Studying Engagement with Digital Classrooms

in Upper Primary and Secondary Government Schools in Madhya Pradesh

A study by

Centre of Excellence in Teacher Education (CETE), School of Education, TISS

Commissioned by

Central Square Foundation (CSF)

Implementation Partner (DSP)

Muskaan Dreams

Centre of Excellence in Teacher Education

CENTRAL SQUARE FOUNDATION

muskaan dreams | Digital promise to every child.

Acknowledgement

The research team would like to sincerely thank the Central Square Foundation for commissioning this study. We especially thank Mr. Harish Doraiswamy (Director – EdTech) and Ms. Lubhavani Anand (Project Lead) for their opportunity to conduct this research and for their flexible and collaborative decision-making throughout the process.

We would also like to acknowledge Ms. Prayasha Panda (Project Manager) for her ongoing support during the study. Our appreciation extends to Mr. Abhishek Dubey (Founder and CEO) of Muskaan Dreams for his visionary initiative in this research and his team for assisting with administrative matters and coordinating with various stakeholders.

Additionally, we are grateful to the District Project Coordinator in Gwalior and the Assistant Director of Schools from the Government of Madhya Pradesh for their support in facilitating the study.

From the Principal Investigator

I am pleased to present the research study report on Studying Engagement with Digital Classrooms in Upper Primary and Secondary Government Schools in Madhya Pradesh. This study collected first-hand data from various stakeholders across 64 government-operated upper primary and secondary schools in Madhya Pradesh.

The findings provide significant insights into the teaching and learning processes, the engagement of both teachers and students, and the challenges, opportunities, and sustainability associated with implementing multimedia-enabled e-content within classroom settings. Furthermore, this report outlines recommendations for future strategies regarding the implementation, scaling, and policy formulation related to digital technologies in government-run secondary schools in India.

This research was commissioned by the Central Square Foundation, to whom I extend my profound appreciation for their recognition of the critical need for such a study and their unwavering support and collaboration during its execution.

This study's success is due to the dedication and perseverance of my research team, the collaborative efforts of the implementing partner, Muskan Dreams, and the various government education departments in Madhya Pradesh. I am also grateful to the school heads, students, and educators from the research sites who contributed their time and participation in the study. My sincere thanks go to the CETE chairperson Professor Padma Sarangapani, for her unwavering motivation throughout the study and to the administrative finance team for their prompt support.

As we progress, I anticipate that this report will lay a substantial foundation for ongoing discourse and initiatives in [relevant field]. I encourage scholarly input and collaborative efforts to further develop and refine these insights.

Dr. Amina Charania

Associate Professor, CETE, TISS

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About CETE, TISS

The Tata Institute of Social Sciences (TISS) is an institution of excellence in higher education that continually responds to changing social realities through the development and application of knowledge towards creating a people-centered, ecologically sustainable, and just society that promotes and protects the dignity, equality, social justice and human rights for all. TISS offers teaching programmes to facilitate the development of competent and committed professionals for practice, research, and teaching; undertakes research; develops and disseminates knowledge; and reaches out to the larger community through extension at the local, national, regional and international levels.

The School of Education, at the Mumbai campus of TISS draws on the rich legacy of the TISS in research in Education. In the 1960s, as an input into the Kothari Commission Report, the Unit for Research in Sociology of Education contributed the first Sociological surveys of school education in India. In the early 2000s, the MA Education (Elementary) which was designed and taught as an inter-institutional programme was brought to TISS and established here. TISS has nurtured varied branches of study in education to develop on the Mumbai Campus. These have now reconverged as a renewed School of Education with expertise in a range of education areas including Education Policy, Education and Development, Sociology of Education, Cognition and Learning, Educational Technology, Curriculum and Pedagogy of Mathematics, Language, Science and Social Sciences, Teacher Professional Development and Inclusive Education. The faculty of the School are multidisciplinary and are active internationally and nationally in research and policy, and all have a rich publication record and are actively engaged in field initiatives. The School is also actively engaged with several states in the country and in the Global South in initiatives focused on strengthening school quality and teacher professional development. The school has an active doctoral programme and attracts students from different parts of the country and South Asia. The alumni of the school are now spread over India and abroad, pursuing research and active in the field supporting initiatives and in teaching.

The Centre of Excellence in Teacher Education (CETE) is a center within the School of Education at the TISS, Mumbai, India. CETE was established by a seed grant from the Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching, Government of India (2018-2019) and the Tata Trusts as the Founding Partner. Envisioned as a centre to catalyse transformation in Teacher Education, CETE's teaching, research and advocacy are built on the premise that professional, qualified teachers are central to achieving quality education. The Centre works through collaborations with state governments and partnerships and building networks for advocacy.Academic Programmes

Academic programmes: High-quality pre-service and in-service teacher education and faculty development.

Research and field action research: On teaching and its relationship to society, curriculum, pedagogy, teacher learning, and policy.

RACHANA: A resource centre and design lab to curate and develop educational resources, and promote inclusion and interactive and activity-oriented use of ICT.

Policy and Advocacy: Strengthening the ecosystem of teacher education.

- Innovative B.Ed.-M.Ed (NCTE recognised) with pedagogic specializations in language, mathematics, science or social science
- MA Education/MEd (part of the B.Ed-M.Ed) offers specialisations in both pedagogical areas- mathematics, science, social science or languages, and thematic areas - Education Technology, teacher professional development, educational development and policy, and inclusive education.
- PhD Education, a doctoral programme anchored in the centre's research groups.
- M.A. in Education and Technology is a new online programme developed in collaboration with industry partners, to build critical knowledge, equitable, and sustainable perspectives, and innovative practices in educational technology.

Continuous Professional Development (CPD)

The centre's bouquet of 6-week (2-credit) courses is offered on the TISSx (tissx.tiss.edu) platform. They provide in-service teachers, teacher educators and educational professionals with rigorous practice-based professional development in English, Hindi and other modern Indian languages. As courses approved by the academic council of TISS, they enable teachers to earn credits towards post-graduate certification.

'Digital Badge' is an innovation offering micro-credits which recognise specific competencies. Constructive Teaching and Learning with Technology course piloted this concept and was offered to over 3700 government teachers in five Indian languages across 7 states and 1 Union Territory between March to December 2022. Free courses from our COOL initiative (Continuous Open Online Learning) can be found on www.tissx.tiss.edu CETE offers calendarised open runs of its popular CPD courses.

Our Reach

30000+ Students

15000+ Teachers

1000+ Schools

5600+ DIET Faculty/ Government Teachers

10+ Countries

16000+ Social Media Followers

143 Current Cohort Students

100+ Alumni Including **40** International

Research & Field Action Catalysing sectoral change -

- Influencing practices, public discourses, and policies through high-quality research.
- Developing and demonstrating models of teacher profession development and field relevant innovations.
- Engaging with and developing strategies for sustainable capacity enhancement, strengthening systems, and institutionalizing change towards inclusion.
- Developing credible and meaningful use of technology in education and teacher education through research and field action.

Research Groups @CETE

Science and Mathematics Education | Critical Humanities and Social Sciences | Education, Development and Policy | EdTech | Teacher Education and Professional Learning | Inclusive Education

Current Field Action Projects & Research Projects

- International award-winning project- Connected Learning Initiative (CLIx) Phase 1 & 2 https://clix.tiss.edu
- Technology Enabled Learning for Teachers & Adolescents for the 21st Century (TELTA 21)
- Survey on the Impact of the COVID-19 Pandemic on Education and Teaching in Asia-Pacific: Future of Work in Education, Education International Asia-Pacific, 2021. https://bit.ly/FoWAsiaPacific
- Handbook of Education Systems in South Asia, Vol I & II Singapore: Springer Nature, 2021
- Connected Learning for STEM (CL4STEM) in three countries of the Global South
- Multimodal Approach to Teacher Professional Development (MATPD) in three South Asian countries
- Innovative Financing in Education to Leave No One Behind (IFE-2-Leave No One Behind)

RACHANA - Resource Centre & Design Lab

RACHANA is a physical and virtual resource centre and design lab to explore and develop resources and use design thinking in scaling, technology use, innovation and resource development. Rachana is developing and designing new resources and edtech resources to support teachers' practice informed by an understanding of PCK and inclusion, and an 8 volume textbook series published by Routledge, on "Principles- Based Adaptive Teaching". The www.clixoer.tiss.edu offers interactive and modules for secondary school English and STEM in English, Hindi and Telugu.

During Nov-Dec 2022, the RACHANA Fellowship Winter School brought together 86 students from 14 Indian states.

Modules to introduce secondary school students to the World of Work, and to orient teachers for professional learning are under development.

Policy and Advocacy

The centre is invested in strengthening existing state aided and private systems of teacher education by working with the central and state governments.

- Working with the NCTE, NITI Aayog and NCERT
- Contributing to the UNESCO teacher task force
- Working on curriculum development, evaluation studies, teacher professional development, policy and practice

1. **UNESCO 'No Teachers, No Class'- State of the Education Report, 2021** Prepared by CETE, and commissioned by UNESCO Regional Office, New Delhi, this reportprovides comprehensive information on the teaching sector in India, its achievements, and areas ofconcern, and recommends steps to be taken by policymakers in improving the industry. This is thefirst of our biennial report on the state of the sector.
2. **RAP Curation Rubric** to Assess the Pedagogical Potential of Open Educational Resources (OERs) for Use on Interactive Flat Panel (IFP) Devices in Schools (2023) is a framework that can guide educators and education departments in selecting resources for use on IFPs.
3. **Impact Assessment of "Capacity Building of Teacher Educators and Teachers on Constructive Teaching and Learning with Technology (CTLT)", 2023** was prepared by CETE to consolidate the findings and impact of the large scale TPD program on "Capacity Building on Leadership in Constructive Teaching and Learning with Technology", implemented by CETE in 2021-22, with support from UNICEF, India. Under this teacher professional development program, the online certificate course on CTLT was offered to around 3700 teachers and teacher educators across 7 Indian states and 1 Union Territory, with objective to create leaders/ master trainers in the CTLT approach. This report consolidates the impact assessment of the course, experience and learnings of the participants and respective state governments, along with recommendations for adoption and scaling of such a robust continuous teacher professional development model to leverage CTLT.
4. **The Report on Digital Transformation in Higher Education in South Asia** was prepared by CETE, with institutional support from the International Center for Higher Education Innovation under the auspices of UNESCO (UNESCO-ICHEI). It examines digital transformation in higher education across South Asia, focusing on Bhutan, India, the Maldives, Nepal, Pakistan, and Sri Lanka. The study assesses technology integration in higher education within the context of critical trends, challenges, and opportunities in the region.

About EdTech Research Group, CETE, TISS

The EdTech Research Group at CETE aims to construct critical knowledge, equitable and sustainable solutions in the areas of education technology through cutting edge research, and innovative teaching and practice. The group of faculty and researchers, work in the areas of:

- Teaching and Professional Development in the Educational Technology context.
- Field Action Projects that focus on sourcing, curating, and creating tech-based educational resources, enabling students and teachers to access, adopt and adapt these teaching-learning materials and resources, and studying their impact.
- Research Projects and small studies focusing on design-based research of edtech tools, resources programmes, research-based development of metrics, rubrics, or courses for major concepts and assessments in education fostered by education technology
- Understanding how to leverage communities of practice on Instant Messaging Applications Publications, Dissemination and Outreach of what Education Technology means to different stakeholders through publications and events.

Research

Curating and Creating resources for various initiatives that CETE is engaged in such as for Rachana and for Interactive Flat Panels (IFP) with particular reference to the Telangana State Board.

Field Action Projects

- Connected Learning Initiative Phase 3 (CLIx-3) in Mizoram
- Technology Enabled Learning for Teachers and Adolescents in the 21st Century (TELTA-21)
- Resources for Interactive Flat Panel (IFP)

Connected Learning Initiative Phase 3 (CLIx-3) in Mizoram

Connected Learning Initiative (CLIx) continued its presence in Mizoram thanks to the HCL Foundation Grant awarded to CETE in 2023. The project, Connected Learning Initiative 3.0: Mizoram- Support Unit for Integration of Technology in Education (MZ-SUITE) leverages existing partnerships and past work in Mizoram. The project benefitted 604 students across 20 schools.

In addition, the engagement with Tamil Nadu SCERT has been ongoing since 2022 with respect to the integration of CLIx English Modules with customization and selection to suit the Mozhighal language lab requisites and the Tamil Nadu context.

Telta-21

Technology Enabled Learning for Teachers and Adolescents in the 21st Century aims to leverage emerging technologies and pedagogies to transform teaching and learning, school culture and communities in the M-Ward of Mumbai city. Last year it reached 63 Mumbai Municipal schools, more than 6000 students and 200 teachers, enabling them to use project-based learning (PBL) with technology for deeper, connected, and authentic learning in subject classrooms and school camps. In 2024, TELTA-21 launched hybrid digital badges for students tracking and motivating their progress in PBL with emerging technologies. The team's efforts were recognized by Capgemini as the Best CSR Project in STEM education for the year 2023.

IFP

The Telangana IFP OER Curation project, conducted from June 2023 to December 2023, focused on enhancing classroom interactions, inclusivity, and pedagogy by integrating curated Open Educational Resources (OER) for grades 8th, 9th, and 10th. Sponsored by the Government of Telangana, this TISS-SCERT collaboration developed 807 digital resources, with accompanying teacher wraparound materials, across Sciences, Mathematics, Social Sciences, English, Telugu, and Urdu. A comprehensive curation framework (RAP Curation Rubric) with 15 indicators across relevance, affordance, and pedagogical practice was developed to assess the quality of the resources. These resources have been implemented across 4000 secondary schools, to aid student learning outcomes and teacher professional development. esources for Interactive Flat Panel (IFP).

