HDFC BANK PARIVARTAN
A step towards sustainable progress

IMPACT ASSESSMENT REPORT

IMPACT ASSESSMENT OF FOCUSED DEVELOPMENT PROGRAMSMART CLASSROOM PROJECTS (P0615)

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EXECUTIVE SUMMARY

This study delves into the educational landscape of India, particularly focusing on the state of Jharkhand, where notable progress has been made alongside persistent challenges. Despite efforts to enhance access to education, barriers such as the digital divide and infrastructure deficiencies persist, especially among marginalized communities. However, various stakeholders, including government agencies, NGOs, and corporate entities like HDFC Bank, are implementing initiatives to address these challenges, notably through the introduction of smart classrooms.

HDFC Bank's Corporate Social Responsibility (CSR) initiative, 'Parivartan', aims to promote sustainable development, with a specific focus on education. Through partnerships with organizations like Nav Bharat Jagriti Kendra and Vikas Bharti Bhishnupur, HDFC Bank is spearheading the Smart Classroom initiative in Jharkhand, targeting 800 government schools across different districts.

Employing a mixed-methods approach, this study combines quantitative and qualitative tools to assess the impact of the Smart Classroom initiative. Primary research involves data collection from key stakeholders, including teachers, school staff, and education officers, supplemented by secondary research reviewing existing literature related to infrastructure development and education quality.

The sampling design ensures a representative sample of schools and stakeholders, enabling a comprehensive evaluation of the initiative's outcomes. Quantitative analysis reveals varied perceptions regarding the condition of smart classrooms, highlighting areas for improvement such as exterior maintenance and aesthetic enhancements.

Key insights from the analysis indicate a positive inclination towards the upkeep of smart classrooms, alongside recognition of areas for enhancement. Overall, the findings provide valuable insights to inform future interventions and enhance the effectiveness of educational initiatives in Jharkhand.

In conclusion, while challenges persist, initiatives like HDFC Bank's Smart Classroom initiative demonstrate a commitment to improving educational quality and accessibility in India. By leveraging partnerships and innovative solutions, stakeholders can work towards achieving inclusive and equitable education for all children, thereby contributing to the nation's socio-economic development.

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,

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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

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].

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 project implemented under the Smart Classroom initiative include the following:

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

Project : P0615 - Establishment of 400 digital smart classes in Jharkhand - Phase II

1. In the second phase of the initiative, HDFC Bank aims to establish 400 digital smart classes across 12 districts in Jharkhand. The selected districts for this phase include Dumka, Garhwa, Khunti, Palamu, Paschimi Singhbhum, Gumla, Latehar, Lohardaga, Pakur, Ramgarh, and Simdega. Key activities include flooring of rooms, electrification with switches and connections, installation of ceiling fans and grills, wall painting, and installation of tube lights.

Both phases of the initiative are 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

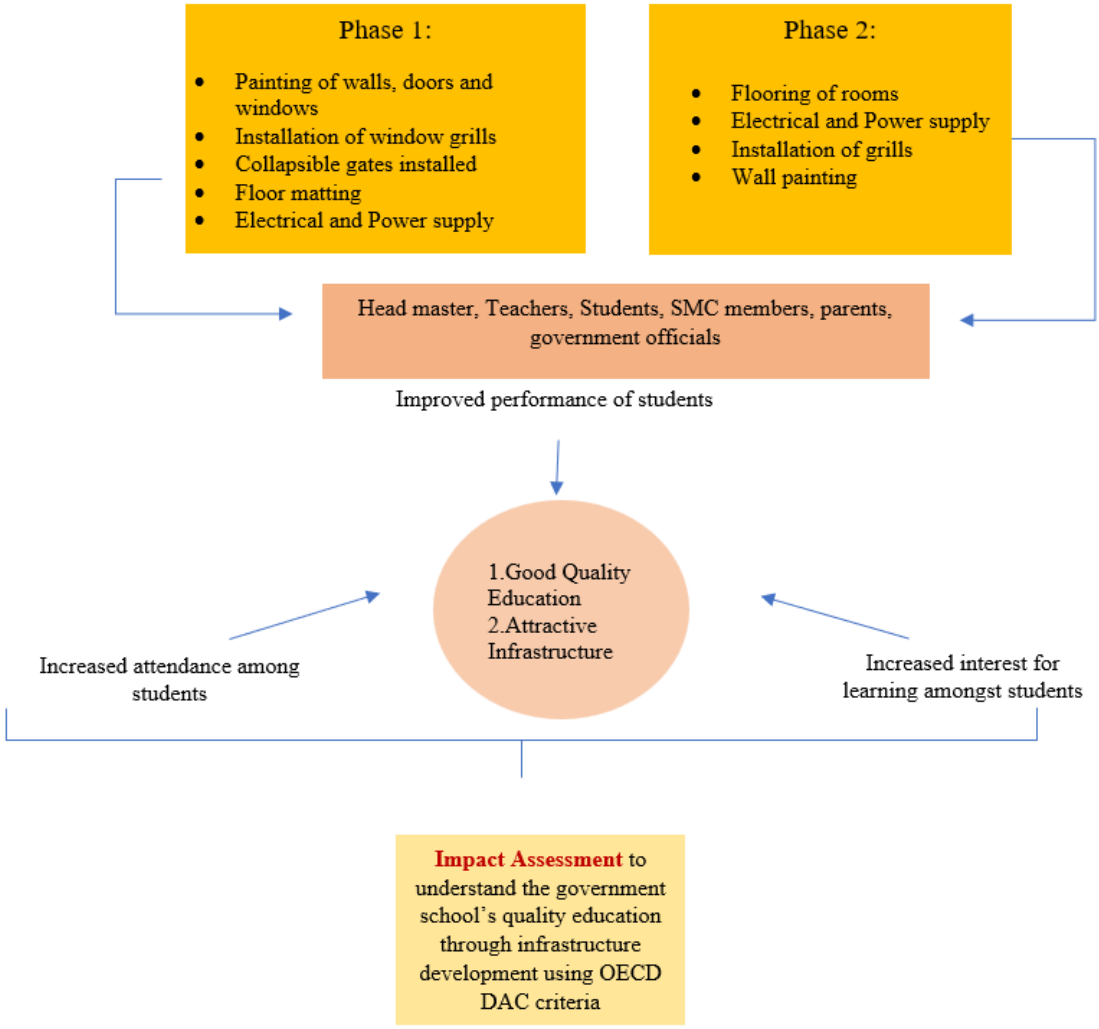
The implementation agency for Project P0615 is implemented by **Vikas Bharti Bhishnupur**, focusing on establishing 400 digital smart classes in 12 districts of Jharkhand under Phase II. Vikas Bharti Bhishnupur is a well-established organization with a track record of implementing developmental projects in rural areas, particularly in the fields of education and community development. Leveraging its experience and network, Vikas Bharti Bhishnupur is instrumental in carrying out various project activities, including the setup of digital infrastructure, training sessions, and monitoring and evaluation processes to ensure the effectiveness and sustainability of the smart classroom initiative in Jharkhand.

