Focused Development Program

Smart Classroom Project Odisha (G0019)

Impact Evaluation Report 2023

NEW DELHI

TABLE OF CONTENTS

CHAPTER 1: BACKGROUND

1.1.   Introduction

Education is the cornerstone of societal advancement and progress, playing a pivotal role in shaping the future of nations. As we navigate the digital age, the integration of technology in education has emerged as a transformative force. In India, a country with a diverse educational landscape, the adoption of smart classrooms and ICT infrastructure is reshaping the way students learn and teachers instruct and therefore paving the way for innovative learning methodologies and enhanced educational outcomes. India's education system is vast and varied, catering to a diverse population with distinct socio-economic backgrounds.

The National Education Policy (NEP) 2020 envisions a comprehensive transformation of the education system, emphasizing holistic learning, critical thinking, and skill development. According to the Annual Status of Education Report (ASER) 2020, 25.3% of rural students in the age group of 6 to 14 lack foundational reading skills. This disparity underscores the need for innovative interventions that can bridge learning gaps and provide equal opportunities for all. It is in this context initiatives like smart classrooms, integration of ICT into curriculum plays a pivotal role in the landscape of education (Saini and Goel, 2019). According to Department of School Education & Literacy, India, these solutions have shown promise in building foundational skills, paving the way for developing important 21st century skills such as communication, collaboration, creativity, critical thinking and problem solving.

1.2.   Smart Classrooms and ICT in Education

It has been documented that smart classroom and ICT are a powerful tool for educational transformation and reform (Goktas et al., 2009; Fu, 2013). ICT includes computers, the Internet, and electronic delivery systems such as radios, televisions, and projectors among others, and is widely used in today's education field. It is indicated that school is an important environment in which students participate in a wide range of computer activities, increasingly, ICT is being applied successfully in instruction, learning, and assessment (Kent and Facer, 2004). Smart classrooms represent a paradigm shift in education, by leveraging a diverse array of ICT tools and resources, including interactive whiteboards, multimedia projectors, tablet devices, educational software, virtual reality, and online learning platforms to enhance teaching and learning (Murithi and Yoo, 2021).

It is postulated that an appropriate use of these technologies can raise educational quality and connect learning to real-life situations. These technologies offer a wide range of functionalities, including interactive content delivery, collaborative learning, real-time assessment, and remote access to educational resources. A report by Ernst & Young (EY) on "Revolutionizing Education through Digital Classrooms" highlights that smart classrooms improve retention rates by up to 55% and enhance student engagement. Initiatives like HDFC Bank's commitment to creating 2500 smart classrooms across the country reflect the growing recognition of technology's potential to bridge educational disparities. The Digital India campaign launched in 2015 has paved the way for ICT integration in schools.

Use of smart classroom and ICT enables effective display of teaching content, convenient access to learning resources, easy class management and instructional engagement, interactive instructions and integrated contextual awareness (Huang et al., 2012; Kaur et al., 2022). These technologies transform a classroom environment into a learner-centric, where students are actively involved in the learning processes (Sanchez and Alemán, 2011) and decision-making and planning (Lu et al., 2010). Therefore, smart classrooms and ICT usage provides authentic learning opportunities for students, brings real life experiences into the classroom to engage students, and prepare them for further education, careers, life-long learnings and well-being in a way that traditional practices often fail to do (Pillay et al., 2017).

Competent human resources are needed for the effective use of smart classrooms and ICT in education at every level, including policy makers, curriculum and content designers, district supervisors, teacher educators, school administrators, and teachers (DSEL, 2012). One important aspect of smart classroom and ICT in education, therefore, is the professional growth of these educators. In order to successfully implement ICT-enabled teaching and learning programs, educators must mobilize local support, inspire staff and students, and manage staff and students (Pillay et al., 2017). Teachers play a critical role in transforming teaching and learning practices and engrossing students in tech-enabled learning environments. The effective integration and long-term viability of technology in education depend on strong leadership in the field. The integration of smart classroom and ICT in teaching have teachers to assess progress in real time rather than waiting for students to submit notebooks, the same goes for giving real time feedback to students as well (Kozma and Anderson, 2002; Ghavifekr et al., 2014).

1.3. Challenges in Using Smart Classrooms and ICT in Education

The advantages of smart classroom and ICT have been well documented in the previous research, however, the challenges associated with its use cannot be neglected. The challenges in using smart classrooms can be at student-, teacher-level and administrative and infrastructures setbacks.

Student-level challenges

Studies have demonstrated that special needs, student mobility, and anxiety over standard test results are the main challenges associated with use of smart classroom and ICT (Frederick et al., 2006; Kishira and Sasaki, 2023). These shortcomings can be overcome by providing group-based tacks and problem-based learning activities, and adequate learning support (Ghavifekr et al., 2016).

Other barriers from the students' outlook include poor technical skills that limit access to digital resources in classroom, lack of timely feedback from instructors; lack of hand-on practice on devices and reduced interaction with peers and instructors (Ghelan, 2008; Alemu, 2015; Schindler et al., 2017). Therefore, facilitation for learning process including induction, orientation, and training for students is a must.

Teacher-level challenges

Several studies have also reported barriers to effective use and integration of technology from a teacher's perspective (Buabeng-Andoh, 2012; Emre, 2019; Mushimiyimana, 2021; Pardo-Baldoví et al., 2023). Studies have corroborated that teachers have low expectations and lack vision for use of smart classroom and ICT in schools (Al-Bataineh et al. 2008; Buabeng-Andoh, 2012). Others have reported lack of collaboration among teachers, insufficient pedagogical support, lack of experience with

technology, and insufficient learning time) as the hindering factors (Ertmer and Otternbreit-Leftwich, 2010; Hennessy et al., 2022;).

Low technical competence, traditional teaching preferences (Goktas et al., 2008) and lack of knowledge on how to combine technology with the existing pedagogical content (Hutchison and Reinking, 2011). Majority of these issues can be resolved through rigorous training activities on use of technology to update teachers' skills and effective, timely, and continuous training to improve ICT skills and manage a technology-rich classroom (Al-Bataineh et al., 2008; Hutchison and Reinking, 2011).

Teachers often use ICT more frequently for the preparation of handouts and tests than to promote critical thinking and existing teaching approaches rarely foster student-centered learning. Chen (2008) proposed that instead of solely providing theories, training session should demonstrate appropriate methods for integrating technology within a curriculum to accomplish meaningful and effective technology integration to meet pedagogical goals and needs.

Administrative and infrastructural drawbacks

Other obstacles exist in terms of an administrative and infrastructures setbacks. Lack of infrastructure is one of the biggest challenges to implementing smart schools in India. Many rural areas in India do not have access to reliable electricity and internet, which makes it difficult to implement technology-based learning, many schools lack adequate or feasible space to set up smart classrooms. A lack of appropriate administrative support for the effective use of ICT, more focus on examination outcomes than using ICT to engage students in higher-order thinking activities and lack of appropriate hardware, software, and materials are few examples of poor administrative and infrastructural support for use of smart classrooms and ICT (Lim, 2007; Goktas, et al., 2009).

However, challenges persist. The lack of infrastructure, reliable internet connectivity, and teacher training are hurdles to the effective implementation of smart classrooms. The "Annual Status of Education Report (ASER) 2020" highlights the digital divide, with only a fraction of students having access to online education during the COVID-19 pandemic. Combined with it challenges like limited teacher training (Kundu, 2021) and maintenance of technological resources further aggravate the situation.