About CSF

Established in 2012, Central Square Foundation (CSF) is a non-profit organisation dedicated to enhancing the learning outcomes of all school-going children across India through system-led reforms. CSF's initiatives span innovation and policy to practice and focus on learning impact at scale. It drives impact across four verticals: Foundational Literacy and Numeracy (FLN), EdTech, Early Childhood Education (ECE), and School Governance, collaborating with MoE and 12 State governments across India.

In EdTech, CSF is focused on integrating technology to enhance learning at home and in school. This includes supporting high-quality learning solutions for low-income communities, generating evidence on technology in education, supporting governments in implementing EdTech programs and creating public goods to strengthen the EdTech ecosystem.

This research report 'Studying Engagement with Digital Classrooms in Secondary Government Schools in Madhya Pradesh' was conducted by the Centre of Excellence in Teacher Education (CETE) at Tata Institute of Social Sciences (TISS) and commissioned by CSF to examine students and teachers' engagement with Multimedia e-content-based learning (MME) under the Digital Shala Programme (DSP) by Muskaan Dreams in secondary government schools across two districts in Madhya Pradesh.

About Muskaan Dreams

Muskaan Dreams is a non-profit organization dedicated to transforming education by integrating technology into government schools to enhance learning outcomes for children. Our vision is a world where every child leverages technology to thrive in the evolving digital future. We believe that empowering teachers and students with digital tools can bridge learning gaps and unlock opportunities for a better future. Since our inception, we have impacted over 500,000 students, reached 3,000+ schools, and trained 10,000+ teachers across six states in India. Despite significant investments in education, many government schools lack functional ICT labs and digital learning facilities, leading to limited ICT integration in teacher training. At Muskaan Dreams, we address these challenges by working closely with government stakeholders, leveraging existing infrastructure, and ensuring technology is effectively utilized in classrooms at scale.

Program Overview:

Muskaan Dreams operates two flagship programs aimed at improving the quality of education through technology-driven interventions:

Digital Shaala: This program focuses on transforming teaching and learning experiences by integrating technology into classroom instruction. It provides access to high-quality digital content, equips teachers with the skills to use technology effectively, and incorporates data-driven approaches to track progress. Our goal is to build a robust digital learning ecosystem that enhances student engagement and academic outcomes. The program is designed to work within the public education system, ensuring sustainability and large-scale adoption by leveraging government partnerships and data-driven decision-making.

Innovators of Tomorrow: This program aims to empower students with 21st-century skills by fostering STEM education, computational thinking, and problem-solving abilities. Through a hands-on learning approach, we introduce students to coding, robotics, and digital literacy, preparing them for future careers in the digital economy. We also work on advocacy efforts to integrate computer science education into government school curricula. The program focuses on equipping both students and teachers with essential digital skills, creating exemplar schools that serve as models for effective computer science education in government institutions.

Both programs are designed to create lasting systemic change by ensuring technology adoption at scale through government collaboration and continuous program improvement. Our efforts have led to 68% of teachers reporting improved teaching effectiveness using digital tools, and 76% of students expressing increased confidence in STEM-related learning. By the end of FY 2025-26, we aim to impact 1 million students.

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Executive Summary

This report explores students' and teachers' engagement with the Digital Shala Program (DSP) in secondary government schools across two districts in Madhya Pradesh. The primary objectives were to study how DSP was used or integrated within teaching and learning activities in the classroom, its perceived value by educators and students, and the challenges encountered during its implementation. The program uses an Android-based system on a flat-screen TV as the basic infrastructure, enabled by Multimedia e-content-based learning (MME) in the form of videos by TicTac Learn. The Android-based system allows teachers to display multimedia e-content on other online platforms, like YouTube.

Key Research Questions

1. What value do teachers and students ascribe to the DSP?
2. How is DSP content used in classrooms?
3. What are the motivators and obstacles in adopting DSP?
4. How sustainable is the DSP in the absence of ongoing support?

Methodology

The sample included 64 schools, categorised into two groups: schools with ongoing DSP support from the implementation partner (SIP), and schools with discontinued support (SNP). A total of 21 SIP and 43 SNP schools participated in the study. The study adopted a mixed-methods approach, including quantitative data from teacher surveys (73 teachers) and DSP platform usage statistics per school (17), qualitative data from the interviews of the School Head (54), teachers (77), and district administrators (2), focus group discussions (FGDs, 51) of students, and classroom observations (CROs, 53). The research tools were developed and revised after conducting a pilot test.

Data Analysis

The data analysis involved specific methods tailored to each dataset. Quantitative data were processed using statistical tools like SPSS, while MAXQDA was employed to analyse large qualitative datasets. Additionally, data triangulation helped identify patterns among the different datasets. The key results from the FGD, CRO, teacher, and HM interviews were organised under nine major themes: Usage, Access, Participation, Value-Benefit, Choice and Decision-Making, Challenges, Monitoring and Support, Home and Parental Perception, and Suggestions.

Key Findings

- **DSP Active and Non-Active Schools:** The study revealed that 19 of the 21 SIP schools were active in DSP use, compared to only 22 of the 43 SNP schools. Reasons for discontinuation of DSP-TV in Inactive Schools were related to electricity and other technical difficulties, and lack of support in operating DSP-TV. Teachers also requested training on the use of DSP-TV.

  The fact that approximately 50% of SNP schools were actively using DSP may be attributed to several factors identified in the data that contribute to its sustainability. These include ease of use and accessibility, high teacher self-efficacy, autonomy for teachers to incorporate additional videos, the learning value recognized by all stakeholders, and its compatibility with teacher-directed instructional methods.

- **Usage Frequency of DSP-TV in Active Schools:** Backend data from 17 SIP schools for the entire year showed that TicTac Learn videos were played for a very limited period, while teachers and students reported use of videos was much higher. The backend data was limited to TicTac Learn use. However, use in two to three months (July and August) showed peak usage across schools; these months also had the highest working days in the school academic calendar. The reported usage frequency by students and teachers

during the week matched the actual use in the backend data for July and August for both SIP and SNP schools. There was no notable difference in usage frequency between active SIP and active SNP schools.

- **Type of Use:** DSP-TV was primarily used to play educational videos, with teachers also integrating platforms like YouTube, e-Pathshala, and government programs like *Chandryan and Mann ki Baat*. The DSP-TV was mostly operated by teachers or teachers with students. 6th-8th grades exhibited a greater number of videos played and longer viewing durations compared to grades 9 and 10. Science videos were used more than Math videos
- **Gender Disparities:** All observations indicated that in co-ed classrooms, the remote was always operated by the boys. Although female teachers reported higher use and confidence in DSP Tv content use in usage, students reported a lack of competence in DSP operation by female teachers.
- **Teaching Method:** Classroom Observations indicated that the predominant teaching method in these classrooms was directive, the interaction was limited to closed-ended questions, and teachers often paused videos to explain or ask close ended questions. In the interviews teachers indicated that they aimed for better understanding of concepts and improving memory and retrieval of concepts. In DSP-TV classrooms, few teachers used textbooks or workbooks, as teachers reported difficulty juggling between resources. This could also be due to a lack of preparation in using DSP with other learning materials simultaneously while teaching. The data showed very few teachers (8% of teachers; 4 out of 50 teachers in SIP) reported creating lesson plans for video classes.
- **Teacher Competence and Training:** The study revealed that teachers had minimal or no formal training in using DSP-TV in the classroom. About 60% of teachers (12 SIP and 18 SNP out of 50) expressed the need for training to effectively integrate DSP-TV into lesson planning. Interestingly, younger, less experienced teachers—particularly those in rural areas or teaching elementary grades—demonstrated higher digital competence. However, a few experienced teachers were observed incorporating additional resources and activity-based learning alongside DSP-TV.
- **Value of DSP-TV:** Teachers and Head Masters indicated that DSP-Tv was effective in engaging students, improving concept understanding, providing authentic examples from real work and enhancing school pride. Science videos were more popular than Math videos due to their storytelling format. Students and teachers demanded updated, comprehensive, more subjects and more engaging content. Teachers and students (17% FGDs) also saw DSP-TV as a temporary replacement for teacher presence when they were absent or busy. Students unanimously agreed that DSP-TV cannot permanently replace teachers. Most parents valued the use of DSP-TV in teaching, though a few expressed concerns about its focus on entertainment.
- **Key recommendations by the stakeholders:** Infrastructure Improvement: Upgrading existing infrastructure and ensuring better ergonomics for effective classroom integration.Technology Updates: Future enhancements in infrastructure, technology solutions, and applications to support DSP-TV use. Teaching Methods: Strengthening instructional strategies to maximize the effectiveness of DSP-TV. Holistic Professional Development: Providing comprehensive training in pedagogy, critical pedagogy, and teacher agency. Social Awareness: Encouraging discussions on relevant social issues within DSP-TV content. Video Content Enhancement: Refining and updating DSP-TV materials to align with curriculum needs.
- Lesson Preparation Strategies: Supporting teachers in planning lessons that seamlessly integrate DSP-TV with traditional instructional methods.

1. Introduction

Classroom engagement in any academic activity is a crucial aspect of learning and is widely studied across the world. Engagement indicates a student's level of involvement, interest, and active participation in lessons, activities, and conversations, which is crucial for their overall learning experience and academic performance (Fredricks et al., 2004; Reschly & Christenson, 2012). A series of studies have listed its advantages including greater learning achievement, higher motivation, better classroom behavior, increased inclusion, and improved academic performance (Fredricks et al., 2004; Heddy & Sinatra, 2013; Johnson & Sinatra, 2012; Tytler & Osborne, 2012; Schunk & Mullen, 2012; Reschly & Christenson, 2012; Wang & Degol, 2014; Sinatra et al., 2015; Ashwin & McVitty, 2015; Kareem et al., 2022).

Though there is a lack of consensus, there are several conceptualizations for student engagement. A 1985 review paper by Mosher and MacGowan claims to be one of the first papers that directly conceptualized or measured student engagement in secondary schools (Mosher & MacGowan, 1985). The authors convey their concern about the lack of systematic research on engagement and describe engagement as *"a complex state of perception or mind, and a way of acting in school."* The paper proposes that altered interactive factors such as society, family, student, and school characteristics could increase *"participation"* in secondary school programs. The paper itself found only two prior cases of use of the term *"engagement"* and mentions one of them: *"Engagement exists when students are participating in the activities offered as part of the school program. Disengagement may be defined as the extent to which students refrain from participating in the activities offered as part of the school program"* (Natriello, 1984). Both these definitions are centered around student behavior or activity in school.

Twenty years later, Fredricks et al. (2004) defined engagement as a multidimensional construct, involving aspects of students' emotions, behavior (participation, academic learning time), and cognition. The definition of engagement has evolved over time and currently there is a myriad of research literature exploring various layers of engagement. Recent studies view student engagement as more than involvement in academic activities (Christenson et al., 2012). As learners, students have to be engaged in varying aspects of the school and classroom such as academic and social aspects of school life (Appleton et al., 2008).

This literature review shows that various terms have been used by researchers to define engagement, such as student engagement, academic engagement, school engagement, and learner engagement (Reschly & Christenson, 2012; Nkomo, 2021). This study will be using the term *"Learning Engagement"*, the definition for which will be provided in the subsequent section. In their comprehensive review of the literature on engagement, published in the Handbook of Research on Student Engagement, Christenson et al. (2012) found various interpretations of student engagement. Therefore, the authors recommend that researchers provide their definition and conceptualization of student engagement for each study. They emphasize the importance of not only defining student engagement but also using measures that align with the specific definition of engagement. Furthermore, they stress the importance of specifying the context of the study, as student engagement is best understood when placed in a context. Kearney and Maakrun (2020) also share a similar opinion. The authors explain that engagement is a complex and multilayered construct that can have varied meanings depending on the context, and suggest that it is important that engagement is defined for a purpose and that purpose is understood by all stakeholders within a given study.

1.1 Features of Engagement

i. Engagement is Multidimensional

One of the key points agreed upon by most engagement research scholars is that engagement is a multidimensional construct. Fredricks et al. (2004) add a layer by stating that

the engagement consists of three components- behavioral, cognitive,and emotional (Christenson et al., 2012). Bond and Bergdahl (2022) argues that learning exists in a social reality and suggests social engagement as the fourth dimension. A brief explanation of each of these components is given below.

The behavioral engagement refers to the observable involvement of students in academic, social, and extracurricular activities. This entails positive behavioral components of student engagement (non-disruptive activities or abiding by established regulations), for example, getting involved in class activities, completing given assignments, interactions with teachers and peers, and regular attendance which is also a strong and consistent predictor of students' educational outcomes (Fredricks et al., 2004; Greenwood et al., 2002).

Cognitive engagement refers to a student's readiness to take on the learning task independently, as demonstrated by the learner's efforts to fully understand the subject matter. According to Appleton et al. (2006), cognitive engagement is typically operationalized by tracking less observable and more internal factors such as intellectual curiosity, relevance of schoolwork to future endeavors, self-regulation, value of learning, personal goals and autonomy. Bond and Bergdahl (2022) also consider staying focused, effort taken by the students to master the subject and reflection, as indicators of cognitive engagement. Cognitively engaged students often go beyond the requirements because they enjoy being challenged (Capella et al., 2013).