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.

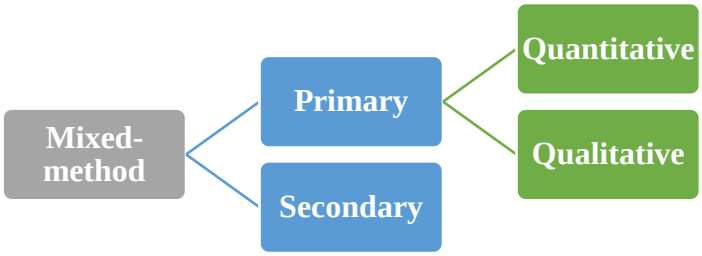


Figure 1: Research Design

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):

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

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

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 2: Sample size calculation

(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 sampled
Ramgarh	56	11
Dumka	56	30
Garhwa	56	30
Khunti	32	17
Palamu	56	30
Paschimi Singhbhum	19	11

Gumla	56	30
Latehar	17	10
Lohardaga	18	11
Pakur	15	9
Simdega	55	29
Total	**800**	**432**

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 is proposed:

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**

** The qualitative components like FGDs/IDIs were facilitated by HDFC Bank CSR and field plan was made accordingly*

Chapter: 3 KEY FINDINGS

3.1. Infrastructure

	Responses	N	Percent
Does the classroom have painted walls?	No	95	42.8%
	Yes	127	57.2%
	Total	222	100.0%

Table 2: Painted walls

The findings suggests that 57.2% of respondents perceive the classroom walls to be painted, indicating a majority belief in the presence of paint. Conversely, 42.8% reported the absence of painted walls. This reflects a mixed perception regarding the wall condition, with a significant portion acknowledging unpainted walls. Additionally, 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.

	Responses	N	Percent
How many walls are Painted in the room?	1	13	5.9%
	2	15	6.8%
	3	5	2.3%
	4	187	84.23%
	5	2	0.9%
	Total	222	100.0%

Table 3: Number of walls are painted

Among respondents who provided data on the number of painted walls in the room, the majority, comprising 84.23%, reported that all four walls are painted. Only small proportions mentioned that fewer walls are painted. This indicates a strong perception that the majority, if not all, of the walls in the room are painted, suggesting consistent aesthetic treatment across the classroom environment.

	Responses	N	Percent
Are the walls painted well?	Yes, all of them are painted	59	46.5%
	Yes, but the paint has faded	44	34.6%
	No, the walls have not improved	17	13.4%
	Others	187	84.23
	Total	127	100.0%

Table 4: Well painted walls

Moreover, there are varied perceptions regarding the quality of wall painting in the room. Approximately 46.5% of respondents stated that all walls are painted well, while 34.6% noted that although painted, the walls show signs of fading. Notably, 84.23% of respondents provided other responses, indicating a wide range of opinions or potential issues not captured by the provided options. Overall, this data highlights the need for attention to wall maintenance and potential concerns about paint quality within the classroom environment.

Image 1 Flooring of the smartclassroom

	Responses	N	Percent
Has the flooring been done	No	10	4.5%
	Yes	212	95.5%
	Total	222	100.0%

Table 5: Flooring

The data suggests that the vast majority, 95.5% of respondents, perceive that the flooring has been completed in the room. This indicates a widespread perception of completed flooring within the room, reflecting a likely consensus on the completion of this aspect of the classroom's construction or renovation.