The journey towards an education system that leverages smart classrooms and ICT infrastructure is ongoing (Jena, 2013). The amalgamation of technology and pedagogy has the potential to create inclusive, interactive, and learner-centric educational experiences. While progress is evident, ensuring equitable access and addressing challenges is imperative for realizing the full potential of technology-driven education. Initiatives like HDFC Bank's commitment to smart classrooms exemplify the transformative impact that strategic partnerships can have on education, paving the way for a digitally empowered and knowledge-driven India.

1.4.   HDFC Bank's Contribution Towards Education

Against the backdrop of growing emphasis on leveraging technology to enhance learning outcomes, HDFC Bank has demonstrated its commitment to education by embarking on an ambitious mission to create 2500 smart classrooms across the country. With a clear objective of promoting education and fostering digital literacy, HDFC Bank, under its Parivartan initiative, has launched programs aimed at revamping the infrastructure of schools and integrating ICT based pedagogy in the curriculum. This

endeavour not only aligns with the national agenda of educational advancement but also addresses critical challenges faced by schools, in regions like Odisha and Punjab.

In the specific context of Odisha and Punjab, where 130 schools have received the support of HDFC Bank through its Focused Development Project (FDP), the challenges in the education landscape are manifold. Many schools in these states, despite government aid, grapple with inadequate access to essential facilities like water, proper sanitation, and hygienic conditions. Moreover, the deficiency in Information and Communication Technology (ICT) infrastructure has hindered the potential for interactive and technologically-driven learning experiences. Recognizing these obstacles, HDFC Bank's collaboration with YUVA unstoppable has aimed to catalyse a transformative change in these schools' education delivery.

The objectives of the intervention are multifaceted, each strategically designed to address the nuanced challenges prevalent in the educational landscape of Odisha and Punjab. Firstly, the program seeks to enhance visualization and creativity among children through interactive and practical learning approaches. By integrating technology into pedagogical methods, the project also aims to raise academic performance and average grades, thereby elevating the overall learning experience. The project's impact is anticipated to be far-reaching, with an increase in attendance rates as students find the digital classrooms more compelling, promoting a positive outcome on learning. In parallel, Project 2 (G0021) focuses on equipping 50 schools in the Patiala district of Punjab with digital classrooms. This endeavour is rooted in the objective of digitally empowering every student, propelling them towards digital literacy. The installation of technology is strategically aligned with the broader goals of promoting ICT literacy, training teachers in effective technology-driven pedagogy, and nurturing critical thinking and analytical skills through self-learning. The project's holistic approach covers not only students but also empowers educators to adapt to the evolving educational landscape.

Access to technology and interactive learning environments directly correlates with improved learning outcomes and engagement levels among students. Study by the National Sample Survey Organization highlights the digital divide in rural India, where access to technology is disproportionately lower than urban areas. By bridging this divide through the introduction of smart classrooms, HDFC Bank's initiative aligns with global best practices in leveraging technology for inclusive and effective education delivery. The HDFC Bank's aspiration of creating smart classrooms and promoting ICT integrated curriculum becomes not just a project but a catalyst for educational empowerment, one that echoes across the landscape of Indian education.

1.5.   Rationale

Driven by the need to evaluate the effectiveness, outcomes, and overall impact of these interventions, HDFC Bank's CSR team has decided to conduct an impact assessment study. The underlying rationale for conducting this study is rooted in the commitment to improving the educational landscape and providing better learning opportunities for students. Several factors contribute to the necessity of conducting the impact assessment:

➢   Many schools in Odisha and Punjab are grappling with significant challenges, including inadequate infrastructure, lack of access to technology, and poor learning environments. These challenges hinder students' learning experiences and overall academic performance. HDFC Bank's

interventions aim to tackle these challenges head-on, but it's essential to understand the extent of the improvements brought about by these interventions.

➢ The insights gained from the impact assessment study will serve as valuable feedback on the interventions. Understanding the strengths and areas of improvement in the implemented projects will guide the tea, in making informed decisions about resource allocation, program enhancements, and expansion to new regions.

➢ The ultimate beneficiaries of these interventions are the students, teachers, and schools in Odisha and Punjab. By conducting an impact assessment, the study's findings will help in tailoring future initiatives to better address the needs of the beneficiaries.

1.6. Objectives

The primary objectives of the study are illustrated below:

1. • To assess the effectiveness of the Smart Classroom's practical and fun approach methods of learning

2. • To assess the improved visualization and creativity amongst the students before the intervention and after the implementation of the project

3. • To assess the improvement in attendance and participation of students in learning

4. • To assess ease and access of technology to the students

2.1.   Approach

The evaluation was conducted by adopting a mixed method approach with both quantitative and qualitative components to fulfil the holistic nature of the evaluation and to ensure that the objectives of the evaluation are met. T**he proposed evaluation was underpinned by the OECD-DAC evaluation framework** which is aligned with the evaluation requirements highlighted in the RFP. As depicted in the diagram, the framework enabled the team to assess the project in Odisha. The outputs from the application of the framework allowed the evaluation team to qualify the quantitative findings with robust ground level perspectives. A brief on OECD-DAC framework is presented below.

OECD-DAC framework

The OECD-DAC framework serves as a comprehensive and systematic approach to evaluating and analysing the effectiveness of programs and interventions. This framework consists of six key components: Relevance, Effectiveness, Efficiency, Coherence, Impact, and Sustainability, which collectively provides a structured methodology to assess the impact of the interventions.

Figure 2.1: OECD - DAC framework[1]
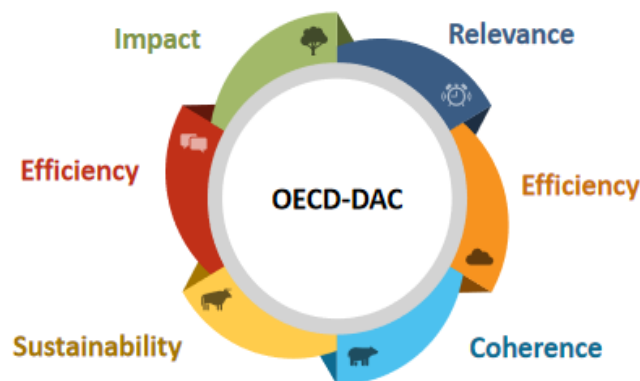
This framework brought out the quantitative and qualitative aspect of program evaluation through its components including improvements in academic performance, attendance, enrolment, benefits of smart classroom for teaching and learning and satisfaction from the project.

Application of the OECD framework

The key areas for enquiry based on the study objectives were mapped with the elements of the OECD-DAC framework. The assessment framework for the project has been outlined in the table below:

---

[1] https://www.oecd.org/dac/applying-evaluation-criteria-thoughtfully-543e84ed-en.htm

Table 2.1. Outline of the assessment framework based on OECD-DAC parameters

OECD-DAC parameter	Key information areas
Relevance	• What criteria were adopted by the NGO to grant support to the schools? • Did infrastructure serve the purpose of providing a better learning setup to students?
Coherence	• What challenges were faced by the school in setting up the smart class infrastructure? • What were the options for the availability of repair and maintenance services?
Efficiency	• Has introduction of smart classroom influenced attendance, performance in class? • Which grades and subjects are covered as part of the project?
Effectiveness	• Has the project achieved its intended outcomes or objectives?
Impact	• Were the things/equipment provided as part of the project functional? • Has introduction of smart classrooms affected teachers' ability to conduct effective and engaging lessons? • What were the observable changes in student behavior that indicate enhanced participation and interests?
Sustainability	• How feasible is it to sustain improved infrastructure in long run, considering factors like upkeep and repairs?

2.2.   Study Design

Aligned with the key objectives of HDFC's impact evaluation of the FDP program– a 'mixed-method design' was adopted. The design involved both secondary as well as primary research.