Finally, emotional engagement is the expression of students' emotional responses (good or bad) to learning, such as expressing curiosity, belongingness, boredom, or anxiety towards their learning environments and a sense of community within the school (Nkomo et al., 2021, p.10). It is responsible for the level of students' negative or positive responses toward teachers, peers, school, and academic activities (Schmidt et al., 2018). It enhances the learning process by instigating positive emotions among learners like interest, curiosity, wonder, passion, creativity, joy, and engagement (Osika et al., 2022).

In addition to this, there are also views of engagement as a two and four-dimensional construct (Appleton et al., 2006). The one constant across these conceptualizations is that it is multidimensional (Appleton et al., 2008). In recent years, social engagement has been added to the list as the fourth dimension (Bergdahl, 2020; Bergdahl, 2022; Bergdahl & Hietajarvi, 2022; Bond et al., 2021). The fourth dimension, social engagement, refers to social relatedness among students which is an important impact factor in their learning engagement (Bergdahl, 2020). Bond and Bergdahl (2022) argue that social engagement plays a crucial role in learning. According to the Self-Determination theory, people share a universal, innate need for social relatedness, a sense of being connected with others (Ryan & Deci, 2017). To participate successfully in the classroom, learners need to feel comfortable interacting with others, trying out new things, and giving and receiving peer feedback (Bergdahl & Hietajärvi, 2022). Learners are more likely to be engaged in learning when this psychological need for relatedness is met through their interactions (Sá, 2023). Therefore, collaborating and interacting with peers and teachers and asking for help are indicators of social engagement (Bond & Bergdahl, 2022).

Behavioral, cognitive, emotional, and social components of engagement are dynamically interrelated and mutually affect each other. The combined picture of these four dimensions under the umbrella of engagement is significant and more valuable as it may provide a richer characterization of learners than any one individual factors could provide. Focusing on only one dimension can limit the understanding of student engagement (Fredricks et al., 2004; Nkomo et al., 2021). This study will incorporate all four aspects of student engagement where applicable. However, due to their interconnected and overlapping nature, the research tools will not differentiate between these dimensions.

ii. Engagement is Malleable

One of the other interesting features of engagement is that it is presumed to be malleable. Fredricks et al. (2004) comment that *"routes to student engagement may be social or*

academic and may stem from opportunities in the school or classroom for participation, interpersonal relationships, and intellectual endeavor." This implies that engagement is influenced by the context of learning- home, school, peers, teachers, and community. The interaction of the individual with the contextual factors and response to the environment could influence learning (Christenson et al., 2012; Reschl & Amy, 2012; Wang & Degol, 2014; Maguire et al., 2017). Although engagement is conceptualized as an aspect of both the individual and the environment, the educational context is viewed as seminal (Fredricks et al., 2004). Thus the interaction with the parents, teachers, peers, the structural features of the school, and reaffirmations of their developmental needs in learning contexts would decide student engagement. Further, school is not only a place for academic engagement but also a place where students socialize with friends and participate in non-academic activities. Focusing only on academics overlooks the role of the school as a development context, where students are involved in various academic, social, and extracurricular activities that shape their identities as capable learners integrated into society (Wang & Degol, 2014). Christenson et al. (2001) argued, *"If students are engaged with school and learning, over time, they should complete school with academic and social competence"* (Christenson et al., 2001; Reschly & Amy, 2012). Several other studies point out the significance of contextual factors, which will be discussed below.

In summary, engagement can be described as a multifaceted concept, encompassing students' behavior, emotion, and cognition, which are interconnected and involve an exchange between the individual and the surroundings.*"Engaged students find learning meaningful, and are invested in their learning and future. Student engagement drives learning; requires energy and effort; is affected by multiple contextual influences"* (Christenson et al., 2012). By conceiving student engagement as a context-dependent construct, researchers can find aspects of the environment that can be changed to improve student engagement and learning (Wang & Degol, 2014).

1.2 Contextual Factors Influencing Engagement

Student engagement does not occur within a vacuum (Bond & Bergdahl, 2022); it is influenced and impacted by many contextual factors (Quin, 2017). A series of studies have pointed out several factors influencing engagement.

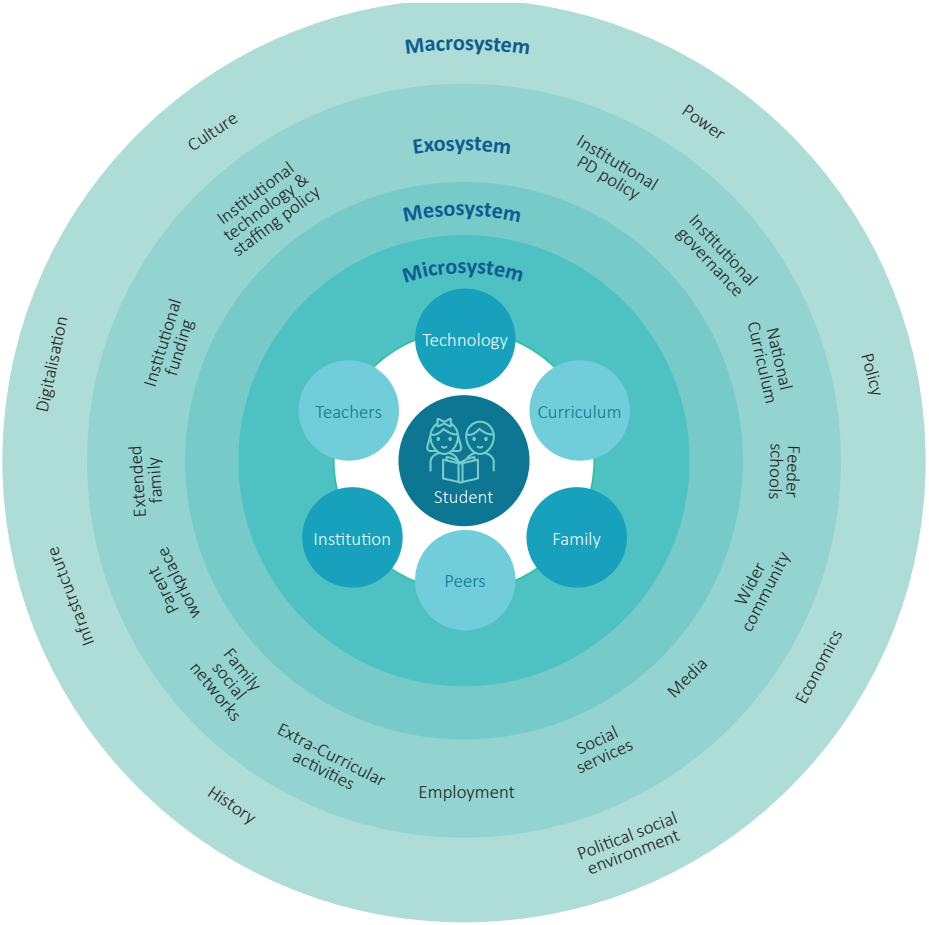
Hollister et al. (2022) mentioned three key classroom interactions to understand the factors influencing student engagement: student-student interactions (Martin & Bolliger, 2018), student-instructor interactions (Swan & Shih, 2005), and student-content interactions (Abrami et al., 2012). The Community of Inquiry framework (Garrison et al., 2000) contributed to a deeper understanding of these cooperative activities that foster engagement by highlighting the significance of teacher presence, social presence, and cognitive presence in promoting good educational experiences. While Self-Determination Theory (Deci & Ryan, 1985) recognizes the role that teachers and peers play in influencing levels of intrinsic and extrinsic motivation, motivation is instead seen as an antecedent to engagement, as the intent that energizes behavior (Reschly & Christenson, 2012).

The political, social, and educational environments, as well as interpersonal dynamics in the classroom, are among the sociocultural elements that have the most influence (Kahu, 2013). The development of a feeling of community, in particular through social interaction with classmates and teachers, is frequently linked to better learning outcomes (Redmond et al., 2018).

Bond (2019) put out a "bioecological model" (Figure 1) that takes into account learning as a social reality and allows interaction to be tackled at the macro, meso, and micro levels. This model places "the student at the center of the microsystem, nested within a system of intertwined milieus; the mesosystem, representing interactions between the micro and ecosystems, as well as between microsystems; the ecosystem, including wider social structures impacting on the learner;

and the macrosystem, encompassing the wider political, cultural, economic, and legal systems, in which all systems are located." The microsystem encompasses the immediate environment of students, which can be their home or classroom, and involves interactions with teachers, peers, meaningful tasks, the institution, family, and technology. These external elements are essential in influencing students' feelings of connectedness, well-being, and engagement. This study used Bond's bioecological model to develop a framework with learning engagement, the student being at the center of the framework and other contextual factors influencing engagement at various levels.

Figure 1.1
Bioecological model of student engagement (Source: Bond, 2020)



1.3 Relationship Between Student Engagement and Digital Technologies

Educational institutions are rapidly deploying various forms of digital technologies into their learning environments. A less-explored topic is a synergy between learning engagement and digital classrooms (Nkomo et al., 2021, p.22), even often misunderstood as well (Kearney & Maakrun, 2020, p.1). Often, engagement in the technical world simply means to be present or be involved in something (Kearney & Maakrun, 2020).

Kearsley and Shneiderman (1998) developed a framework for technology-based teaching and learning, based on the principles of *"Relate, Create, and Donate,"* calling it Engagement Theory. They described engaged learning as consisting of active cognitive processes, such as problem-solving and decision-making, based

on meaningful and authentic collaborative activities. For example, engagement can be achieved through collaborative activities such as a class exercise involving pairs of students or through a multi-year curriculum development project involving many teams. Project-based assignments with a focus on real-world issues (create) help students articulate and solve problems and make meaningful contributions beyond the classroom (donate). The authors argue that while engagement is possible without technology, technology can enhance and facilitate engagement in ways that would have been challenging to achieve otherwise. Technology could create a learning environment that promotes the type of creativity and communication essential for fostering engagement.

There are studies that argue on an effect on the engagement of learners using technology (Annetta et al., 2009; Tiernan & O'Kelly, 2019). Schindler et al. (2017) reviewed literature related to web-conferencing software, blogs, wikis, social networking sites, and digital games to study their influence on student engagement. The author suggests that technology should be considered a factor that influences student engagement in existing models. Several studies that suggest the use of animated videos supports the use of diverse teaching strategies and learning methods that can promote diverse thinking skills among students (Barak, 2011; Tiernan & O'Kelly, 2019). Animated videos can contribute to a better understanding of the learning material by enabling the creation of mental representations of concepts, phenomena, and processes. This study found that students exposed to animated movies as part of their Science education showed enhanced comprehension and application of Science concepts and phenomena, in contrast to students who solely relied on textbooks and still images.

Several authors also conveyed their concern about a lack of shared understanding of what constitutes student engagement when it comes to digital technologies. Henrie et al. (2015) review how student engagement has been measured in technology-mediated learning experiences and provide their concern over lack of cohesion around definitions, models, and operationalization of student engagement. A review by Nkomo (2021) highlights similar trends, noting that research on student engagement primarily focuses on its impact on class attendance or video views. Moreover, most studies rely on self-reported measures like questionnaires, which the author critiques as insufficient. The review suggests addressing multiple factors such as the economic, social, demographic, cultural, and academic background, and utilizing multiple datasets such as trace data (backend / activity data), for an understanding of student engagement in environments involving technology.

Tondeur et al. (2009) add that, when it comes to Information and Communication Technology (ICT) integration in schools, many of the research studies are centered on critical teacher characteristics associated with educational ICT use, such as teachers' innovativeness and their computer experience. Though teacher characteristics are relevant, cultural characteristics (i.e. leadership, goal-orientedness, and innovativeness) and structural characteristics (ie; infrastructure, planning, and support) are also significant. Tondeur et al. (2009) found that schools with adequate ICT infrastructure, planning, and supportive leadership, coupled with strong teacher support, exhibited higher ICT integration, directly linked to increased teacher ICT use. The study by Bradley & Russell (1997) noted that teachers who worked in schools that provided support and training on computer technology were found to be more competent computer users and experienced less anxiety in using computers than teachers working in less supportive environments. Ertmer (2005) suggested that providing continuous support to teachers as they develop confidence and competence with technological tools would result in classroom practices that facilitate the use of technologies and lead to increased student learning. This study also recommends developing small communities of practice, where teachers can jointly explore new teaching methods, tools, and beliefs, and support each other.

Another literature review in the area of engagement cites (Taylor & Parsons, 2011) a technology-rich learning environment as a significant factor for improving learner engagement. However, the definition of a technology-rich environment provided in the paper, makes technology more than a mere factor in improving engagement. The term *"rich learning environment"* is defined as, it *"not only includes physical devices, such as experiment kits or computers, but also the teaching technique, the type of activity pupils engage in, and the method of assessment"* (Taylor & Parsons, 2011; Barak & Doppelt, 2002). Taylor & Parsons (2011) suggests that there is more to look into while placing technology under the umbrella of engagement. A study conducted among school students in Ireland indicates a strong preference for video content among both students and teachers (Tiernan & O'Kelly, 2019). The visual nature and the ability of video content to provide real-life examples, allows students to visualize information and bring subjects to life by giving examples from which they can learn. The study finds that video content works well as an introduction and conclusion to topics across subject areas, however, attention needs to be paid to how and when questions are used, with pausing video for discussion being the preferred option. Tiernan & O'Kelly (2019) points out that choosing appropriate content matters; students recognize its relevance and how it links to the topics under discussion. The previously mentioned study on animated videos for students also shares a similar finding (Kearney & Maakrun, 2020). The study suggests that for teaching Science via animated movies, animated movies should be an integral part of the curriculum and the learning materials. Further, the study concludes that animated movies can be applied to diverse teaching strategies, enhance diverse learning methods, and promote diverse thinking skills. It recommends that it be presented as an introduction to a topic, while teaching a topic, or as a summary to conclude the topic and thereby for constructing meaningful conversations.