	Responses	N	Percent
If yes, what type floor has been done	Carpet	144	67.9%
	Cement Tile work	14	6.6%
	Ceramic Tile	4	1.9%
	Wooden floors	17	8.0%
	Others	33	15.6%
	Total	212	100.0%

Table 6: Type of flooring

The findings illustrates that carpet is the predominant flooring type, comprising 67.9% of respondents' reports. Wooden floors and other variations also contribute, indicating diverse flooring choices. Cement tile work and ceramic tiles represent smaller proportions. This suggests varied preferences in flooring materials, potentially reflecting considerations of comfort, aesthetics, and practicality within the classroom environment. Such diversity underscores the importance of catering to different needs and preferences to create a conducive and visually appealing learning space.

3.1.1. Key Insights

The analysis of responses regarding the smart classroom's exterior condition reveals a mix of perceptions among participants. While a notable proportion described it as 'Well Painted' or 'Somewhat Painted', indicating satisfaction, a significant number also noted areas requiring improvement or maintenance.

Concerns such as the absence of graffiti, the perceived presence of painted walls, and positive perceptions of flooring completion suggest efforts towards maintaining a conducive learning environment. Additionally, the acknowledgment of design or creative art on the walls underscores an awareness of aesthetic enhancements. Overall, the data portrays a positive inclination towards the upkeep and aesthetic appeal of the smart classroom, with areas identified for potential enhancements to further elevate its environment.

3.2. Amenities

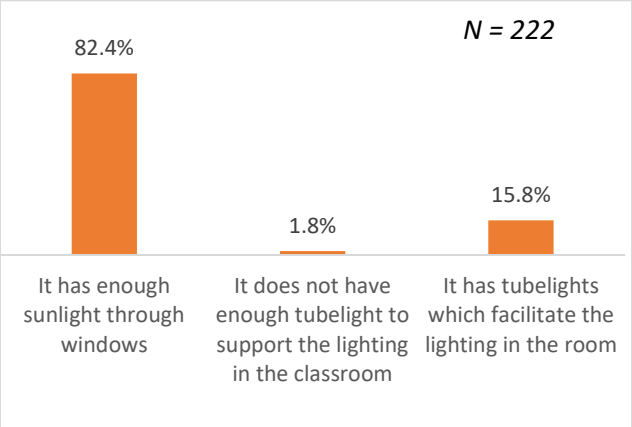


Figure 3: Sufficient Lighting

The study highlights that 82.4% of respondents believe the smart classroom receives ample sunlight through its windows for sufficient lighting. 15.8% acknowledged the presence of tubelights aiding room illumination. This suggests a favourable perception of the natural lighting situation, with a minority recognising supplementary lighting sources. Overall, it implies that the smart classroom benefits from natural lighting, potentially promoting a conducive learning environment while minimising reliance on artificial illumination.

According to the data, 96.8% of respondents affirmed the presence of tube lights in the room. This overwhelming majority indicates that tube lights are indeed installed, ensuring adequate artificial lighting alongside natural light sources. Such widespread confirmation underscores the importance of artificial illumination in maintaining a well-lit environment conducive to learning. The presence of tube lights aligns with expectations for modern educational spaces, facilitating comfortable and productive learning experiences for students and teachers alike.

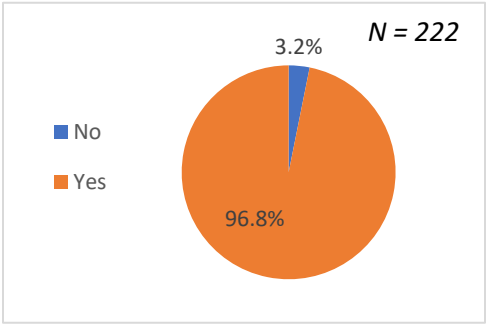


Figure 4: Presence of tube light

	Responses	Count	Column N %
How many tube lights are there in the room?	1	3	1.4%
	2	9	4.2%
	3	2	0.9%
	4	2	0.9%
	5	19	8.8%
	6	175	81.4%
	7	5	2.3%
	Total	215	100.0%

Table 7: Number of tube lights

The findings suggests that 80.5% of respondents reported the presence of six tube lights in the room, signifying the most common observation. This suggests that the majority perceive the room to be equipped with a significant number of tube lights, potentially ensuring sufficient artificial illumination to complement natural light sources. Such findings reflect the importance of adequate lighting in creating conducive learning environments within educational settings.

	Responses	Count	Column N %
Do all the tube lights work?	Yes, all of the work	161	74.9%
	No, some of them don't work	43	20.0%
	No, none of them work.	11	5.1%
	Total	215	100.0%

Table 8: Working tube lights

According to the data, 74.9% of respondents indicated that all the tube lights in the room are functional, suggesting a majority perception of operational lighting fixtures. However, 20.0% reported that some of the tube lights don't work, highlighting a notable portion experiencing issues with lighting functionality. This data underscores the importance of regular maintenance and prompt repairs to ensure consistent illumination, thereby fostering an optimal learning environment within the room.

	Responses	Count	Column N %
How many do not work?	0	150	69.8%
	1	21	9.8
	2	14	6.5%
	3	11	5.1%
	4	3	1.4%
	5	1	0.5%
	6	13	6.0%
	7	2	0.9%
	Total	215	100.0%

Table 9: Non-working tube lights

According to the findings, 69.8% of respondents reported that none of the tube lights are not working, indicating the majority experience no lighting issues. However, 30.2% of respondents reported varying numbers of non-functional tube lights, with smaller proportions reporting one to seven tube lights not working. This suggests a notable portion of respondents encountering lighting problems to some extent, highlighting the need for maintenance to ensure consistent illumination in the room.