Figure 2.2. Study design
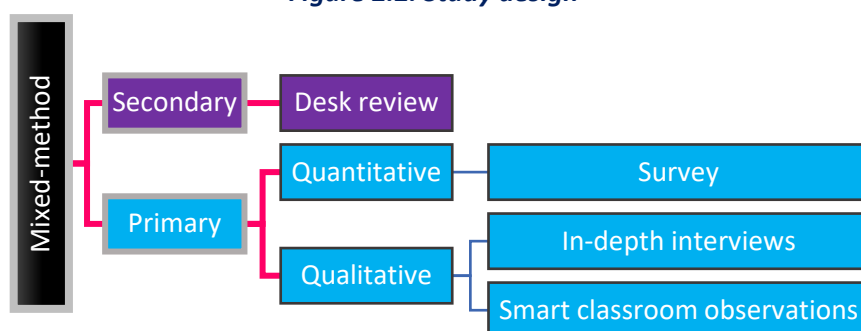
Both quantitative, and qualitative information were collected. Secondary and primary research were undertaken for fulfilling the evaluation requirements. As part of the secondary research, a desk review was done. The primary research comprised of engaging with teachers, principal and YUVA staff in the study area. Additionally, observations on smart classrooms were also conducted to complement the

collected data. This comprehensive approach provided a well-rounded perspective on the research objectives.

2.2.1. Secondary research – Desk review

As part of the secondary research, a desk review was conducted on the available resources on introduction of smart classrooms and ICT in education and associated challenges. Additionally, relevant program documents that have been developed during implementation of the program activities were gathered and reviewed. The desk review provided the details about the interventions, including the provision of infrastructural support and equipping schools with smart devices. This research also helped to identify potential indicators that were critical to measure the impact of the interventions. It guided the selection of appropriate data collection methods. The major highlights from the review have been included in the background section of this report.

2.2.2. Primary research

I. *Qualitative data*

As part of the primary research both qualitative and quantitative data were collected. It is important to qualify the results emerging from the quantitative survey and understand the causalities and factors that explain the quantitative results. The qualitative component of the assessment involved in-depth interviews (IDIs) with head masters (HM) of the selected schools and a staff from implementation partner YUVA Unstoppable. By conducting these qualitative interviews, a more holistic understanding of the impact, challenges, and dynamics surrounding the implementation of the projects will be captured. The qualitative data will complement the quantitative results, providing insights into the contextual factors, causalities, and stakeholders' perspectives. Additionally, classroom observations were conducted to gain insights into the class physical environment, availability and functionality of smart device, stylus pen, white board, benches, wall paintings and displays as well as observe the teaching methodologies and student engagement in the smart class.

II. *Quantitative data*

As part of the quantitative study, a teachers' survey was done to understand the services and capacity building provided as part of the project, teaching and learning outcomes of smart classrooms and satisfaction with the project.
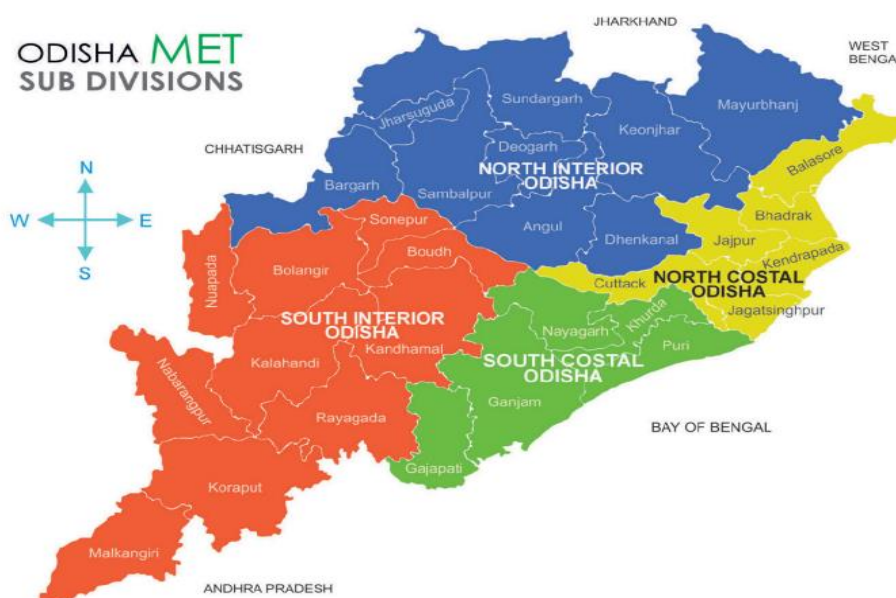
2.3. Sample coverage

As per the Odisha Met Sub Divisions, the state is divided into 4 zones[2]. The Figure below represents the met sub-divisions of Odisha. The zones are listed below:

- ➢ North Interior Odisha (NIO)
- ➢ North Coastal Odisha (NCO)
- ➢ South Interior Odisha (SIO)
- ➢ South Coastal Odisha (SCO)

---

[2]https://agri.odisha.gov.in/sites/default/files/202106/Five%20Decades%20of%20Odisha%20Agriculture%20Statisticss%20%282%29.pdf

Figure 2.3 Sub-divisions of Odisha

These zones served as the basis to select the district for the present study. The districts in each zone bears similar characteristics, to maintain logistical brevity, we randomly selected one district from each zone. Using the Random function in Excel, the districts identified in each zone were: **Keonjhar (NIO), Cuttack (NCO), Boudh (SIO), and Khurdha (SCO)**. It was decided that from each district 2 schools will be included in the study. Therefore, a total of 8 schools were covered as part of this assessment. The schools were selected using the random function in Excel, following list of two schools in each district.

The overall sample size covered as part the assessment is 32. The sample covered as part of the qualitative (22) and quantitative (10) component from each district is given in the table below:

Table 2.2 Sample covered in the study

Area (N=32)	Quantitative (n=10)	Qualitative (n=22)	
	Teacher's survey	In-depth Interviews (n=9)	Smart class observations (n=13)
Keonjhar	3	2	4
Cuttack	2	2	2
Boudh	3	2	4
Khurdha	2	2	3
YUVA Unstoppable staff (Odisha)	-	1	-

The data was collected from 8 schools covering, 13 smart classrooms, 10 teachers, 8 headmasters and 1 YUVA Unstoppable team member from Odisha.

2.4.   Study tools

The Basic Paradigm team developed the study tools for collection of data. An observation checklist was created for evaluating the environment of the smart classroom. This checklist covered major domains such as – availability and functionality of assets provided as part of the project; seating,

classroom layout and accessibility, instructional strategies/ teaching methods and student engagement.

Likewise, separate interview guides were created for conducting IDIs with HMs and YUVA Unstoppable team member. The interview guides for HMs and YUVA team member covered major aspects related to the project like, selection of schools, installation of smart classroom, training of teachers, management, student engagement and learning outcomes, handholding support and feedback system, maintenance and challenges.

Additionally, a structured questionnaire was prepared to interview teachers. The teachers interview schedule covered topics like assets provided under the project, capacity building of teachers, addressal of smart classroom related grievances, experience of teaching using smart device, learning outcomes of smart classroom, satisfaction with the project. Each tool has an informed consent form in the first page to ensure adherence to research ethics. The observation checklist and teacher's interview schedule were digitized with the help of KOBO toolbox.

2.5. Survey implementation

The Basic Paradigm (BP) team member with the help of YUVA point of contact in Odisha contacted the schools to seek permissions for the data collection and visited the schools to interview the HMs and teachers associated with the smart classroom. Informed consent was taken from all the participants before starting the interviews as well as for classroom observation.

For the smart classroom observation, the team member took consent from the teacher to sit during the class for observation and take pictures necessary for the evaluation. The desired details on infrastructure, equipment provided and the teaching-learning practice were captured in the digitized format and notes were maintained to record additional information.