Another study by Tiernan & O'Kelly (2019) recommends that *"teachers must review and develop their own pedagogy, to allow students to actively engage with digital technology and to utilize it as an effective learning tool".* Nkomo (2021) has a similar suggestion; though technology offers multiple solutions in an educational context, attention must be given to these methods' pedagogical appropriateness. Further, the study found no transparent pedagogical approach to using social media and recorded lectures to enhance the learning of students.

In summary, considering multiple factors and sources of data is significant for understanding student engagement in environments involving digital technologies. Technology plays an important role in improving engagement. At the same time, the appropriateness and relevance of technology, the content, and the pedagogy to be chosen are also significant. It's worth noting that, NEP 2020 also mentions the teacher's role in a digital classroom in facilitating active student engagement with the digital content. NEP also emphasizes changing pedagogy, training for teachers, and setting up standards of content, technology, and pedagogy for online/digital teaching-learning (NEP, 2020, p.60).

1.4 Technology Adoption in Education

Technology adoption refers to the *"acceptance, integration, and embracement of new technology"*(Granić, 2022). A variety of models and theories have been proposed to explain the idea of technology adoption and the factors influencing it. Among them, the Technology Acceptance Model is the widely explored model with two primary factors influencing an individual's intention to use new technology: perceived ease of use and perceived usefulness (Granić, 2022). Perceived usefulness is the extent to which a person believes that using a particular system would enhance their job performance. Perceived ease of use, refers to *"the degree to which a person believes that using a particular system would be free of effort"* (Granić, 2022). The relationship between perceived usefulness and usage is stronger than the relationship between perceived ease of use and usage. Users are more inclined to adopt an application because of the functions it offers rather than how easy or difficult it is to use. Users are willing to

deal with some level of difficulty in using a system if it provides essential functionality. Thus, even if a system is easy to use, if it does not perform a useful function, users may be discouraged from adopting it (Davis,1989). Self-efficacy, (an individual judgment of one's capability to use an application), subjective norm (the degree to which an individual believes important people around will support or not use the application), perceived enjoyment (the extent to which the activity of using the computer is perceived to be enjoyable in its own right, apart from any performance consequences), system quality and system accessibility along with technological complexity, and finally, the perceived playfulness (which operationalizes the question of how intrinsic motives affect the individual's acceptance of technology) has a significant influence on perceived ease of use and usefulness (Davis,1989, Granić, 2022).

One of other widely accepted models, Unified Theory of Acceptance and Use of Technology, considers performance expectancy, effort expectancy, social influence, and facilitating conditions as direct determinants of user acceptance and usage behavior (Behavioral Intention). Performance expectancy is defined as *"the degree to which an individual believes that using the system will help him or her to attain gains in job"* such as pay or promotions. Effort expectancy is the *"degree of ease associated with the use of the system."* Social influence, a construct with subjective norms as one of the root constructs, is defined as the *"degree to which an individual perceives that important others believe he or she or they should use the new system",* i.e. influence and support the teachers receive from their colleagues and administration. Finally, facilitating conditions are defined as the *"degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system."* This includes the training, guidance, assistance and other resources available for the individual (Venkatesh et al., 2003).

Granić (2022) identifies gender and age as moderating factors for technology adoption in education. As per the author, gender moderates the effect of perceived ease of use and social norms on behavioral intention, whereas age moderates the effect of perceived ease of use, perceived usefulness and self-efficacy on behavioral intention. The perceptions of computer self-efficacy and ease of use more strongly influenced women.

In a nutshell, the choice of adopting and not adopting a technology, depends on the perceived ease of use and usefulness, behavioral intention and other moderating factors. This suggests, teacher's self-efficacy, support received from colleagues and administration, training and assistance obtained, resources and infrastructure available, quality, accessibility, technological complexity and the perceived playfulness would determine whether the technology is used to the maximum extent.

1.5 Digital Infrastructure in India

The India Report on Digital Education 2021 states that the genuine ICT-in-education revolution will happen when students and teachers in government schools integrate digital technologies in their classroom environments. It emphasises on the priority of increasing student engagement in the classroom and the use of technology. However, in India there are few digital classrooms as evident in the most recent data from the Unified District Information System for Education (UDISE 2021-2022) that shows only 24.4% of all government schools have internet connectivity and only 37.7% have computers (UDISE,2021-22). Additionally, just 10% of Indian schools have functional computers for use in the classroom. NEP 2020 also admits that a larger section of the population still has limited access to technology (p.59).

The current national focus in India is to provide quality education to children after reaching universal enrolment (ASER, 2022). India will have a huge population of young people over the next decade, and our ability to provide them with quality schooling will decide the country's destiny in the future (NEP, 2020, p.3). However, access to quality education is a serious challenge, as educational gaps in accessibility and high-quality education continue. Children in government schools lack basic learning facilities (ASER, 2018),

and parents typically connect public schools with low-quality learning processes and facilities, frequented by students from marginalized communities and economically disadvantaged families (UNESCO, 2022, p.16). This contradicts India's commitment to the global education development agenda, as stated in SDG 4, which aims to *"ensure access to high-quality education for all and enhance a lifetime of learning experiences for everyone"* by 2030.

In this situation, ensuring that every child has access to high-quality education through affordable, dependable, and context-sensitive digital education can promote equal opportunity for girls and boys and minimize inequities (Sustainable Development Goals Fund, 2018). The possibilities of integrating technology in learning have undergone a revolution in the last decade, and have accelerated in the recent years. The use of digital education technology helps students develop core 21st-century skills including teamwork, problem-solving, and global awareness (Pineida, 2011). There is literature pointing to the need to clearly define the nature of 21st-century skills and analyze the themes emerging from prominent organizational frameworks regarding the knowledge and skills required for active engagement in the 21st century (Dede, 2009). Building on this, the NEP 2020 envisioned revolutionary changes in digital education over the last decade – in terms of devices, internet connectivity, computing architectures, and experience.

However, digital learning initiatives alone are not sufficient; conducting extensive and timely research, encompassing both technological and educational aspects is essential to provide teachers with critical insights into the most effective methods of student learning (NEP, 2020, p.56). Efforts to bridge the digital divide encompass more than simply expanding communities' access to ICTs. A significant emphasis should be directed towards education and training, targeting both users and instructors who are utilizing the technology (Smith, 2015).

Therefore, it is crucial to assess the extent of the problem concerning the effective implementation of digital learning initiatives and to gain insights into the engagement of teachers and students within the educational system. It is of utmost importance to comprehend the acceptance of digital interventions and the factors contributing to their perceived sustainability, which in turn influence the quality of engagement among teachers and students. Consequently, in light of this understanding, the proposed study aims to investigate the engagement of the Digital Shala Programme (DSP) initiated by Muskaan Dreams in Madhya Pradesh as part of a pilot project. The research will study the engagement among students and teachers, examining the various factors that either facilitate or hinder its current adoption and utilization of DSP in the districts of Indore and Gwalior in the State of Madhya Pradesh.

1.6 Digital Initiatives in Education – Madhya Pradesh

The Madhya Pradesh government has implemented several digital initiatives to enhance education. Some of them are Wdiscussed in the following section:

ICT@School, an initiative launched in 2004 under the Rashtriya Madhyamik Shiksha Abhiyan (RMSA) aims to integrate Information and Communication Technology (ICT) into the educational system and to transform traditional education by empowering students through widespread use of new ICT technologies (ICT @ SCHOOL (mp.gov.in)) This program focuses on setting up computer labs in schools, providing digital learning resources, and training teachers and students in using these technologies effectively.

Vimarsh Portal (2017), also known as Rashtriya Madhyamik Shiksha Abhiyan Portal (RMSA Portal), is an online educational platform launched by the Directorate of Public Education in Madhya Pradesh. The Vimarsh portal hosts Professional Learning Community PLC (PLC), an online platform for teachers and education functionaries to share experiences, innovations, and solutions in various educational forums. This is designed for the entire state of Madhya Pradesh, however it is mostly CM RISE Schools that are actively using it. The platform provides access to various

educational resources for teachers such as videos on innovative teaching methods, various activities in schools, exam related materials, lesson plans etc. Vimarsh MP SED is a YouTube channel with 1,676 videos, offering a wide range of educational resources. Recent videos focus on Model CM RISE schools in Madhya Pradesh, highlighting activities like morning meetings, innovative teaching methods (e.g., Think-Pair-Share), and events like Career Melas. The channel features toolkits, routines, and lesson plans for CM RISE schools, along with animated videos on child protection and life skills under *"Umang Animatics."* Additionally, there are numerous curriculum-based videos for grades 9 to 12, covering subjects like English and Social Science, especially created during the COVID-19 pandemic period.

LeapForWord, an English literacy program, launched in 2019 is being implemented throughout Madhya Pradesh, in collaboration with Rajya Shiksha Kendra. The LeapForWord team has partnered with Rajya Shiksha Kendra and hosts certificate courses for government schools' English teachers. LeapForWord has a web based application where they provide English Literacy Courses to teachers (LeapForWord- Making India English Literate). In Madhya Pradesh, they have trained over 1 Lakh teachers.

The Madhya Pradesh government has also developed **Gyan Pitara,** an online resource, to provide textbooks and videos for classes 3 to 8 across multiple subjects. The initiative is integrated into school education via digital platforms and smart classrooms and aims to make learning more accessible to students in the state by offering digital educational materials. The videos are available in the website as YouTube links and are not curated by any specific department or organization. The Department of Education has partnered with multiple non-governmental organisations (NGOs) to create video content. Currently, the portal for this exists but there are no new video content uploaded after 2015 (Gyan Pitara - Madhya Pradesh Education Portal (mp.gov.in)

DigiLEP, is a digital learning program launched during the COVID-19 pandemic, that uses WhatsApp to provide digital learning materials to students. The DigiLEP program, which relied on WhatsApp, commenced on April 8, 2020. It involved the creation of an extensive network comprising more than 50000 WhatsApp groups to engage with parents and students. WhatsApp groups were used to share educational resources like videos, portable document format (PDFs), and assessments. The digital content was sourced from various places like Digital Infrastructure for Knowledge Sharing (DIKSHA), YouTube, educational websites etc. Sometimes, faculty from District Institute for Education and Training (DIET) also created capsule videos and circulated them. Additionally, the DigiLEP groups introduced a chatbot called "*Humara Ghar Humara Vidyalaya"* that offered multiple choice questions (MCQ)-based assessments for students. This chatbot was later transferred to the SwiftChat app and renamed as *"Swayam Siddhi."* Now, Swayam Siddhi is a prominent digital home learning platform in Madhya Pradesh, providing weekly assessments for students in grades 1-12. It has reached over 1.6 million students.This initiative was further reinforced in Academic Year (AY) 2021-22, with the total number of groups exceeding 1 Lakh. These groups have facilitated connections with over 21 Lakh parents across grades 1-12, through which grade-specific digital learning material was distributed to students daily via WhatsApp (PAB minutes, 2022). Currently, the DigiLEP Whatsapp groups are active in some districts and pockets of Madhya Pradesh. Though most of it is being used by District and Block officials to relay messages, letters and communication to school heads and teachers, some groups still exist between parents and teachers. However, after schools reopened post pandemic, they are not being used to distribute academic or learning content.

The CM RISE Teacher Professional Development Program was designed and launched as a COVID-19 pandemic response, is a flagship programme of the School Education Department, supported by an NGO on the programme strategy and implementation.The programme aims to

maintain the continuity of teacher training and professional development, based on their needs and realities (PAB minutes,2022). The CM RISE Digital Teacher Training programme, launched on May 1, 2020 under the CM Rise Teacher Professional Development initiative, aimed to provide teachers in Madhya Pradesh with digital training modules. These modules were designed to be self-paced and engaging, catering to the needs of teachers in both remote and in-person teaching environments. The training covered topics such as classroom management, foundational teaching skills, teacher mindset, mental health and well-being, and innovative pedagogical practices. Developed in collaboration with state subject experts and partner institutions, the high-quality training modules are accessible on the national DIKSHA platform. The CM RISE Digital Teacher Training has also supported an additional 18 modules of NISHTHA (NCERT's training- National Initiative for School Head' Teachers' Holistic Advancement). These modules can be accessed on mobile phones or computers. Additionally, state-wide YouTube Live trainings were also conducted, related to the digital courses. Upon completion of the courses, teachers receive digitally verified certificates (CM Rise Teacher Professional Development (mp.gov.in)). In Madhya Pradesh, 2,80,000 teachers of government schools have enrolled in the digital education training courses under this initiative with above 95% course completion rates. CM RISE Digital Teacher Training was featured in the "India Report: Digital Education" launched by the Ministry of Human Resources Development (MHRD) in 2020.