	Responses	N	Percent
If no, what is the reason for them not working	Tube light does not turn on.	31	57.4%
	Tube light is damaged/broken.	10	18.5%
	No tube light in the holder.	3	5.6%
	Others	10	18.5%
	Total	54	100.0%

Table 10: Reason for not working tube lights

Among respondents who reported non-functional tube lights, 57.4% cited that the tubelight does not turn on, indicating potential electrical issues. Another 18.5% mentioned that the tubelight is damaged or broken, suggesting physical defects. Additionally, 18.5% provided other reasons for the non-functionality of the tube lights. These findings suggest a variety of factors contributing to tube light malfunctions, highlighting the need for prompt maintenance and troubleshooting to ensure optimal lighting conditions in the room.

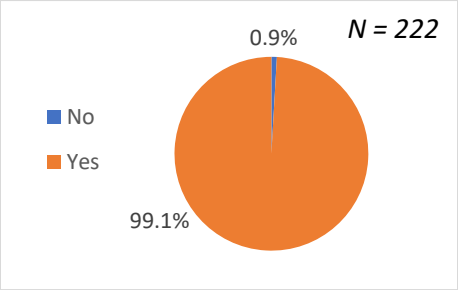


Figure 5: Presence of Switch board

Furthermore, the findings indicates that 99.1% of respondents reported the presence of a switch and connection board in the room. This overwhelming majority suggests a consensus that the room is equipped with these essential electrical components. Such widespread provision of switches and connection boards ensures convenient access to electricity, facilitating various activities and technological needs within the classroom. Overall, this data highlights the importance of ensuring adequate electrical infrastructure to support modern educational requirements and ensure a functional learning environment.

	Responses	N	Percent
Do all the switches work?	Yes	194	88.2%
	Only some do	19	8.6%
	No switch works	7	3.2%
	Total	220	100.0%

Table 11: Switch boards

Furthermore, 88.2% of respondents reported that all switches work, indicating a majority perception of functional electrical switches in the room. This indicates that while the majority perceive functionality, a notable minority experience issues with switch operation. Addressing non-functional switches is essential to ensure uninterrupted access to electricity, maintaining a conducive learning environment within the classroom.

Image 2 Switchboard in smart classroom

	Responses	N	Percent
Does the room have ceiling fans?	No	16	7.2%
	Yes	206	92.8%
	Total	222	100.0%

Table 12: Ceiling Fans

Image 3 Fan in the smart classroom

The data shows that 92.8% of respondents indicated the presence of ceiling fans in the room, while only 7.2% reported their absence. This indicates a strong consensus that ceiling fans are installed, likely serving to improve air circulation and maintain comfort within the classroom. Such a high percentage of respondents affirming the presence of ceiling fans suggests they are a common feature in the room, reflecting efforts to ensure a conducive learning environment for students and teachers alike.

	Responses	N	Percent
How many fans are there in the room?	1	22	10.7%
	2	173	84.0%
	3	3	1.5%
	4	8	3.9%
	Total	206	100.0%

Table 13: Number of ceiling fans

Moreover, there are varied numbers of fans in the room, with 84.0% of respondents reporting the presence of two fans, making it the most common configuration. This suggests that while dual fans are prevalent, there's some variability in the number of fans installed, catering to different room sizes or climate considerations. Overall, the majority perception of two fans aligns with expectations for adequate air circulation within the classroom.

	Responses	N	Percent
How many fans work?	0	26	12.6%
	1	44	21.4%
	2	128	62.1%
	3	2	1.0%
	4	6	2.9%
	Total	206	100.0%

Table 14: Number of working fans

The majority of respondents, 61.2%, perceive that two fans are operational, suggesting a common configuration. However, 38.8% reported varying numbers of non-functional fans, with smaller proportions

experiencing issues with one to five fans. This highlights the importance of addressing maintenance needs to ensure all fans are operational, maintaining adequate air circulation and comfort within the classroom.

	Responses	N	Percent
Are the fans clean and well maintained?	Yes	190	92.2%
	No	16	7.8%
	Others	0	0.0%
	Total	206	100.0%

Table 15: Well maintained and clean fans

Moreover, 92.2% of respondents perceive the fans as clean and well maintained, suggesting a positive assessment of their condition. However, 7.8% noted concerns about cleanliness and maintenance, highlighting potential areas for improvement. Regular upkeep is essential to ensure efficient operation and air quality within the classroom. Overall, this data underscores the importance of ongoing maintenance efforts to maintain a conducive learning environment for students and teachers.

	Responses	N	Percent
Do all of the fans, work properly? (responses to different speeds, Regulator issues, or fan is loose)	Yes, all of them work properly.	150	72.8%
	No, only some of them work properly.	36	17.5%
	No, none of them work properly.	20	9.7%
	Total	206	100.0%

Table 16: Working fans

The findings reveals varying perceptions regarding the functionality of fans in the classroom. While 72.8% of respondents believe all fans work properly, 17.5% reported issues with some fans, and 9.7% indicated that none function correctly. This indicates a need for attention to fan maintenance and repair to ensure consistent air circulation. Addressing operational issues promptly is crucial to maintain a conducive learning environment, highlighting the importance of regular maintenance checks to uphold the functionality of essential equipment within the classroom.