The team member also conducted the survey of teachers in each school using the structured interview schedule to gather information on experiences of teachers and students and understand how the smart classroom enhanced learning outcomes. The questionnaire was administered to teachers through KOBO toolbox.

Lastly, the team member conducted the IDI with the head masters (HM) and YUVA staff using the interview guides to capture their experience about setting up smart classroom, resources provided, its benefits, associated challenges, and sustainability. The IDIs were recorded and additional notes were maintained to capture the information. The data was collected during 29th November to 7th December 2023.

2.6. Data analysis and report writing

The collected data was compiled and analysed to deduce the major findings from the study. The transcription of qualitative data was done and the data was collated for analysis and deducing the patterns in the findings. Finally, this report has been prepared to present the major findings from the evaluation of this project. The results from the evaluations have been discussed in the next chapter.

CHAPTER 3: RESULTS

This chapter outlines the key findings from the study conducted to assess the impact of HDFC Bank's Smart Classroom Project in Odisha. It presents the information gathered to offer a comprehensive overview of the different aspects of the project, highlighting the observations on smart classrooms, provisions provided as part of the project, capacity building of teachers to use smart device, how smart classrooms has affected learning outcomes for students. Additionally, it delves into views on projects implementation, management, maintenance, and challenges form demand (schools) and supply (implementors) sides.

3.1.   Smart Classroom Observations

District-wise major findings from the smart classroom observation in each school are given below.

1. **Khurdha district**

    a. **School 1:** School has a generator and consistent power supply. HDFC smart device (K-Yan) has been installed in a specific classroom and is exclusively used by 6th standard students at present. The digital content is readily available on smart devices for all classes. The teachers and principal are enthusiastic about Smart class activities and interactive sessions, with students actively participating. Students use smart devices only under the supervision of the teachers.

    b. **School 2:** HDFC has contributed by installing a dedicated smart class. The smart classroom is regularly utilized by 7th grade students, with occasional use by 6th and 8th graders. Students actively engage with the devices during classes, which are equipped with content covering all subjects for these grades. There is inadequacy of tables in the smart class which causes discomfort and makes it challenging for teachers to freely move around the class. Despite training, teacher was uncomfortable in using the smart device.

2. **Cuttack district**

    a. **School 3:** The headmaster and teachers have expressed a keen interest in HDFC smart device (K-Yan) and the associated educational content. The smart classroom is currently used for the 6th grade students, since the current seating arrangement for smart device usage is suboptimal, especially for 7th and 8th standard students. Although, teacher was making efforts to maximize the potential of the existing device yet need for periodic training sessions as recognized.

    b. **School 4:** One smart class is set up in relatively small room. The smart classroom primarily caters 7th standard students, with occasional rotations allowing 6th and 8th class students to access the smart class. Teachers displayed a keen interest in the smart devices, demonstrated adaptation to technology. Students actively participated in class, frequently posing questions to their teachers. However, limited space and seating arrangement in the current smart class hinder the students' ability to sit comfortably.

3. **Boudh district**

a. **School 5:** Currently, one smart class installed in the school by HDFC is used by 6th standard students. The active involvement of teacher and students in the learning environment of smart classroom was notable. Students frequently engaged with the content and posed questions demonstrating their keen interest. However, there were infrastructure challenges were noticed. Numerous benches in the classroom were broken, and the flooring was damaged, potentially limiting the overall learning experience of students.

b. **School 6:** The K-Yan smart device is installed in one class and is exclusively used by 8th graders. A palpable enthusiasm for learning and utilizing smart devices was observed among students in the smart classroom. Teachers delivered the lessons using smart device with great fervor.

4. **Keonjhar district**

a. **School 7:** One smart class was established in the school which is being used for the 9th standard students. The class was divided into different sub-section and smart class was taking simultaneously for the sub section respectively. In summary, the school's rich history and commitment to quality education are commendable. The request for training on the HDFC smart device demonstrates a forward-looking approach, aiming to harness the full potential of technology for the benefit of both teachers and students in this well-established educational institution.

b. **School 8:** One smart device (K-Yan), was installed in the classroom with wall paining, flooring and benches. Currently, K-Yan device was used to teach 10th grade students only. The installed device and the provided furniture were working satisfactorily. Teachers used the smart device appropriately to deliver the lesson. Students attentively grasped the content being taught in the smart class.

3.2.   Basic profile of the participants

This section presents the basic profile of the participants included in the study such as year of installation of smart classroom, teachers by age, gender, grades and subjects taught. Figure 3.1 shows the year of installation of smart classroom in the schools. Eight out of ten teachers reported that as part of the HDFC's efforts smart classroom was established in the year 2022.

Figure 3.1 Number of teachers by the month and years of installation of smart classroom in school
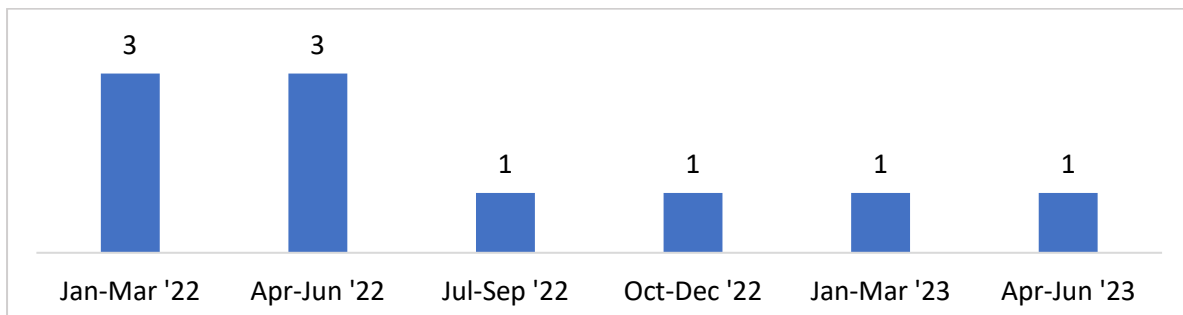

Figure 3.2 shows the background characteristics of teachers who were interviewed. It can be seen that the 6 out of 10 teachers were of age 45 years or less. Out of the interviewed teachers, 7 were females and 3 males. Majority of teachers taught middle grades (6-8th) followed by secondary grades (9-10th).

Among the interviewees, majority of them taught Mathematics (6), followed by English (3) and Science.

Figure 3.2. Number of teachers by the background characteristics

<div style="border:1px solid #4a90d9; border-radius:15px; background:#5b9bd5;">
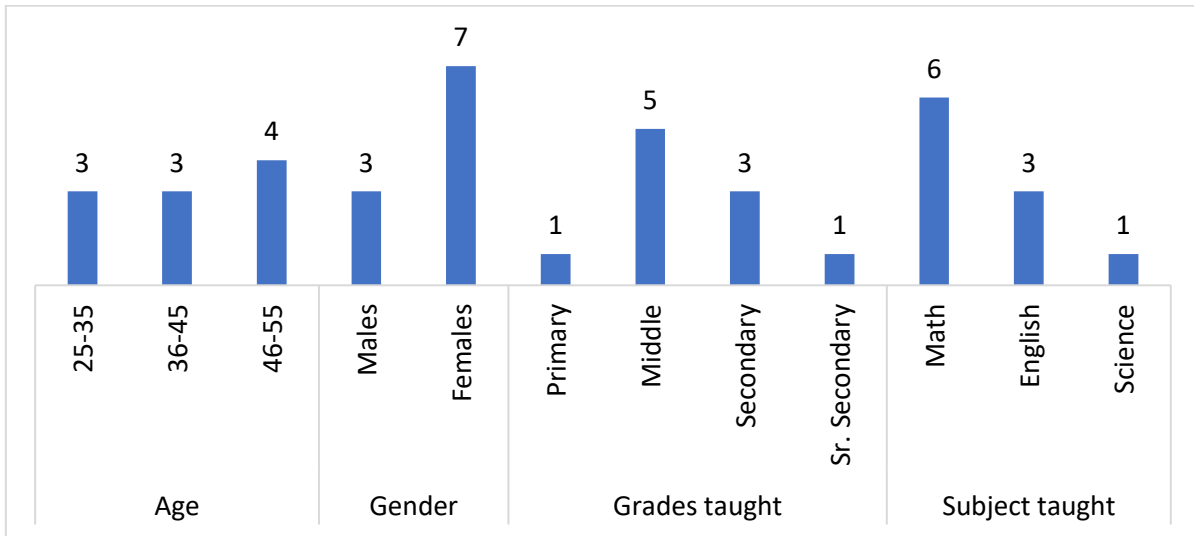
Key Points
- Mean age of respondents was 42 years.
- The smart device was mainly used to teach students in middle grades (6-8th).
- Apart from maths, science and English, smart device was also used to teach social science in the schools.