The 9000 Chief Minister (CM) RISE Schools Policy (2023), plans to establish 9000 state-of-the-art 'CM Rise' schools across the state, equipped with smart classrooms, modern labs, and sports facilities (CM Rise Schools (mp.gov.in). As per this programme, CM Rise schools are ideally supposed to have one IFP (Interactive Flat Panel) in each classroom.

In addition to these, the state has launched TV and radio classes to reach students who lack internet access (PAB minutes,2022).These initiatives collectively aim to improve educational outcomes and provide students with access to quality education.

1.7 Fund Allocation in Samagra Shiksha Abhiyan

The Samagra Shiksha Abhiyan Project Approval Board (PAB) minutes of the year 2022-23 and 2023-24 provided following information regarding the fund allocated and spent for ICT and digital initiatives, and electrification in Madhya Pradesh.

In 2022-23, the Samagra Shiksha Abhiyan PAB decided to focus on the saturation of certain key aspects over the next 4 years to achieve universal access and affordable quality education for all at the secondary stage, as envisaged by NEP 2020. The report highlighted infrastructure, ICT, and smart classrooms as key areas. It mentioned that all secondary/senior secondary schools, including Kasturba Gandhi Balika Vidyalayas (KGBVs), should be provided with ICT/Smart classrooms with internet facilities, and states and union territories (UTs) should ensure electricity in schools for this purpose.

In the year 2022-23, Rs. 19,848 lakhs were sanctioned for ICT and Digital initiatives. This amount was allocated for purchasing hardware and software, operating systems, smart classrooms, and furniture. The reported spill over for the year was Rs. 18,345 lakhs, with all the activities completed/still in progress. Additionally, Rs. 3,604 lakhs were sanctioned for purchasing tablets for schools administration and students in the same year, and these projects were either in progress or completed by the end of the financial year (PAB Minutes,2023-24). In the year 2023-24, there is a substantial increase in the amount sanctioned for ICT and Digital initiatives- Rs.30,802 lakhs. However, Rs.18,067 lakhs were carried over to the next year with 4,095 out of 6,828 activities "not started" (PAB Minutes,2024-25). Funds were also allocated for electrification, new buildings, and additional classrooms. Rs. 2,593.46 lakhs were sanctioned for the electrification of existing schools up to grade 8 of which 2,217.77 lakhs were utilised. 4 lakhs were sanctioned for secondary schools for electrification under Rejuvenation of Basic

Infrastructure and Overall Cleanliness of Govt. Schools in the year 2022-23 (PAB Minutes, 2023-24). However, the status was reported as *"not started"* for the entire sanctioned amount, resulting in the entire amount being carried over. A similar pattern was observed in the 2023-24 fiscal year. Specifically, Rs. 365 lakhs of the Rs. 375 lakhs sanctioned for electrification upto grade 8 (under Strengthening of Existing Schools) remained unspent and carried over to the following fiscal year. Additionally, the entire Rs. 4 lakhs sanctioned for electrification of secondary schools (under Rejuvenation of Basic Infrastructure and Overall Cleanliness of Govt. Schools) were also unspent and carried over to the following fiscal year (PAB Minutes, 2024-25).

1.8 Background of Digital Shala Programme

The DSP was launched at a few chosen schools in Madhya Pradesh in 2019 by Muskaan Dreams, a non-profit organization focused on EdTech with the goal of closing the digital divide in India. The objective of this project is to equip government schools with Smart television (TV) infrastructure in order to give students in grades 6 to 10 access to successful, inexpensive, practical, scalable, and valuable digital learning opportunities. Schools under the DSP are provided with digital resources and infrastructure which includes Smart TVs and Pen Drives containing educational content TicTac Learn Videos, developed by Central Square Foundation (CSF).

The TicTac Learn videos are available in Hindi and access is not dependent on internet connectivity. Besides, TicTac Learn, Muskaan Dreams' application is installed on these TVs, with an individual teacher profile which monitors usage when connected to the Internet. Continuous support by Muskaan Dreams is extended to selected schools and their teachers and students in terms of teacher training, monitoring of tool usage, assessment of teaching methods, routine inspections, and the provision of maintenance support as required. This onsite support is discontinued after two years of implementation, and the schools are expected to implement DSP by themselves using the given devices (What We Do – Muskaan Dream Creative Foundation, n.d.).

The DSP implementation follows a five-stage process: select, set up, shine, stabilize and sustain. During the 'select' and *'set up*' phases, schools are selected by the Muskan Dream in collaboration with the Madhya Pradesh Government, and the infrastructure is established in the schools. The third phase 'shine' is where the teachers get the training in terms of operating the devices and how to teach using the devices. Once the training is completed, the Programme Associates from Muskaan Dreams visit the schools at regular intervals for monitoring, making it the fourth stage *'stabilize'*. The final stage is *'sustain'* where mostly at the end of the 2nd year the programme associates exit from the school assuming that the teachers are well equipped and trained enough to carry the digital classroom teaching. Post two years low touch in person or virtual support for 2 months are provided. (What We Do – Muskaan Dream Creative Foundation, n.d.).

1.9 TicTac Learn

TicTac Learn videos, is a platform of multimedia e-content, created by Central Squre Foundation (CSF) in collaboration with Google, are accessible online but have been made available offline in pen drives by Muskaan Dreams. The videos are aligned with the NCERT curriculum, and Muskaan Dreams provides access to this content for Science and Math from grades 6 to 10. This multimedia e-content based learning (MME) platform hosts a library of 12,000 short animated videos covering Math and Science topics (with a focus on Science, Technology, Engineering, and Mathematics- STEM subjects) aligned to grades 1-12. The content is available in 5 languages - Hindi, English, Telugu, Odia, and Marathi. The videos can be accessed through the TicTac Learn website, YouTube, and DIKSHA education portal. For each topic, TicTac Learn provides explanatory videos as well as practice questions. The video content aims to be engaging and entertaining while explaining concepts clearly. The videos can help teachers in classroom teaching, or be used by students independently for self-paced learning.

In DSP, the teachers are expected to use TicTac Learn through the Smart TVs for a period of 30-60 minutes (two periods) per day with their students to explain the Math and Science concepts. TicTac Learn was evaluated for its effectiveness by Tulna EdTech Product Evaluations (n.d.) using predetermined scales of *"Exemplary," "Valuable," and "Potential to Improve"* for each of the three criteria: content quality, pedagogical alignment, and technology and design which has multiple subsets. The Tulna evaluation framework (IIT Bombay, 2021) rated content quality and pedagogical alignment exemplary for Mathematics in Grades 6–8, but gave it a slightly lower rating "valuable" to technology and design. One of its subsets *"inclusivity in the representation of learners"* was rated valuable and the subset *'pedagogical alignment'* was rated *'potential to improve'* by Tulna evaluation because no support or guidance was provided to enable the effective use of the product by teachers. For Mathematics in Grades 9-10, the content quality, pedagogical alignment, and technology and design were rated as *'exemplary'* and *'valuable'* respectively. One of the subsets of technology and design, Universal design and Content accessibility is rated with *'potential to be improved'* because no fulfilment of the essential features of universal design without the audio support, it was hard to understand what question is being asked here for diverse learners. There are no subtitles or transcripts, which, for instance, makes the content unavailable for learners with hearing impairments. Tulna also that TicTac Learn needs to pay greater attention to the diversity and inclusiveness of all religions and races. Studying TicTac Learn content and design is not part of the current study, however, data related to these factors will be reported and interpreted in the light of the objectives of the study.

1.10 Learning Engagement in the Study

This study attempts to understand how the TicTac Learn videos and DSP TVs could influence the engagement of learners. In this study research, student engagement with DSP is the primary focus, defined by the perceived and observed value, usage of DSP, and participation in DSP classes by both students and teachers. Additionally, the study seeks to identify the challenges associated with this engagement.

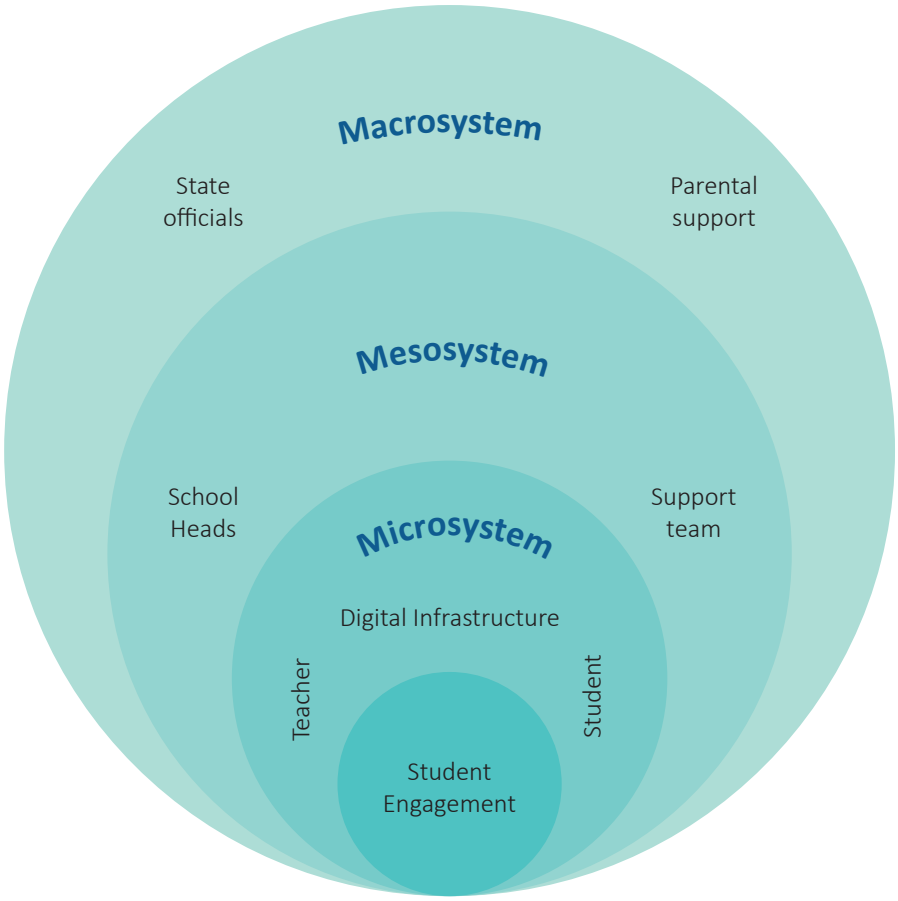
1.10.1 Factors Affecting Learning Engagement with DSP

Below are factors affecting learning engagement with DSP, identified based on the literature, exposure to the field, and understanding of the scope, and nature of the implementation. These factors were investigated to obtain a comprehensive picture of the students' and teachers' learning engagement with DSP:

- DSP classroom interaction
- Student's background
- Student's interaction with DSP
- Teacher's characteristics
- Teacher's interaction with DSP
- Support provided to teachers for implementation of DSP
- School, school head, and district officials views and support
- Value ascribed to DSP by all stakeholders

This study considered the *"bioecological model"* by Bond (2019) to draw a framework for the stakeholders in the study.

Figure 1.2
Framework for the Stakeholders in the Study



1.11 Research Questions

This study aims to understand the engagement of students and teachers with the Digital Shala program (DSP) in secondary government schools of two districts in Madhya Pradesh. The following Research Questions will guide the study:

1. What value or significance do teachers and students ascribe to the use and integration of DSP in their classrooms?
2. How are DSP content and applications used in the classroom?
3. What is the level of engagement among students and teachers in the Digital Shala program?
4. What are the motivators and obstacles influencing the adoption of DSP?
5. How is DSP integrated within the school systems and processes?
6. What is the potential impact of discontinuation of support and training over time even after the school is provided with the infrastructure?
7. What are the other potential uses of the Digital Shala Programme including its infrastructure that can be leveraged to inculcate and sustain active and learner-centered pedagogies and learning processes in the future?
8. What is the current adoption of this intervention and its perceived sustainability?

2. Research Method

The research employed a mixed-methodology approach, which combined both quantitative and qualitative data collection techniques. This approach was particularly suitable for understanding the research topic comprehensively. There is not much known on learning engagement literature using digital technologies especially in the Indian context. By not adhering to any specific hypothesis, the study allowed for an open-ended investigation, thereby providing richer insights into the phenomena under study (Stebbins, 2001; Reiter, 2017). Quantitative data were gathered through teacher survey and usage statistics from the DSP platform, while qualitative data were obtained from in-depth interviews, FGDs with students, and classroom observations. This mixed-method approach enhanced the validity and reliability of the findings and offered a holistic view of the research context (Creswell & Clark, 2009).

2.1 Sampling

In this study, schools served as the primary sampling unit.

2.1.1 Sampling of Schools

Two categories of schools were investigated: schools where the partner organization is currently implementing DSP (SIP) and schools where DSP implementation support by the implementation organization has discontinued (SNP).

- **SIP Schools:** These 21 (7 from Indore and 14 from Gwalior) schools have Smart TVs installed with DSP required features, accessories and TicTac learn videos in classrooms and receive continuous support and regular visits from Muskaan Dreams. All 21 SIP schools were included in the study.
- **SNP Schools:** These 114 (19 from Indore and 95 from Gwalior) schools had Smart TVs installed at the time of fisrt installation and received support for about 1 to 2 years but no longer received any support or visits from the implementing organization. A representative sample of 43 SNP schools was selected using systematic random sampling with proportional stratification, ensuring proportional representation of urban and rural areas.