	Responses	N	Percent
Does the room have a grill?	No	8	3.6%
	Yes	214	96.4%
	Total	222	100.0%

Table 17: Grills in classrooms

The data indicates that 96.4% of respondents reported the presence of a grill in the room, while only 3.6% stated otherwise. This overwhelming majority suggests a consensus that a grill is installed, likely serving as a safety measure for windows or vents. Such widespread provision of grills reflects efforts to enhance

security and safety within the classroom environment, aligning with standard practices for ensuring student and teacher well-being.

	Responses	N	Percent
Does it close properly?	Yes, with ease	161	75.2%
	Yes, but some effort is required	43	20.1%
	No, it does not close properly	10	4.7%
	Others	0	0.0%
	Total	214	100.0%

Table 18: Grills closing properly

Furthermore, the findings reveals varying experiences with the closure of the grill in the room. While 75.2% of respondents stated that the grill closes with ease, 20.1% reported that some effort is required for closure. Additionally, 4.7% mentioned that the grill does not close properly. This suggests a need for attention to ensure the proper functioning of the grill, as it plays a crucial role in maintaining security measures within the classroom environment. Addressing any reported difficulties in grill closure promptly is essential to uphold safety standards and ensure the well-being of students and teachers alike.

3.2.1. Key Insights

The data analysis regarding the smart classroom's lighting and infrastructure reveals several key insights. Firstly, there is a strong perception among respondents that the classroom receives ample sunlight through its windows for sufficient lighting, reducing reliance on artificial illumination. However, the presence of tube lights is also acknowledged, indicating a balanced approach to lighting provision. The majority of respondents confirm the presence of tube lights in the room, with six tube lights being the most common configuration. While most respondents perceive all tube lights to be operational, a notable proportion reported issues with some of them, highlighting the importance of regular maintenance. Similarly, while ceiling fans are prevalent in the classroom, a significant number of respondents reported non-functional fans, indicating maintenance needs. However, the majority perceive the fans as clean and well-maintained. Overall, the data underscores the importance of regular upkeep to ensure optimal functionality of essential infrastructure within the classroom, contributing to a conducive learning environment.

3.3. Teachers

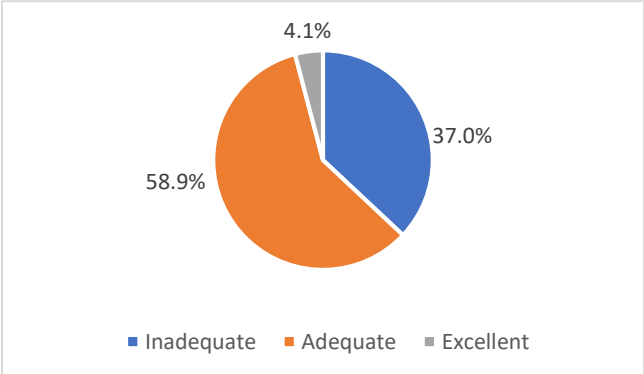


Figure 6: availability of infrastructure facilities in the school before Smart Classroom

Before the Smart Classroom project, respondents' perceptions of the availability of infrastructure facilities in the school varied. While 58.9% rated them as adequate, 37.0% deemed them inadequate. This indicates a mixed assessment, with a significant proportion expressing concerns about inadequate infrastructure. The data suggests that there was room for improvement in infrastructure facilities

before the implementation of the Smart Classroom project.

	Responses	Count	Column N %
Have there been any noticeable improvements in access to infrastructure facilities after the Smart Classroom project?	Yes, significant improvement	91	41.6%
	Yes, slight improvement	114	52.1%
	No change	12	5.5%
	Decline in access	2	0.9%
	Total	219	100.0%

Table 19: Improvements in access to infrastructure

The data indicates 41.6% reported significant improvement and 52.1% noting slight improvement in access to infrastructure. Only a small proportion, 5.5%, observed no change, while a minimal 0.9% reported a decline in access. This overwhelmingly positive feedback suggests the Smart Classroom project has been effective in enhancing access to infrastructure facilities, reflecting its success in improving the overall educational environment and supporting the needs of users within the institution.

	Responses	Count	Column N %
Have you noticed any change in student attendance since the introduction of Smart Classrooms?	Increased	186	84.9%
	Remained the same	33	15.1%
	Total	219	100.0%

Table 20: Change in student attendance

Since the implementation of Smart Classrooms, 84.9% of respondents reported an increase in student attendance, indicating a positive impact on engagement. Verbatim responses highlighted enhanced facilities, improved infrastructure fostering educational interest, and better comprehension and interest in digital teaching. These affirmations align with the observed rise in attendance, suggesting that Smart Classrooms contribute to a more engaging and effective learning environment. The majority perception of increased attendance reflects the success of Smart Classroom initiatives in fostering student engagement and participation. Additionally, respondents' verbatim feedback underscores the broader benefits of Smart Classrooms, including improved infrastructure and digital teaching methods, which collectively enhance the overall educational experience within the institution.