</div>

3.3. Services provided under smart classroom project

Within the scope of the smart class initiative, YUVA, supported by HDFC Bank, supplied a set of equipment to establish one smart classroom in selected government-aided schools of Odisha. This included a smart device "K-Yan", a stylus pen, whiteboard and digital curriculum. The digital curriculum catered to grades 6 to 10. Beyond digital resources, the project extended logistical assistance, facilitating the conversion of regular classrooms into interactive smart learning spaces. This transformation involved elements such as vibrant wall colours, displaying charts and posters, colourful benches, and flooring. The primary goal was to create an enjoyable teaching-learning environment for both teachers and students.

Table 3.1 shows the availability and functionality of equipment and infrastructural support provided under the project. All the schools had the equipment and other aids provided for the smart classroom and they were functional. Out of 8 only 1 school reported that flooring was coming off, classroom painting was chipped, benches were not in good shape and posters on display were tattered.

Table 3.1. Availability and functionality of services provided to schools for smart classroom

Equipment	Available	Functional
Smart classes observed	8	8
K-Yan device	8	8
Stylus pen	8	8

Equipment	Available	Functional
Digital curriculum	8	8
White board	8	8
Smart class flooring	8	7
Classroom painting	8	7
Benches	8	7
Posters/ IEC materials	8	7

Key Points
Overall, all observed classes (13) had functional equipment and infrastructure, except in 1 school.

3.4. Capacity building of teachers

The project also prioritized equipping teachers with practical training sessions, empowering them to effectively utilize the digital content via the smart device and exploit its digital board writing functionality. This section explores the capacity building of teachers as part of the project.

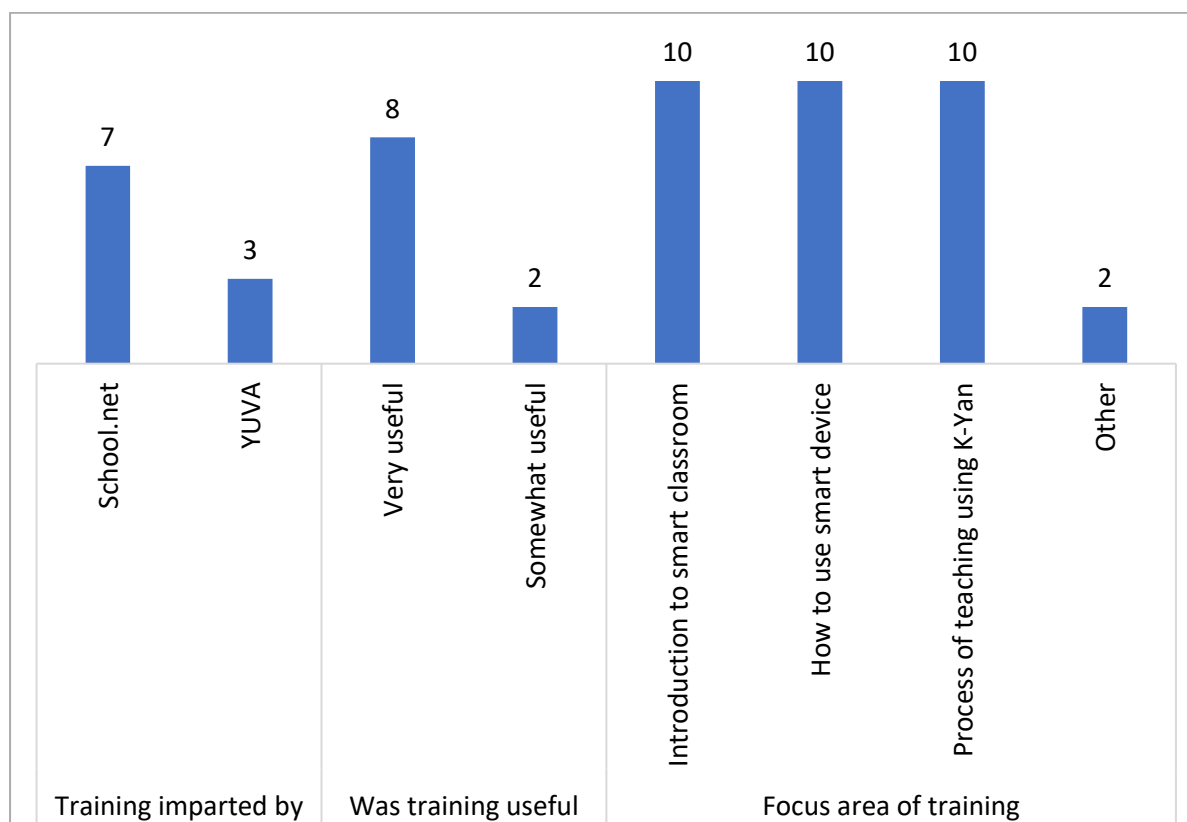*Figure 3.3 Number of teachers by training received and focus area of training*

Figure 3.3 shows the training received by the teachers and the focus area of the training. Majority of teachers reported that the training was imparted by School.net (7), while remaining said that the training was given by YUVA Unstoppable team (3). The training was mainly focussed on introduction to smart classroom and enable teachers to use the smart device and the process of teaching using the smart device, as reported by all the teachers (10).

Key Points
- All the teachers received one-day training on K-Yan.
- Teachers were able to teach as per the training received.
- All the teachers thought that training received was useful to them.
- Few schools did not receive training from School.net on operating K-Yan device.
- Teachers were interested to receive periodic training to use smart device and integration of technology into pedagogical methods.
- In most of the cases, it took less than 24 hours to resolve the issue.

3.5.   Handholding and technical support

Once the training was done YUVA team provided handholding support to the schools. The project has one state-specific tollfree helpline number to address the grievances related to the smart classrooms.

Figure 3.4 shows the handholding and technical support provided to teachers for the smart classrooms. Half of the teachers had availed the tollfree number to seek assistance for smart device. Eight out of ten teachers had received feedback from project team on their smart class. All of the teachers reported that they have received handholding support after the training.