  This sample size maintains a 90% confidence interval with a ±10% margin of error.

In total, 64 schools (43 SNP and 21 SIP) were included as samples for the study. In total, 13 schools (7 SIP+6 SNP) were included from the Indore district, and a total of 51 schools (14 SIP+37 SNP) were selected from the Gwalior district.

2.1.2 Sampling of Class Grades for Classroom Observation (CRO) and Focus Group Discussion (FGD)

- Classroom observations and focus group discussions (FGDs) with students were conducted in class grades (6 to 9)selected through convenient sampling, based on the availability of teachers using DSP in Science and Math classes. Observations were made in one Math and one Science class. Each school was visited a maximum of three times for data collection. Classroom observations and FGDs were conducted in schools that were active users of DSP and were designated into categories 1, 2 and 3 (active schools). Some schools, where DSP had not been implemented in the last three months, were categorized as Category 4 and 5 (non-active schools), and therefore, classroom observations and FGDs were not conducted in these although these 5 categories were initially only considered for SNP schools, SIP schools were also falling into these categories.
- Following are the 5 categories identified for data collection in schools. These categories were identified based on the Checklist tool and interviews with School Head and teachers:

  1. The DSP-TV was used in the last 3 months for TicTac Learn.
  2. The DSP-TV was used in the last 3 months for TicTac Learn and other applications for teaching.
  3. The DSP-TV was used in the last 3 months for teaching but using other applications other than TicTac Learn.

4. The DSP-TV was used for non-teaching purposes in the last 3 months.

5. The DSP-TV is not used at all for any purpose.

2.1.3 Sampling of Students for FGD

Focus Group Discussions (FGDs) are a qualitative data collection method used extensively in exploratory research. They involve guided discussions with a small group of participants on a specific topic, facilitated by a moderator. FGDs are valuable for obtaining in-depth insights into participants' attitudes, perceptions, and experiences (Creswell & Clark, 2009).

FGDs were conducted with class grades where classroom observations occurred, using proportionate random sampling for selection of students from a class to maintain gender-based homogeneity. Maintaining homogeneity in FGDs, particularly through gender-based grouping, is a strategic choice that enhances the quality and depth of the data collected. It creates a conducive environment for open discussion, reduces power dynamics, and allows for focused insights specific to the homogeneous group (Nagle & Nichelle, 2016; Greenbaum, 1998). About 25-30% of the total students present in the selected classroom participated in FGDs, with a minimum number of participants of four per group and a maximum number of 10. If it was not possible to form two different gender groups due to small class size, the gender group with a higher number of students was selected. School or implementing organization personnel, such as teachers or principals, were not present during FGDs to avoid influence.

2.1.4 Sampling of Teachers, School Heads, and State Officials

- All Math and Science teachers who were part of the DSP and had conducted at least three sessions using DSP-TV infrastructure in the past three months participated in the survey and interviews. For SNP schools, if DSP had been discontinued or not implemented in the last month, the most active DSP-implementing teacher in the past was interviewed, as determined by the school principal or in charge.

- School heads in the 64 schools were contacted for interviews. If the school head was unavailable throughout the visit days, then the school-in-charge if avsailable was interviewed instead. The interview was skipped if neither the school head nor the school-in-charge was available.

- Available state and district officials from two districts (one block level and one district level) were approached to share their experiences and opinions on program implementation.

Table 2.1

Tool used In SIP and SNP Schools and Data Collected				
S/N	**Tool**	**Data Collected**	**SIP**	**SNP**
1	School Head Interviews	54	17	37
2	Teacher Interviews	77	31	46
3	Classroom Observations	53	30	23
4	Focus Group Discussions	51	29	22
5	Teacher Interview Survey	73	29	44

2.2 Research Tools

The research tools were developed and revised after receiving feedback from a pilot testing. Two schools (one SNP-rural and one SIP-urban) were selected for piloting the tools based on convenient sampling, primarily on the advice of Muskaan Dream project associates and the

ease of school accessibility during the pilot. The development of these tools was guided by the list of variables presented earlier in this report, theoretical frameworks, literature, multiple meetings with the implementing organization and CSF, and site visits of DSP.

2.2.1 Piloting Research Tools

The pilot testing phase involved piloting various research tools to ensure they were effective in capturing the necessary data. These tools included an initial checklist, school-head interviews, teacher interviews, classroom observations, and FGDs.

- **Checklist:** Designed to capture basic details of the school and the DSP implementation, the checklist was initially too broad. After pilot testing, it was refined to include specific indicators such as the number of DSP TVs in school, status of current use, teachers trained in DSP teaching and years DSP-TV has been installed in the school. This made data collection more focused and comprehensive.
- **School-Head Interviews:** Originally, the interview protocol for school-head included generic questions about school administration. Post-pilot, the questions were adjusted to focus more on the impact of DSP on teacher and student engagement and implementation issues, providing richer insights into the program's administrative aspects.
- **Teacher Interviews:** The initial teacher interview tool included a mix of closed and open-ended questions. After piloting, it was modified to include more specific questions about DSP training effectiveness, challenges faced, and suggestions for improvement. For example, earlier the tool had an item "Has DSP-TV learning made learning better?" as a close-ended question, which was modified to an open-ended question "Do you think students learn better with DSP TVs than with regular classes?". This change helped in gathering more actionable feedback from teachers.
- **Classroom Observations:** During the pilot phase, the CRO checklist was very lengthy and did not allow time to capture all items during the observation. After the pilot, the items were reduced, and a new table of open notes with time stamps were introduced.
- **Focus Group Discussions (FGDs):** In the research proposal, FGDs were to be conducted along with Student Engagement Survey. At the pilot, it was found that the students required a lot of time and researchers' guidance to fill in the surveys, therefore it was dropped after the pilot. Initially, FGDs with students were too open-ended, leading to off-topic discussions. After pilot testing, a semi-structured guide was developed, which focused discussions on specific themes like DSP content effectiveness, student engagement, and perceptions. This made the FGDs more productive and relevant to the research objectives.

2.2.2 Final Tools Used for Data Collection

- **Checklist:** A checklist with 17 items was designed to capture essential details about the school and its DSP implementation. This tool was used by researchers in the field as the initial data collection instrument, filled out with the help of the school-head or school in-charge. The checklist included information such as the school's block, district, name, location (rural/urban), classes taught, UDISE code, school categories (SIP/SNP), student strength, number of teachers, number of classrooms with TVs, and years of DSP implementation. This helped in understanding the context of each school comprehensively and rate their active/non-active status.
- **Semi-Structured Interview and Survey with Teachers:** A questionnaire was developed to capture teachers' classroom engagement, incorporating key factors identified in this document's list of variables. It included both quantitative and open-ended responses and was administered one-on-one using a semi-structured interview method. A semi-structured interview is a qualitative method

for gathering data that blends structured and unstructured interview techniques. It involves following a predetermined set of open-ended questions or topics but allows flexibility in how the interview progresses (Kallio, H., et. all (2016)).

Separate tools were created for SIP and SNP schools, containing 32 and 44 items respectively. For SNP schools, if the teacher indicated that the school was in categories 4 or 5, the researchers asked questions that focused on operations, classroom practices and training. The questionnaire included quantitative data such as years of teaching experience and subjects taught, followed by open-ended questions on DSP usage, training, operations, teaching methods, content, challenges, and suggestions.

After the interview, teachers were given the Teacher Engagement Survey (TES) and were guided through completing it. The TES was a Likert scale survey with 31 items, covering themes such as the effectiveness of DSP in teaching, operating DSP, and using DSP-TV content. This scale ranged from "Strongly Disagree" to "Strongly Agree."

- **Semi-structured Interviews with School Heads, and Government Official:** The School Heads participated in interviews where they responded to a questionnaire comprising 17 items, organized into five distinct sets of open-ended questions. These themes covered implementation, evaluation, usage, technical specifications, and benefits. The purpose of these interviews was to explore how students and teachers perceive the program and its value in greater detail.

  The Government officials were interviewed using a semi-structured questionnaire consisting of 13 questions falling under broader themes on benefits, evaluation, challenges, and implementation. A focus group discussion was also conducted with the Block Resource Centres' offices following the same questionnaire.

- **Classroom Observations:** Data collection during classroom observations involved using an observation tool and taking continuous handwritten notes. The CRO tool was utilized to record observations on categories like student engagement, classroom interaction, digital infrastructure, seating arrangements, and other relevant aspects. Observers positioned themselves at the back of the classroom to avoid interrupting the teaching and learning activities.

- **Focus Group Discussions with Students:** Classes were selected for FGDs based on previous classroom observations. FGDs took place in classrooms that had already been observed, specifically in 15 SIP schools and 12 SNP schools. Separate FGD tools were developed for SIP and SNP schools. The tool for SIP schools consisted of 32 items, while the tool for SNP schools included 34 items, covering categories such as perceptions of DSP-TV teaching, classroom behavior and practices, content-related questions, peer collaboration, challenges, and suggestions.

  Researchers aimed to conduct two FGDs per school, one in a Mathematics class and one in a Science class. Some schools (10 SNP and 14 SIP) hosted both FGDs, while others (2 SNP and 1 SIP) only had one FGD conducted due to issues related to power cut, teacher unavailability on holiday.

- **Data Extraction from Muskaan Records:** Muskaan Dreams' application is installed on DSP TVs, with an individual teacher profile which monitors usage when connected to the internet. The data collected by Muskaan Dreams across the schools under DPS were transferred through spreadsheets. The backend data received from Muskaan Dreams included information on all the schools under the DSP program. After scrutiny, details for 64 schools (sampled) of this study (43 SNP and 21 SIP) were extracted from the dataset, which was then verified and checked for errors. Entries with errors were removed in

consultation with the CSF team. The remaining entries were coded using Google Sheets and analyzed using SPSS software.

2.3 Data Analysis

Each type of data set underwent analysis using distinct methods, as outlined in their respective summaries in findings. The overall data analysis process included:

- **Quantitative Analysis:** Data coding and result analysis were performed using statistical tool- SPSS.
- **Qualitative Analysis:** Large qualitative datasets were analyzed using MAXQDA software, while thematic analysis was employed for smaller qualitative datasets.

Data triangulation was conducted to find similar or contradictory patterns in findings. Further details on the data analysis are provided in the Findings chapters.

For varied responses, researchers used terms such as 'most' (more than 75%), 'many' (60%-74%), 'several' (40%-59%), 'some' (15%-39%) and 'a few' (0-14%) along with the corresponding frequency in brackets, to accurately represent the data.

3. Summary of Findings

This chapter presents a comprehensive summary of the key findings derived from the research study. It synthesizes the results obtained through data collection and analysis, highlighting significant trends, patterns, and insights relevant to the study's objectives.

3.1 DSP-TV Implementation Status of Schools

According to the school incharge/headmaster checklist, a school's active status indicates that DSP-TV was used at least once in the last three months before the interview. The head teacher or master in charge of each school reported the school's active or non-active status at the start of data collection. The study sampled 64 schools, comprising 21 SIP schools and 43 SNP schools. Among them, 19 out of 21 SIP schools were reported as active, compared to only 22 out of 43 SNP schools implementing DSP-TV. This suggests that about half of the SNP schools were not actively using DSP-TV at the time of the survey.

Furthermore, of the 23 schools classified as non-active, 14 reported having at least one functioning DSP-TV. This indicates that factors other than the availability of a functioning DSP-TV contributed to the non-active status in many schools. The reasons for the non-active status of DSP-TV implementation were similar for both SIP and SNP and were primarily related to infrastructural challenges. For example, security of DSP-TV, broken, stolen or lost equipment. Many rural schools reported electricity issues that interrupted DSP functioning leading towards their non-active status. Lack of space has been reported by a few schools both rural and urban, their responses indicated these schools had dedicated space for DSP-TV classes, which got replaced for other functionalities like vocational education class or staff room.

The SNP schools had been implementing DSP-TV for a longer period than SIP schools but because they had completed two years of support from Muskaan Dreams, there was no continuous supervision or infrastructural support available. This lack of support likely contributed to a higher proportion of inactive SNP schools compared to SIP schools in the sample. The students and classroom observations were not conducted in non-active schools, however, a separate section in the findings, reports teacher interview data in non-active schools.

3.2 Reasons for Discontinuation of DSP-TV in Inactive Schools

Electricity appears to be the primary reason for the discontinuation of DSP, particularly in rural areas. Issues related to DSP-TV such as dysfunctional or damaged DSP-TV or pen drive are also significant factors contributing to discontinuation. Infrastructure issues such as lack of classroom or security issues were also raised by teachers (For more details, refer: Findings from Teachers Interviews, Sub-section: 4.3.5.4 Reason for Discontinuation of DSP).

A teacher from a SNP school mentioned, *"For the past four months there is no electricity in the school, we have given many applications to the district administration but nothing has happened."*

Another teacher from a SNP school shared, *"The school's electric wires were cut and taken away. It's been over a year now, and there is no electricity in the school, so how can the TV be used?"*

Another teacher from a SIP school shared that, *"There were two TVs in the school. One DSP-TV was damaged by a stone thrown through the skylight. Since then, the other TV is also kept locked in a trunk, because once the door lock of the room was found broken. Since then, that TV is rarely used, and even when it has been used, it's not for educational purposes."*

During the interviews conducted with the district officials, the in-charge of smart-class in the district mentioned that there are several reasons for the irregular supply of electricity in schools. For example, there is a constant case of wire theft in many places, and in a few cases, theft of DSP-TV. The schools receive electricity from the Distribution Panel (DP), which is common for everyone in the locality. If the community around the schools do not pay the electricity bills, the supply of electricity is stopped by the electricity department.