	Responses	Count	Column N %
Do students show more interest and participation in classroom activities after the implementation of Smart Classrooms?	Yes, significantly	100	45.7%
	Yes, to some extent	112	51.1%
	No change	7	3.2%
	Total	219	100.0%

Table 21: Student's interest and participation in classroom activities

Since the implementation of Smart Classrooms, 96.8% of respondents reported increased student interest and participation in classroom activities, with 45.7% noting a significant improvement and 51.1% observing some extent of enhancement. Only 3.2% reported no change. This data indicates a substantial positive impact of Smart Classrooms on student engagement, suggesting that technology-enhanced learning environments contribute to heightened interest and participation in classroom activities, aligning with the broader trend of increased student attendance and positive feedback regarding facility enhancements.

"It brings a positive attitude in the students."

- An excerpt from an IDI with an Education Official, Palamu

	Responses	Count	Column N %
Have you noticed any specific improvements in student engagement and participation during classroom activities?	Increased participation in discussions	33	15.1%
	Enhanced collaboration among students	59	26.9%
	Greater enthusiasm for learning	105	47.9%
	More active involvement in group activities	15	6.8%
	Other (please specify):	7	3.2%
	Total	219	100.0%

Table 22: Specific improvements in student engagements

The findings suggests specific improvements in student engagement and participation since the implementation of Smart Classrooms. Responses indicate increased participation in discussions (15.1%), enhanced collaboration among students (26.9%), greater enthusiasm for learning (47.9%), and more active involvement in group activities (6.8%). These findings highlight the diverse positive effects of Smart Classrooms on student engagement, ranging from improved communication and collaboration to heightened interest and involvement in learning activities. Such outcomes underscore the effectiveness of technology-enhanced learning environments in fostering a dynamic and interactive classroom environment that promotes student engagement and participation.

	Responses	Count	Column N %
Have you observed any improvement in the academic performance of students since the introduction of Smart Classrooms?	Significant Improvement	69	31.5%
	Slight Improvement	138	63.0%
	No Change	12	5.5%
	Total	219	100.0%

Table 23: Improvement in the academic performance

Since the introduction of Smart Classrooms, 94.5% of respondents reported an improvement in student academic performance, with 31.5% noting a significant improvement and 63.0% observing slight improvement. Only 5.5% reported no change. This data indicates a positive impact of Smart Classrooms on academic outcomes, with the majority of respondents perceiving improvements. The findings suggest that technology-enhanced learning environments contribute to enhanced academic performance, aligning with the broader trend of increased student engagement and participation observed in previous responses.

	Responses	Count	Column N %
What changes have you observed in students' academic performance, attendance, and grades since the introduction of Smart Classrooms?	Improved academic performance	103	47.0%
	Increased attendance	99	45.2%
	Enhanced grades	7	3.2%
	No significant changes	10	4.6%
	Total	219	100.0%

Table 24: Change in student's attendance and grades

Since the introduction of Smart Classrooms, respondents observed various positive changes in students' academic outcomes. The majority noted improved academic performance (47.0%) and increased attendance (45.2%). A smaller proportion reported enhanced grades (3.2%). These findings suggest that Smart Classrooms positively impact students' academic performance and attendance, with some also experiencing improvements in grades. The data underscores the effectiveness of technology-enhanced learning environments in fostering positive educational outcomes, aligning with previous perceptions of increased student engagement and participation.

"Yes, I think that students have developed more interest in study after installation of smart class"

- An excerpt from an IDI with school staff, Palamu

	Responses	Count	Column N %
How would you rate the overall grades of students before and after the Smart Classroom implementation?	Improved	180	82.2%
	Remained the Same	36	16.4%
	Declined	3	1.4%
	Total	219	100.0%

Table 25: Rate the overall grade of students

Since the implementation of Smart Classrooms, 82.2% of respondents reported improved overall grades of students, while 16.4% noted that grades remained the same. Only 1.4% reported a decline in grades. This data indicates a positive impact of Smart Classrooms on students' academic performance, with the majority perceiving improvements. The findings suggest that technology-enhanced learning environments contribute to enhancing overall grades, aligning with previous perceptions of improved academic performance and attendance associated with Smart Classroom implementation.

	Responses	Count	Column N %
Have you noticed any changes in the learning environment since the implementation of the Smart Classroom?	Very Satisfied	33	15.1%
	Satisfied	173	79.0%
	Neutral	9	4.1%
	Dissatisfied	4	1.8%
	Total	219	100.0%

Table 26: Changes in learning environment

Furthermore, respondents also expressed satisfaction with the changes in the learning environment. The majority (79.0%) reported being satisfied, with 15.1% stating they were very satisfied. Only a small proportion (1.8%) expressed dissatisfaction. These responses indicate an overall positive perception of the learning environment post-Smart Classroom implementation, suggesting that the introduction of technology-enhanced learning environments has contributed to enhancing satisfaction levels among users, potentially reflecting improvements in teaching and learning experiences within the institution.

	Responses	Count	Column N %
Have you noticed any changes in the learning environment since the implementation of the Smart Classroom?	Yes	202	92.2%
	No	12	5.5%
	Not Sure	5	2.3%
	Total	219	100.0%

Table 27: Changes in learning environment

Since the implementation of the Smart Classroom, 92.2% of respondents reported noticing changes in the learning environment. This data indicates a widespread perception of alterations in the learning environment following Smart Classroom implementation. The majority's recognition of changes suggests

that the introduction of technology-enhanced learning environments has had a noticeable impact on the educational setting, potentially reflecting improvements or modifications introduced through the implementation of Smart Classrooms.