Figure 3.4 Number of teachers by handholding and technical support received for smart classroom
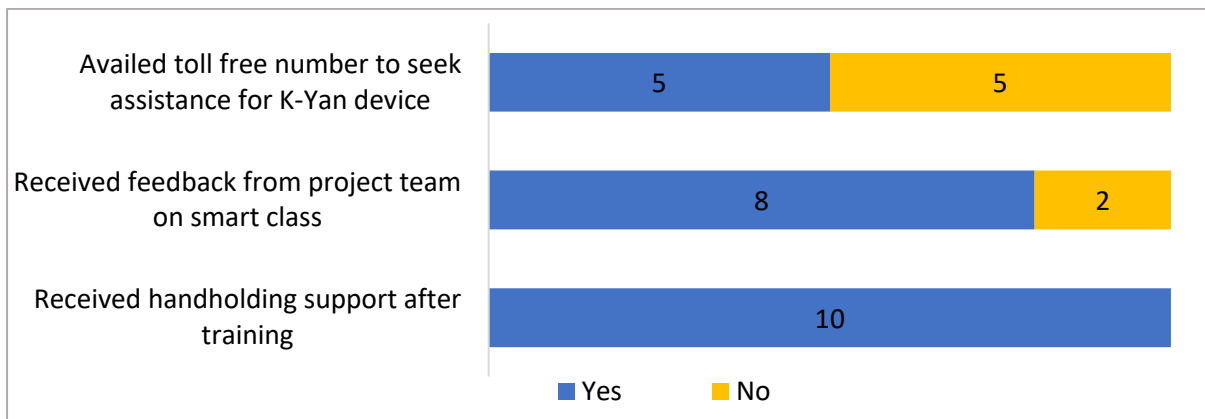
3.6.   Teaching experience in smart classroom

This section talks about the experience of teachers in the smart classroom and how it has benefitted them (figure 3.5). It can be seen that majority of the teachers reported that teaching in smart classroom has been beneficial for them in some way or the other. All the teachers reported that smart classroom has helped them explain the topics graphically and it has become easier to make topics simpler for students' understanding. All the teachers also shared that smart classroom provides an interactive environment in the class and has helped them refer to previously stored lessons easily. Some teachers also reported that smart classroom has benefitted as they can easily organize revision sessions with the help of smart device.

Figure 3.5 Number of teachers by benefits of teaching in the smart classroom

10	10	10	10	7	3
Helps explain topic graphically	Makes topics simpler to understand for students	Provides an interactive environment in the class	Easier to refer to previously stored lessons	Easier to organize revision sessions	Other
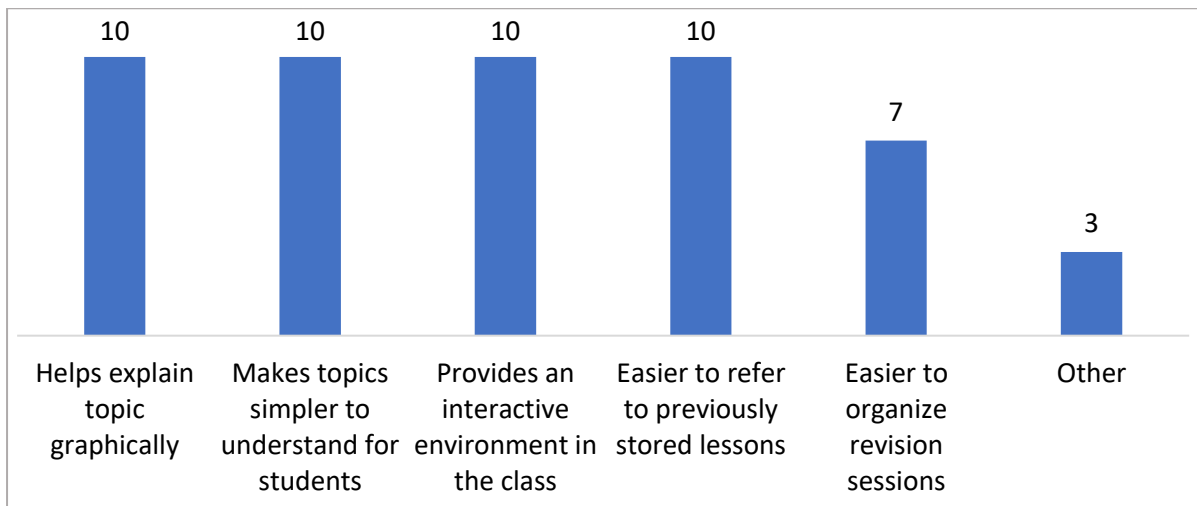
Key Points
- All the teachers were comfortable in teaching using the smart device.
- Teachers were enthusiastic about smart class activities and interactive sessions.
- All the teachers agreed that smart classroom has helped them to create an enabling and interactive learning environment for the students.

3.7.   Snippets from smart classrooms

The pictures given below shows teachers from different schools surveyed as part of the project while teaching in the smart classrooms.

Picture 3.1 Smart classroom in Government High School, Khurdha

*Picture 3.2 Smart classroom in Upper Primary School, Boudh*

Picture 3.3 Smart classroom in Government High School, Cuttack

3.8. Smart classroom: Influence on attendance and schooling

The project also anticipated that the concept of digital classroom would be more compelling and would lead to an increase in attendance rates among students. Therefore, figure 3.6 shows the change in attendance, drop-out and school enrolment by gender. Nine out of ten teachers reported that absenteeism among male and female students has reduced after the introduction of smart classrooms. Teachers also felt that there has been a reduction in the boys (7) and girls (8) drop-out, while the school enrolment among boys (7) and girls (8) has increased since the introduction of smart classroom.

Figure 3.6 Perception on influence of introducing smart classroom on attendance and schooling
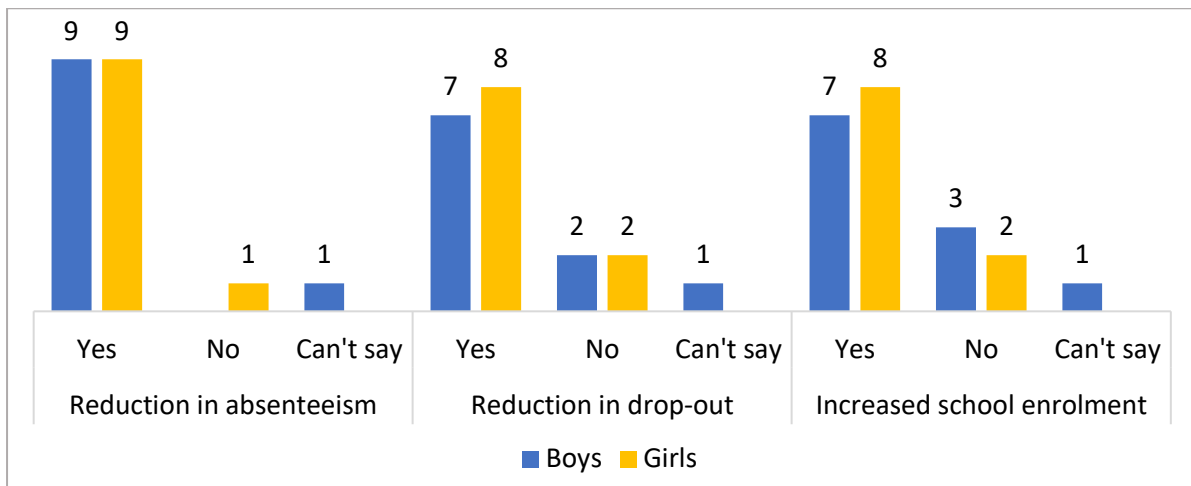
Key Points
- Introduction of smart classrooms has promoted attendance and schooling.
- Teachers reported improvement in drop-outs and school enrolment, particularly in context of girls.

3.9. Smart classroom: Learning outcomes

The introduction of technology has led to a paradigm shift in education. The use of smart classrooms paves a way for developing new age skills: communication, collaboration, creativity, critical thinking, and problem solving. The smart classroom allows a convenient access to learning resources, easy class management and instructional engagement, interactive instructions and integrated contextual awareness. This technology transforms a classroom environment into a learner-centric, where students are actively involved in the learning processes. Smart classrooms promise authentic learning opportunities for students, brings engaging experiences and prepare students for further education, careers, life-long learnings and well-being in a way that traditional practices often fail to do.

