in educational settings. Continued efforts in maintaining infrastructure facilities and leveraging technology for educational purposes are crucial to sustaining these positive outcomes and further promoting student success in the future.

Recommendations:

- **Investment in Infrastructure Maintenance**: Educational institutions should prioritize regular maintenance and upgrading of infrastructure facilities, including exterior and interior wall painting, flooring, and basic amenities such as lighting and ventilation. This ensures a conducive atmosphere for teaching and learning and prolongs the lifespan of infrastructure components.
- **Enhanced Utilization of Smart Classroom Technology**: Schools should continue to leverage Smart Classroom technology to its fullest potential, incorporating interactive teaching methods, multimedia-based content delivery, and collaborative learning activities. Providing teachers with training and support in utilizing these tools effectively can maximize their impact on student engagement and learning outcomes.
- **Promotion of Student Attendance and Participation**: Efforts should be made to sustain and further promote the positive changes observed in student attendance and participation. This may include implementing incentives for attendance, fostering a supportive and inclusive learning environment, and providing opportunities for student voice and choice in classroom activities.
- **Continued Monitoring and Evaluation**: Ongoing monitoring and evaluation of the impact of Smart Classrooms on educational outcomes are essential. This includes gathering feedback from teachers, students, and other stakeholders, analyzing data on attendance, academic performance, and student engagement, and adjusting the implementation as needed.
- **Sustainable Funding and Resource Allocation**: Adequate funding and resource allocation are crucial for the successful implementation and maintenance of Smart Classroom initiatives. Educational institutions should prioritize budgetary allocations for infrastructure upgrades, technology investments, and teacher training to ensure the long-term sustainability of these programs.
- **Community Engagement and Collaboration**: Collaboration with parents, community members, and other stakeholders is vital for the success of Smart Classroom initiatives. Engaging stakeholders in decision-making processes, seeking input on program implementation, and fostering partnerships with local businesses and organizations can enhance support for educational initiatives and promote a sense of ownership and investment in student success.