	Responses	Count	Column N %
In your opinion, how effective has the Smart Classroom intervention been in enhancing the teaching-learning process?	Highly Effective	70	32.0%
	Moderately Effective	116	53.0%
	Slightly Effective	29	13.2%
	Ineffective	4	1.8%
	Total	219	100.0%

Table 28: Effectiveness of smart classroom

Based on the findings, the Smart Classroom intervention is perceived as effective in enhancing the teaching-learning process by the teachers. Among them, 32% consider it highly effective, 53% moderately effective, and 13.2% slightly effective. Only a small proportion (1.8%) deemed it ineffective. These findings suggest a generally positive perception of the Smart Classroom intervention's effectiveness, highlighting its significant impact on improving the teaching-learning process and affirming its value in facilitating more engaging and efficient educational experiences.

	Responses	Count	Column N %
How has the implementation of Smart Classroom development/renovation impacted your teaching methods and delivery of content?	Enabled more interactive teaching	54	24.7%
	Facilitated multimedia-based content delivery	105	47.9%
	Improved lesson planning and organization	30	13.7%
	Enhanced student engagement	24	11.0%
	Other (please specify	6	2.7%
	Total	219	100.0%

Table 29: Impact on teaching methods

The implementation of Smart Classroom development/renovation has significantly impacted teaching methods and content delivery. Respondents reported various positive changes, with 47.9% stating that it facilitated multimedia-based content delivery and 24.7% indicating enabled more interactive teaching. Additionally, 13.7% noted improved lesson planning and organisation, and 11.0% highlighted enhanced student engagement. These findings suggest that Smart Classroom implementation has diversified and enhanced teaching approaches, leveraging multimedia tools for more interactive and engaging content delivery, ultimately leading to improved organisation and increased student engagement within the learning environment.

	Responses	Count	Column N %
How has the Smart Classroom initiative contributed to a more interactive and dynamic learning environment?	Facilitated interactive multimedia presentations	87	39.7%
	Encouraged collaborative learning activities	89	40.6%
	Provided opportunities for hands-on learning experiences	32	14.6%
	Fostered peer-to-peer interaction	6	2.7%
	Other (please specify)	5	2.3%
	Total	219	100.0%

Table 30: Contribution in more interactive and dynamic learning

The Smart Classroom initiative has significantly contributed to creating a more interactive and dynamic learning environment. Respondents reported various positive outcomes, with 40.6% stating that it encouraged collaborative learning activities and 39.7% indicating that it facilitated interactive multimedia presentations. Additionally, 14.6% noted that it provided opportunities for hands-on learning experiences. These findings suggest that the Smart Classroom initiative has fostered active student engagement through diverse learning modalities, promoting collaboration, multimedia-based presentations, and hands-on experiences, ultimately enhancing the overall dynamism and interactivity of the learning environment.

"After the initiation of SMC, absenteeism is very low. Students find it very important to attend school."

- An excerpt from an IDI with an SMC member, Gumla

	Responses	Count	Column N %
How has the Smart Classroom intervention contributed to achieving the desired outcomes in terms of education quality and student engagement?	Very positively	70	32.0%
	Somewhat positively	140	63.9%
	Neutral	6	2.7%
	Negatively	3	1.4%
	Total	219	100.0%

Table 31: Achieving desired outcome

The Smart Classroom intervention has had a predominantly positive impact on achieving desired outcomes in education quality and student engagement. With 32.0% expressing a very positive perception and 63.9% somewhat positive. These findings affirm the value of technology-enhanced learning environments in fostering a more dynamic and engaging educational experience, aligning with the institution's objectives for improving teaching and learning outcomes.

	Responses	Count	Column N %
Is there any renewed facility in the smart classroom?	Yes	76	34.7%
	No	143	65.3%
	Total	219	100.0%

Table 32: Renewed facility

The findings reveals that while 34.7% of respondents acknowledged the presence of renewed facilities in smart classrooms, including upgradation of benches, desks, and almirahs, 65.3% reported no such renewal. Alongside, respondents also highlighted other improvements such as renewal of facilities like painting, flooring, and walls as well as the installation of CCTVs for security purposes. Additionally, efforts towards cleaning and tidying classrooms and facilities, as well as repairing or replacing stolen or missing items related to smart classrooms, were noted as contributing factors to overall facility enhancement within smart classrooms.

	Responses	Count	Column N %
Is it well maintained?	Yes	73	96.1%
	No	3	3.9%
	Total	76	100.0%

Table 33: Maintenance of renewed facility

A notable, 96.1% of respondents perceive the smart classroom as well-maintained. This suggests that the majority of smart classrooms are effectively maintained, potentially contributing to a conducive learning environment. Alongside, respondents highlighted various practices contributing to maintenance, such as regular cleaning and maintenance, neat classrooms maintained by teachers, and adequate cleaning practices. Security measures, including secure storage of equipment and regular observation for safety, were also noted. Maintenance responsibilities were attributed to district officials or NGOs and school staff, ensuring upkeep and functionality of smart classrooms.