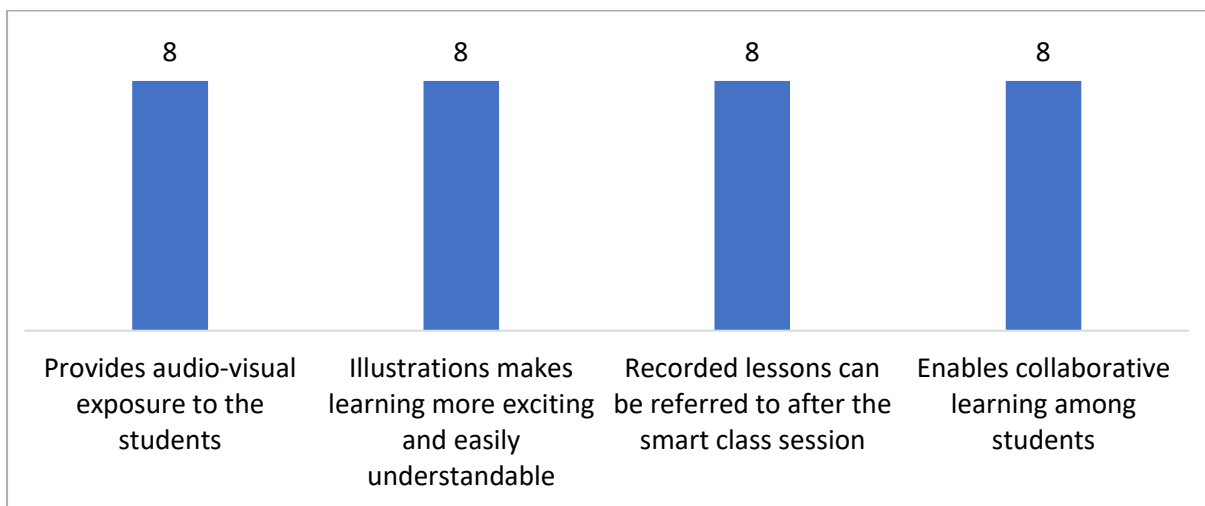*Figure 3.7 Benefits of smart classroom for learning among students*

Figure 3.7 depicts the benefits of smart classroom for learning among students from teachers' perspective. Eight out of ten teachers agreed that smart classroom have provided audio-video exposure to students and the use of illustration in smart classroom has made learning more exciting and easily understandable for students. Another added benefit is the option of recording the lessons which can be later used for reference purposes (8); the smart classroom also enables a collaborative learning (8).

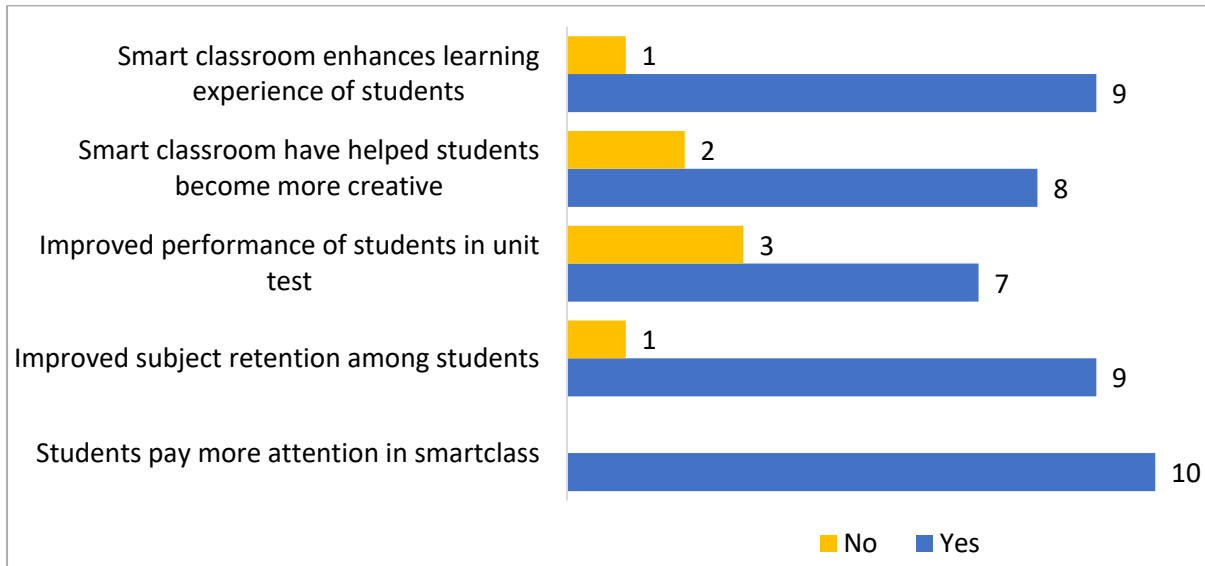*Figure 3.8 Perceived influence of smart classroom on learning outcomes*

Figure 3.8 shows the learning outcomes of introduction of smart classrooms. The majority of teachers believed that smart classroom enhances the learning experience of students (9) and have helped them become more creative (8). Teachers also shared that since the introduction of smart classrooms students' performance in unite test (7) as well as their subject retention has improved (9). All the teachers agreed that students have started paying more attention since the introduction of smart classroom.

Figure 3.9 Changes in students' behavior since the introduction of smart classrooms
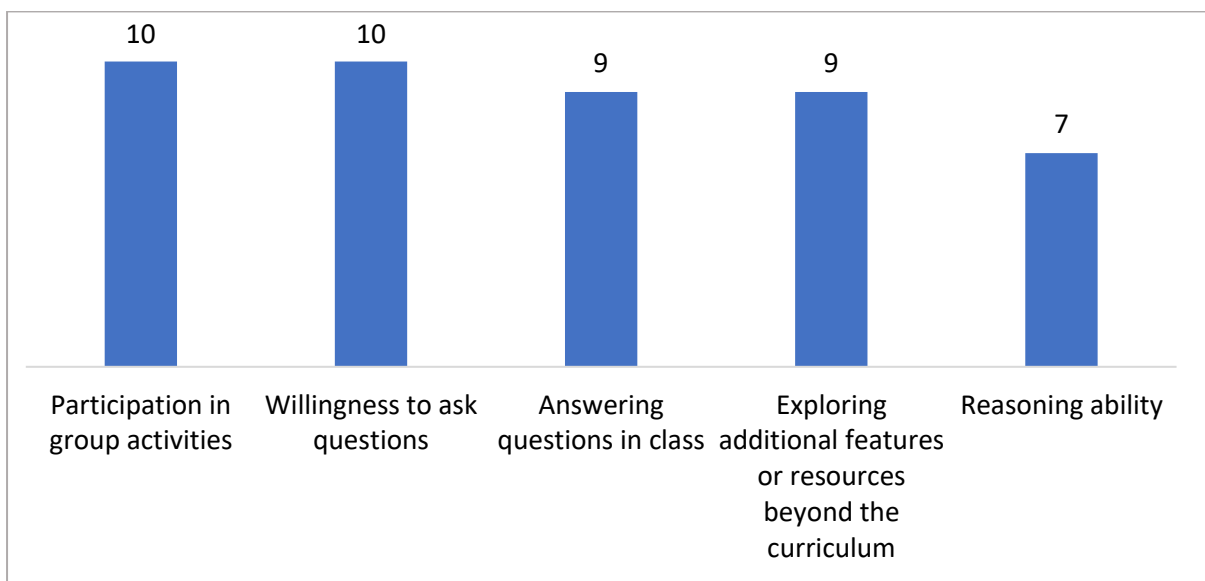
Figure 3.9 presents the changes in students behaviour observed by the teachers since the introduction of smart classroom. All the teachers believed that students have started participating in group activities and more students are posing questions in class. Nine out of ten teachers added that students have started answering questions asked in the class and they are interested to explore additional features or resources beyond the curriculum. Seven out of ten teachers believed that reasoning ability of students has improved.