The following sections report findings related to usage patterns of DSP-TV and student's engagement in DSP-TV active schools.

3.3 Active DSP Schools

3.3.1 Usage Frequency

The average number of working days in schools was 215 days (1,182.5 hours) for grades 6, 7, and 8; 225 days (1,237.5 hours) for grade 9; and 205 days (1,127.5 hours) for grade 10. According to the limited backend data provided by Muskaan Dreams for 17 SIP schools, videos were played a total of 561 times during the 2023-2024 academic year (April 2023 to March 2024), averaging 33 plays per school. The total duration of video playback was 2,305 minutes (38.41 hours), with an average of 2.26 hours per school. On average, a single video was played for 4.1 minutes in a school (For more details, refer to Back-end Data Analysis, Sub-section 4.6.2, Table 4.6.2).

Contrary to the overall usage data from the platform for the entire year, students and teachers reported significantly higher play of videos. Although the backend usage data was derived from TicTac Learn videos only, the students and teachers reported usage was in general for all types of applications in the DSP-TV like YouTube. This could have also been a reason for the lack of consistency between backend data and self-reported data. The FGD and interview data showed YouTube and TicTac Learn videos as the most used applications on DSP-TV (For more details, refer: Figure 4.1.1: Finding from FGD- Usage of DSP-TV).

Further analysis was conducted to assess the average usage during the most active months. July and August were identified as peak usage months for most schools, with the highest number of videos played for extended durations.

In July, videos were played 240 times across 16 schools, with a total play duration of 14.39 hours—an average of 15 plays per school and 0.9 hours of usage per school in that month. The average duration per video played was 3.6 minutes. Similarly, in August, videos were played 141 times across 13 schools, with a total play duration of 10.85 hours.

An average of 10.8 times videos were played per school with the average duration per school being 0.83 hours for that month. The average duration per video played was 4.55 minutes. (For more details, refer: Back-end data analysis, Sub-section: 4.6.6, Table 4.6.7.)

The average backend usage data of the most active months seems closer to the students' and teachers' usage reported data in FGDs and interviews. Most of the FGD data (for both active SIP and SNP) reported use of DSP-TV to be daily or twice a week, with a few FGDs reporting use on a monthly or bi-monthly basis (For more details, refer: Findings of FGD, Sub-section: 4.1.6 (ii)). Similarly, teachers' self-reported data from interviews indicated usage of DSP-TV for teaching either daily or 2 to 3 times a day. There was not much difference in self-reported (both by students and teachers) usage frequency across active SIP and SNP schools.

3.3.2 What Were the DSP-TVs Used For?

The FGDs with students in SIP asked for different applications used on the DSP-TV. Most FGDs reported curricular-related videos on YouTube in classes, followed by TicTac Videos (For more details, refer: Findings of FGD, Sub-section: 4.1.6 (iii)). Although infrequently, other purposes were watching different government-run programmes like Mann ki Baat, and Chandrayaan, besides watching other entertainment-driven content like cartoons, and movies, were also reported (For more details, refer: Findings of FGD, Sub-section: 4.1.14, Figure 4.1.16). School Head interviews echoed the views of the students on use of DSP-TV for various curricular and extracurricular activities (For more details, refer: Findings from School Head Interviews, Sub Section: 4.4.3, Figure 4.4.7).

On the other hand, none of the teachers reported using DSP-TV for entertainment, and very few teachers reported use of DSP-TV for extracurricular activities.

Note: Not in a single case, the participants had used the term TicTac or TicTac Learn, they used the term 'videos' instead (For more details, refer: Findings of FGD, Sub-section: 4.1.7(ii)). The report, wherever necessary, has used the

word video or videos for TicTac Learn videos, or videos on YouTube.

Teachers' reported use of DSP-TV for TicTac Learn many times a week, besides TicTac Learn, YouTube videos was the most used application, a few teachers reported using links like e-pathshala, NCERT as promoted by the state for teaching.

(For more details, refer: Findings from Teachers Interviews, Sub-section: 4.3.6.3 Usage)

"I mostly use YouTube. Other than that, we also use whatever links we are sent by the Department such as NTSE (National Talent Search Examination), NCERT links etc."

The classroom observations were more centered around TicTac Learn, and most teachers used that, except for a few teachers in SNP school who used YouTube videos during classroom observations. There was not a single observation where teachers mixed TicTac Learn videos with any other digital resource or YouTube videos.

While using DSP-TV especially for YouTube, the FGD and classroom observation data indicated that the teachers sometimes used their mobile device and its Internet data (For more details, refer: Findings of FGD, Sub-section: 4.1.6(iii). No other digital devices were seen used during teaching in the classrooms.

An important aspect of DSP-TV use indicated by students in FGD and classroom observation was to substitute or fill the absence of teachers (For more details, refer: Findings of FGD, Sub-section: 4.1.10 (ii)), partially or for the entire class period. If the teacher was absent or busy with other administrative tasks or had to step outside to run an errand for the school, DSP-TV TicTac Learn was reported to substitute teachers.

"Learning has improved from the TV classes because now even if the teacher is absent, we still have something to study"
(8th Graders)

Classroom observations revealed that when teachers stepped out of the classroom for a period, the video content continued playing, but the teachers did not make an effort to discuss the content that had played in their absence. Overall, students appeared to perceive the videos as a valuable addition to their learning experience, particularly as a substitute when teachers were not present.

However, teachers themselves did not explicitly state that videos served as a replacement for their absence. In one interview, a teacher acknowledged the usefulness of videos in assisting another subject teacher in covering her subject when she was unavailable. Similarly, while not widespread, a few school heads noted that DSP-TV videos helped keep students engaged in the absence of a subject teacher. (For more details, refer: Findings of School Head Interview,Sub-section: 4.4.5 (iii), Usefulness for teachers).

"If a subject teacher is absent then another (subject) teacher can teach using TV and maintain the routine. Students can ask questions to the (main subject) teacher later."

3.3.3 Who Was Operating DSP-TV?

The FGD data reported that DSP-TV was mostly operated by teachers or teachers with students (For more details, refer: Findings of FGD, Sub-section: 4.1.6(iii)). The FGD data indicated that female teachers mostly needed help in operating.

"Mostly, the male teachers operate the TV because the female teachers don't know how to"
(10th Graders)

The backend data also suggested male teachers had significantly played more videos and for a longer duration than female teachers (For more details, refer: Back-end data analysis, Sub-section: 4.6.10).

Although not strongly reflected, one of the interviews mentioned that in the schools the teachers trained students in operating DSP-TV.

As stated by a teacher, *"We underwent training. First, they trained us how to use it and then they asked us to gradually teach the students as well. Then we trained the students. Now the students can operate the TV. If I or any teachers such as Math or Science teachers are not there in the class or absent…. then students can operate the TV to do their work."*

The classroom observations indicated that when students operated DSP-TV, in the co-education schools, in every instance, boys were found operating the DSP-TV and not girls. On the other hand, girls in the only girls' schools were found operating the DSP-TV.

Gender stereotypes favoring digital competence in boy students and male teachers was at play in the data both in reported perception by students and classroom observation (For more details, refer: Findings of FGD, Sub-section: 4.1.6 (iii)). Besides cultural influence of these stereotypes, it could be the direct observation of male teachers versus female teachers often using DSP-TV that could have influenced student's perception in operating the DSP-TV. This influence of teachers who also serve as role models, can potentially impact many related gender stereotypes in students especially in their adolescence including the choice of careers in future.

Elementary grades had a higher number of played videos and duration than grades 9 and 10. On an average, rural schools had a significantly higher number of videos played with higher duration than urban schools. (For more details, refer: Back-end data analysis, Sub-section: 4.6.6).

3.3.4 What Happens in DSP-TV Classrooms?

From the classroom observations it was noticed that most teachers used one TicTac Learn video for a given topic for the entire duration of the classroom. Many School Heads interview reported the value of DSP videos, supporting teachers in explaining the concepts (For more details, refer: Findings of School Head Interview, 4.4.5 (iii) Usefulness for teachers). Similarly indicated by students in the FGD and in most of the observed DSP-TV classes, the dominant teaching method was explaining (For more details, refer: Findings of FGD, Figure 4.1.15), teachers explained the DSP-TV content and asked questions based on the video content.

As shared by a teacher, *"…We play videos on certain topics followed by lectures to explain the topic in depth. Sometimes we use a blackboard to write notes."*

Most of the time, the questions asked were closed-ended, and very rarely open-ended or thought-provoking questions were asked by the teacher. For example, in a Grade 6th Science class, the teacher asked, referring to the video, *"What is the color of blood?"*

The students responded to teachers' questions in chorus, which was easier with closed-ended questions. Many times, teachers picked students to answer one by one based on who raised their hands. There was no significant gender difference found in responding to teachers' questions. The observations noted back-benchers to be less interactive, and showed less interest in DSP-TV in other students in the class, and in some cases, they were unable to read the text in the videos. The teachers were seen to mostly focus on the front seaters. In some cases, there was not enough space for the teacher to move toward the last bench of the class.

In several observations the teachers paused the videos every 1 to 5 minutes, and asked questions to the class. In very few cases the teacher did rewind the video to re-explain or prompt a question or note-taking. However, there were some classroom observations where the teacher never paused the video. Apart from calling out students to solve problems, mostly Math problems, it was rare to find the teacher using other activities with DSP-TV (For more details, refer: Findings from Classroom Observations, 4.2.7 Classroom Practices).

In very few classes, it was observed that students (either gender) without being prompted by the teacher asked questions about the videos content.

A girl in a 7th-grade Science class asked, *"Sir mithya dharna kya hota hai"/Sir, what are false concepts."* The teacher paused the video and explained the meaning of the word "mithya/ false."

On the other hand, some of the school heads indicated that students ask questions only now (with the use of DSP-TV). *"Students ask questions. Earlier they didn't ask."*

Overall, most teachers could start the DSP-TV within 5 minutes, a few took more than 10 minutes to figure out the operation of remote, the internet sometimes, and sourcing the videos (For more details, refer, Findings from Classroom Observations, 4.2.7(iv) Time elapsed to start the DSP-TV).

Very few DSP classes started with an introduction of the topic or an activity, in most of the classes, the teachers abruptly started DSP-TV videos at the start of the class (For more details, refer: Findings from Classroom Observations, 4.2.7 (v) Method of Introduction in DSP-TV Class). This could be also because the teachers might have assumed that the observer/researcher was there to observe the use of videos in the classroom, and wanted to jump right to it.

The classroom observation data indicated students only sometimes take notes when prompted by the teacher and students never by themselves took notes while watching videos in the DSP-TV. However, when directly asked in FGD, all students agreed that they took notes, assuming it was the right thing to do during videos or maybe also in general in the classroom.

Apart from explaining the video content, asking questions, and having students take notes, other instructional activities were observed infrequently in DSP-TV classes. In particular, the common practice of calling students to solve problems on the board was rarely seen during these sessions (For more details, refer: Findings from Classroom Observations, 4.2.7(vi) Methods of Explanation).

The observations suggested that the dominant teaching method used in these classrooms was directive, where teachers and videos were transmitting information aiming for better understanding of concepts and improving memory and retrieval. Some level of interaction was found mostly in the form of whole class question and answer, mostly closed ended.

The teacher interviews also mentioned using DSP-TV for explaining the content and revision. (For more details, refer: Findings from Teachers Interviews, Sub-section: 4.3.6.3(iii) Usage; Teacher Preferences and Usage Patterns of DSP-TV Content).

3.3.5 Role of Textbooks in DSP-TV Classrooms

While students were prompted to take notes, very few classroom observations and teacher interview data indicated use of textbooks or work/grade books in the DSP-TV classroom. It almost seemed that the videos had replaced textbooks and also workbooks. It is possible that teachers found using both at the same time cumbersome, or were not prepared to swift across both these resources. Also, very few teachers indicated making lesson plans for the video classes.

"At the time of teaching, we have to think of the related videos so the rhythm of teaching is affected. As we have to use both traditional and TV it takes some additional time (switch on – off karne parte hai). So, we need to put in extra effort. But it attracts students and helps them to learn faster. 3D videos are attractive. Diagrams help in the teaching-learning process, but the teaching plan gets disturbed (muting or pausing it continuously). We have to follow the book and there are exercises so I use it after I explain the topic. (Videos) It is good for revision work."

(For more details, refer: Findings from Teachers Interviews, Sub-section: 4.3.6.4(ii) Classroom Practices; Use of Lesson Plan as reported by teachers during teacher interview).

On the other hand, it's possible that the teachers did not feel the need to refer to textbooks while using videos and relied on the comprehensiveness of the video content. However, several teachers in the interviews indicated that the content in the videos was not comprehensive. On the other hand, some of the FGD data indicated, students felt videos went beyond textbooks in what it covered. In one of the active SNP schools, the teacher said the sequencing of the chapters sometimes don't match with the textbook.

"The contents of the videos are not based on the school syllabus sequence keeping in mind the learning outcome."

(For more details, refer: Findings from Teachers Interviews, Sub-section: 4.3.6.4(iv) Classroom Practices; Method of Teaching using DSP).