	Responses	Count	Column N %
Who maintains it?	School Staff	57	75.0%
	Implementation Agency Staff	18	23.7%
	Government Staff	1	1.3%
	Total	76	100.0%

Table 34: who maintains it

The maintenance of smart classrooms is primarily undertaken by school staff, as reported by 75.0% of respondents. Additionally, 23.7% mentioned implementation agency staff. This data suggests that the responsibility for maintaining smart classrooms is predominantly entrusted to school staff, highlighting their crucial role in ensuring the upkeep and functionality of these learning environments. The involvement of implementation agency staff and government personnel also contributes to the collaborative effort in maintaining and sustaining smart classrooms within educational institutions.

3.3.1. KEY INSIGHTS

The Smart Classroom initiative has notably improved infrastructure and teaching methods, fostering a more engaging learning environment. Before the project, infrastructure availability was mixed, with a significant proportion deeming it inadequate. However, post-implementation, there was a noticeable improvement, leading to increased student attendance and enhanced academic performance. Teachers reported more interactive teaching methods and multimedia-based content delivery, contributing to improved student engagement and participation. Overall, the initiative has been highly effective in enhancing the teaching-learning process, achieving desired outcomes in education quality, and promoting student engagement. Despite challenges like the need for renewed facilities and maintenance, the majority of respondents expressed satisfaction with the changes and the initiative's effectiveness in improving educational outcomes.

Chapter: 4 Conclusion and Recommendations

In conclusion, the findings on the smart classroom's exterior condition highlights a diverse range of perceptions among participants. Additionally, opinions varied regarding the presence of design or creative art on the walls, with some acknowledging its positive impact on the room's aesthetics. Overall, there is a positive inclination towards the upkeep and aesthetic appeal of the smart classroom, with areas identified for potential enhancements to further elevate its environment. These insights underscore the importance of ongoing maintenance and aesthetic improvements to create a conducive and visually appealing learning space for students.

Moving on to the analysis of amenities within the smart classroom, valuable insights were gathered regarding its lighting and infrastructure. The studysuggests a positive perception among respondents regarding natural lighting, with the majority believing that ample sunlight enters the room through its windows. Additionally, the presence of tube lights is widely acknowledged, indicating a balanced approach to lighting provision that complements natural light sources. Most respondents reported functional tube lights, although a notable proportion encountered issues with some fixtures, highlighting the importance of regular maintenance. Furthermore, the presence of essential electrical components such as switches and connection boards is nearly universal, ensuring convenient access to electricity for various activities within the classroom. However, issues with switch functionality and non-functional ceiling fans were reported by a minority of respondents, underscoring the importance of addressing maintenance needs promptly to maintain a conducive learning environment. Overall, the data emphasises the significance of regular upkeep to ensure optimal functionality of essential infrastructure within the smart classroom. By addressing maintenance issues promptly, educational institutions can create an environment that fosters learning and enhances the well-being of both students and teachers.

Lastly, the analysis of the Smart Classroom initiative reveals its significant positive impact on various aspects of education quality, student engagement, and infrastructure enhancement within schools. Before the project, perceptions of infrastructure availability were mixed, with a notable proportion deeming it inadequate. However, post-implementation, there was a noticeable improvement, leading to increased student attendance and enhanced academic performance. The initiative has transformed teaching methods, enabling more interactive and multimedia-based content delivery, which has, in turn, fostered greater student engagement and participation. The overwhelmingly positive feedback from both teachers and students indicates the effectiveness of the Smart Classroom intervention in achieving its desired outcomes. It has contributed to creating a more dynamic and interactive learning environment, facilitating collaborative learning activities and providing opportunities for hands-on experiences. Moreover, the initiative has been highly effective in enhancing the overall quality of education and promoting positive changes in students' academic performance and attendance. Despite some challenges such as the need for renewed facilities and ongoing maintenance requirements, the majority of respondents expressed satisfaction with the changes brought about by the Smart Classroom initiative. Overall, the Smart Classroom initiative has demonstrated its value in modernising educational infrastructure, enhancing teaching and learning processes, and ultimately improving educational outcomes. Moving forward, continued support and investment in such initiatives are essential to further advance and sustain the positive impacts observed within educational institutions.

Recommendations:

1. **Regular Maintenance Schedules:** Implement scheduled maintenance routines to promptly address any issues related to infrastructure and amenities within the smart classrooms. This will ensure the upkeep and functionality of essential components, contributing to a conducive learning environment.
2. **Teacher Training and Support:** Provide comprehensive training and ongoing support to teachers to effectively utilise technology-enhanced teaching methods. This includes familiarising them with multimedia tools and interactive teaching techniques to maximise student engagement and learning outcomes.
3. **Periodic Evaluations:** Conduct regular evaluations to assess the long-term impact of the Smart Classroom initiative on educational outcomes. This will enable stakeholders to identify areas for improvement and make necessary adjustments to enhance the effectiveness of the initiative.
4. **Enhanced Collaboration:** Foster collaboration between school staff, implementation agency staff, and government personnel to ensure seamless coordination in maintaining and sustaining smart classrooms. Establish clear communication channels and responsibilities to streamline maintenance efforts.
5. **Renewed Facilities:** Invest in the renewal of facilities within smart classrooms, including upgrading benches, desks, and storage units, to enhance the overall learning environment. Consider additional improvements such as painting, flooring, and wall decorations to create visually appealing spaces conducive to learning.