> **Key Points**
> - Teachers reported that curiosity of students to learn has increased.
> - The results show that teachers accept that introduction of smart classroom has been a positive learning experience for students.
> - Teachers also shared that it has provided technological exposure to students, and they have learnt skills like: suing smart device, switching between different applications, using ppt, touchscreens etc.

## 3.10.   Snippets from learning in the smart classroom

Picture 3.4 Student using the K-YAN device participating in Smart classroom in Government High School, Khurdha

3.11.   Barriers to access and use of technology

Figure 3.10 shows the factors that hinder the access to and use of technology among students. Majority of teachers accepted that students are not allowed to use smart classroom for learning without supervision. Seven out of 10 teachers mentioned connectivity issues, 8 teachers reported lack of training/ skills to use technology among students. Most of the teachers reported irregular electric supply. All the teachers agreed that students have limited time in the smart classroom.

Figure 3.10 Obstacles faced by students to access and use technology for learning
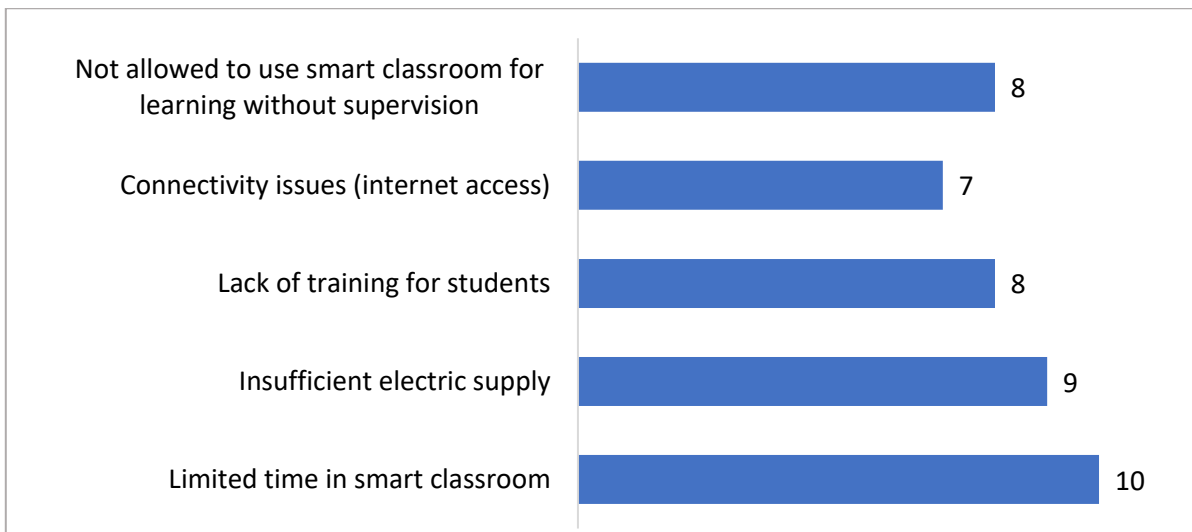
> *"…this restriction is in place to ensure the safety of the devices, as students may inadvertently damage them without proper supervision"* – School in Khurdha

3.12. Satisfaction with smart classroom

All the teachers were satisfied with the effectiveness of smart classroom for learning. Figure 3.11 shows the nine out of 10 teachers were satisfied with the infrastructure provided as part of the project and 8 out 10 teachers were satisfied with the effectiveness of smart classroom for teaching.

Figure 3.11 Satisfaction with a. infrastructure provided under the project and b. effectiveness of smart classroom for teaching

YUVA staff shared that the selection of schools is done in two ways: either school places a request for installation of smart devices or in other cases YUVA contacts school inquiring about requirement of smart device and the further steps are taken based on the outcomes of this discussion.

"Unavailability of electricity and connectivity to roads are major issues. There were instances when we had to replace selected school for installation with another school due to these issues" – YUVA staff

Reassuringly, majority of HMs were satisfied with digital curriculum and smart class set-up. They believed that this approach has a positive influence on the teaching as well as learning outcomes.

"…In digital content, the main text is available in Oriya. Some examples and exercise are not in local language. If all the content is translated to Oriya it would be very great for better learning outcomes" – HM

Picture 3.5 Discussion about Smart classroom with Head Masters of Government-aided schools, Keonjhar

Encouragingly, HMs shared that the installation of these devices in government-aided schools has provided the underprivileged students an opportunity to access technology. HMs shared that the introductory trainings provided as part of the project have been very helpful in familiarizing teachers with the use of modern technology. Although, younger teachers are more comfortable in using the technology but teachers from older generations are slowly warming up to its use and may do well with periodic trainings.

CHAPTER 4: CONCLUSION AND WAY FORWARD

4.1. Conclusion

Table 4.1 provides the conclusion derived from the evaluation based on the parameters of the OECD-DAC criteria.

Table: Conclusion based on the OECD-DAC assessment framework parameters

Frameworkparameters	Conclusions
Relevance	• Support for setting up the Smart Classroom for Grades 6-10 has been relevant in the technologically transforming education. • Identification of schools for smart classroom was done by surveying schools for requirement technological assistance or schools raise a request for installation of smart device.
Coherence	• Availability of room, small rooms, electricity and connectivity to roads pose some challenges in installation of smart class. • Schools are supported by YUVA team to overcome anytechnical or other issues associated with the smart device. • For smooth implementation of smart class, YUVA has made provisions with the local suppliers.
Efficiency	• The Smart classroom is mainly used by 6-8th graders. Mostly Math, Science and English are taught in smart classroom. • Introduction of smart classrooms has improved attendance of students. It has also reduced drop-outs, particularly among girls. • Attentiveness, retention of topics and test performance of students has improved after introduction of smart classroom. • HM and teachers have expressed satisfaction with smart class for teaching and learning.
Effectiveness	• The project has been effective in achieving its intended objective of providing an interactive environment to students to enhance their visualization, creativity and learning outcomes in government-aided schools in Odisha.
Impact	• The equipment and infrastructure provided as part of the project were properly functioning. • The training imparted by the project teams have built capacity of teachers to conduct effective and engaging lessons using smart device. • Changes were noted in students' behavior in terms of posing

Frameworkparameters	Conclusions
	questions, answering questions, participating in group activities indicating enhanced participation and interests.
Sustainability	• Currently, YUVA has provided maintenance support to schools through local vendors. • Additionally, schools have toll-free for seeking support for smart class related grievance. • In some cases, SMCs are already working towards the maintenance. • However, to sustain the intervention schools need to have a dedicated budget, seek support from the education department or local NGOs.

4.2. Way forward

The positive outcome of the smart classrooms suggests the need for scaling up the project and providing smart classrooms for all grades.

Smart class set up in small room that affects the seating arrangements thus makes learning experience uncomfortable. While setting up the smart classroom, attention should be paid that the smart device is set-up in a room that has ample space.

The benches and infrastructure for the smart classroom should be provided keeping in mind the maximum class size to avoid compact and uncomfortable seating arrangements. Also, provision for the periodic monitoring for maintenance of smart classroom should be established.

To support the older teachers who are not well versed with imparting digital education, refresher trainings should be provided in a planned manner to keep them updated for improved discharge of their teaching duties. It should be ensured that training caters to teachers' need for integrating modern technology in pedagogy.