In summary, it can be said very few teachers used textbooks or workbooks while teaching using the DSP-TV videos. In a way they used either videos or textbooks while teaching. The reasons are highly speculative, given the contrasting evidence across teachers and students.

(For more details, refer: Findings from Teachers Interviews, Sub-section: 4.3.6.4(iv) Classroom Practices; Method of Teaching using DSP).

3.3.6 Role of the Teacher in DSP-TV Classrooms

Although, the students, teachers and school heads indicated that videos substitute teachers' temporary absence, the teachers in the interviews, and students in the FGD stressed on the significance of teachers' presence and role in teaching with DSP-TV.

As stated by a teacher, "*...there is certainly an audio-visual impact. It should happen from time to time. I think it's a recreation for the brain and students get freedom from boring lectures. But, when teachers explain it to them, students understand better. If we think that we should just run the* video *content and leave, then it won't happen. Until you explain the* video*, students won't understand the content. Then, they just listen to it lazily. So, I think, it's important that teachers explain the content to students."*

(For more details, refer: Findings from Teachers Interviews, Sub-section: 4.3.6.7(ii) Value Benefit; Effectiveness of DSP-TV in enhancing student Learning).

The students when asked about the role of teachers in DSP-TV classes, there was an overwhelming response across students, almost sounding like solidarity for teachers and their presence alongside the DSP-TV (For more details, refer: Findings of FGD, Sub-section: 4.1.10(ii)). The reasons ranged from the role of explaining in the language they understand, can clear doubts, maintain discipline in the classroom.

"Without the teacher, just watching the video doesn't make us understand everything. It's difficult to understand just by watching the video" (8th Grader)

"If we don't understand, we can ask the teacher" (6th Grader)

"Without a teacher, all the kids in the class will be mischievous, and they'll study very little." (7th Grade Teacher)

3.3.7 Eagerness of Students for DSP-TV Videos

One of the questions asked during the Focus Group Discussions (FGD) highlighted students' eagerness to engage with DSP-TV videos. When asked whether students request teachers to play the videos, about half of the SIP respondents and less than one-third of the SNP respondents indicated that students sometimes make such requests (For more details, refer: Findings of FGD, Sub-section:4.1.9 (vii)). These requests are made to revise a topic or see new content or if the students are bored of traditional chalk and talk classes.

"They demand every day to have class on TV. They love to learn on TV. But as a government school, we have some set procedures/ activities. So we cannot take classes on TV every day." (Teacher, SIP)

The remaining half of SIP respondents and two-thirds of SNP respondents in the FGD indicated that students do not request teachers to play DSP-TV videos. Their reasons varied—some believed that teachers knew best when to use the videos, while others mentioned that teachers played them regularly, based on their available time, or even their mood.

This data highlights a clear difference between SIP and SNP students, which could be attributed to the longer exposure of SNP students to DSP-TV videos. There was also some evidence suggesting that prolonged use had led to a sense of boredom among SNP students.

Some responses from the school heads indicated that the implementation of the DSP programme has led to increased student engagement in classes.

"Students ask questions. Earlier they didn't ask."

Some of the school heads also indicated that the implementation of the DSP program has led to an increase in student attendance (For more details, refer: Findings of School Head Interview, Figure 4.4.16).

A school-head said that, "The student attendance is more when we teach them through the TV."

Eagerness of students for videos was also captured by asking if the students would want videos in all the subjects.

3.3.8 Videos for All Subjects

The FGD data revealed that, on multiple occasions, students expressed a demand for new DSP-TV videos. This suggests that repeated exposure to the same content may have led to boredom, highlighting the need for refreshed or varied video content to sustain student engagement (For more details, refer: Findings of FGD, Sub-section: 4.1.9(iv)). Students indicated videos in other subjects will be helpful as it will aid learning through its multi-sensory appeal (video and audio). Interestingly students in both the groups had some responses that indicated request for videos in other subjects hinting more use of videos in the classroom.

A very small number of FGDs indicated that students did not want DSP-TV videos for all subjects, citing different reasons. One key reason was general boredom with video-based learning.

"Videos show only short explanations, but teachers in regular classes teach in full detail" (8th Grader), "We can ask the teacher. We don't understand well in the TV class, but we understand when the teacher teaches" (9th Grader).

One of the recurring requests made by teachers during the teacher interviews was for the inclusion of content for other subjects apart from Math and Science. Similarly, most of the teachers in the survey reported that they would want videos in all subjects. A few teachers indicated that students would show an interest in other subjects if they were taught with the DSP-TV, and many teachers indicated that this additional content covering other subjects would be helpful in the absence of teachers (For more details, refer: Findings from Teachers Interviews, Sub-section: 4.3.6.10 (ii) Suggestions; Suggestions reported by teachers during teacher interview)

As shared by a teacher, *"It should include other subjects too, not only focused on Math and Science. Because in Government schools there is always a shortage of teachers so every time Math and Science teachers might not be available, they might have some kind of meetings or training. So, at that time other subject teachers can use the TV."*

In addition to requesting content for other subjects, teachers also emphasized the need for DSP-TV videos to align more closely with the prescribed NCERT syllabus. One teacher, who taught both Math and Science, specifically highlighted the necessity of updating the Math content to better support classroom instruction.

As shared by a teacher, *"Need to upgrade the syllabus. It is not updated. NCERT removed a few topics last year. But still, it is in the video content. Many times, we forget if that part is in the syllabus or not. After playing the content we came to remember that the topic is not in the syllabus. This is problematic. Extra knowledge is good but we do not have time for that. We abide by school policy (school timetable) and need to complete the syllabus. We have only 40 minutes in class. Next, some teachers are waiting for the next class. So, I need to complete the teaching within that 40 minutes."*

3.3.9 Difference Between SIP and SNP Active Schools

Overall, there were very few clear differences found in use, value and perception of DSP-TV in classrooms between SIP and SNP.

As reported by school heads, the DSP-TV implementation was recent in SIP schools,

while it had been implemented for more than a year to six years in SNP schools. Most SIP schools had more than 1 DSP-TV in their schools. (For more details, refer: Findings of School Head Interview, Sub-section 4.4.4(ii) & Figure 4.4.13). As reported by teachers in the interviews, there was more demand for playing videos by students in SIP than in SNP schools (For more details, refer: Findings from Teachers Interviews, Sub-section: 4.3.6.6).

The classroom observations witnessed more SIP than SNP DSP-TV classrooms using the floor for the seating of students. More SIP students than SNP students could name topics watched on DSP-TV videos. Across data sources, SNP over SIP reported more challenges, especially technical difficulties in implementing DSP-TV.

3.3.10 Difference Between Rural and Urban Schools

Across data sources, rural schools than urban schools reported to have challenges related to electricity outages. At the same time, the backend data suggests that rural schools have a higher average play duration of TicTac Learn per school (2.8hrs) than urban (0.9hrs). Similarly, in the teacher interviews, the rural teacher indicated higher and most frequent use of DSP-TV than the urban teachers (For more details, refer: Findings from Teachers Interviews,Sub-section: 4.3.6.3 Usage).

In a few instances, rural school students indicated DSP-TV signals parity for modernity for rural schools with not only private but also urban schools.

"It's good to have TVs in village schools too, because our friends who go to the city have TVs in their schools''
(9th Graders)

Most of the teachers who mentioned that students request teachers to use DSP-TV are from schools situated in rural areas. On the other hand, teachers who reported that students do not request the use of DSP-TV are from schools situated in urban areas (For more details, refer: Findings from Teachers Interviews, Sub-section: 4.3.6.6. Classroom Practices: ii.Classroom participation of students in the DSP-TV class as reported by teachers during teacher interview). Thus, it can be said that the higher use of DSP-TV by rural teachers, along with rural students' demand for increased usage, may be associated with their aspiration for parity with urban or private schools. This suggests a desire for more technology-enabled education, reflecting a broader motivation for modernized learning experiences.

The survey data indicated that rural teachers reported significantly higher digital competence than urban teachers in using a pen drive with DSP-TV, a difference that was statistically significant. Additionally, regression analysis demonstrated that digital competence in operating DSP-TV was a positive predictor of increased usage in classrooms. This suggests a strong association between rural teachers' confidence or efficacy in using DSP-TV (via pen drive) and their higher frequency of usage.

3.3.11 Learning Value of DSP-TV

This section explores the perceived learning value of DSP-TV in classrooms.

- **Attention to Topics:** In the teacher survey, most of the teachers agreed or strongly agreed that DSP-TV was useful for getting students' attention in the class (For more details, refer: Findings from Teacher Interviews, Sub-section: 4.3.6.7(vi) Teacher perception on TicTac Learn Videos as reported by teachers in the Teacher Enagagement Survey). The interviews have some evidence of the same. For example,

  "TV helps because the students are more interested in watching the videos… but if you teach the lesson in the class, they don't pay attention to it and start talking amongst themselves."

- **Remembering and Understanding of Concepts:** Most of the students in FGD, and teachers and school heads in the interviews indicated that the dual-media affordances of the videos improved remembering and understanding of the

concepts (For more details, refer: Findings of FGD, Sub-section: 4.1.9(viii)). It was interesting to note that across students, teachers and the school head, there was a common expression of the benefit of DSP videos, the visual and audio affordances of video supporting, remembering and understanding of concepts.

"We remember better with videos featuring cartoons and stories'"
(7th Graders)

"Visual aids such as diagrams, flowcharts, or processes help us remember the information"
(8th Grader)

"If we miss something while teaching, TV can fill in the gaps and help students understand better."
(School Head interview)

One of the school heads extended this affordance of videos to the children who have difficulty in writing (meant reading and writing).

"The children who cannot (read or) write but due to visuals and audio (In DSP-TV) they understand the concepts and learn." (School Head's interview)

- **Benefits of videos:** Besides, videos and audio supporting remembering and understanding, there was some reporting on the benefits of videos for providing examples from daily lives.

"The examples in the video help me understand."
(8th Grader)

It's good because you get more examples.
It also helps during exams."
(10th Grader)

The scope of the study did not allow observation of classes without DSP-TV to compare connect with daily lives as a prime affordance of videos on DSP-TV. However, in the classroom observation very rarely the teachers were seen narrating examples from the real world other than in the videos while explaining the video content. In that sense, the videos did play a crucial role in making concepts more authentic with the examples it provided from real life.

Some teachers also indicated the affordance of videos for remembering the content and understanding better.

"When we teach them using blackboard, we just write and the students copy it which might not clear the students' ideas. When we use TV they visualize it with full concentration, at the same time they listen to the topics and write the information. Students understand and remember better than blackboard." (Teacher)

During the meeting with the Assistant Director of School Education, Gwalior, she stated that *"Learning through visual media is very beneficial for students. Earlier the District Education Office (DEO) did not have a budget for a digital classroom. Later, Muskaan Dreams (Muskaan Dreams) initiated and provided the DSPs which are good for student's learning, especially from rural areas. Now the government is looking forward to transforming conventional classrooms into digital ones. The schools are receiving smart TVs which will also be used as smart boards apart from digital classrooms."*

- **Clearing Concepts:** While defending not currently using DSP-TV videos, one of the teachers indicated that since this is revision phase, they use videos to clear concepts and not for revision. *"We use it mainly when students do not understand particular topics like how light rays pass through objects or for digestive systems etc."*

  Overall, FGDs and teachers' interviews indicated that video-audio affordance, practical demonstrations and animation, story formats and daily/real life examples in the videos were helpful in understanding and remembering of the concepts better (For more details, refer: Findings of FGD, Sub-section: 4.1.9(ii)).

  A few SNP FGDs data indicated two novel responses on the value of DSP-TV videos for learning and teaching, one was learning beyond textbooks and the other was it supports teachers in teaching. It could be the maturity of the intervention in these schools that may have allowed SNP students to reflect deeply on the value of the DSP-TV videos.

  The survey responses of teachers indicated that most of the teachers agreed or strongly agreed that the DSP-TV videos stimulated

students' prior learning, helped in informing lesson objectives to students, and overall guiding in a topic.

3.3.12 Social Value of DSP-TV

This section examines the social value of DSP-TV in the classroom and its broader impact on students, teachers, and the learning environment.

- **Dignity of Schools:** Benefit of DSP videos to improve learning through both video and audio modes, and enhancing dignity of their schools in comparison with their perception of better/ private schools have been seen in both the school types (For more details, refer: Findings of FGD, Sub-section: 4.1.9(iii)). Although in small numbers, the SNP FGDs also reported benefits in terms of being able to learn outside textbooks and helpful for teachers overall in their teaching. Some indication of an in-depth analysis of benefit with SNP FGDs could be a matter of a longer time exposure. *One of the school heads said:*

"The parents also feel pride and happiness (for having DSP-TV and its videos) that their children's schools are competing with private schools."

Students mentioned: *"It's a good thing that in our school too, like in big schools, teaching is done through TV"*
(9th Graders)

- **Parents Perception About the DSP-TV:** Most of the data from students, teachers and school heads suggested that parents were very appreciative of the use of DSP-TV in teaching and learning, and it was a matter of dignity and pride for them that a government school has these facilities (For more details, refer: Findings of FGD, Sub-section: 4.1.13).

A few students narrated their parent's aspirations and perceptions related to DSP-TV in schools.

"Children will become smarter by studying on TV"
(7th Graders)

"It's good if our children also study such modern things in their school"
(8th Grader)

A teacher from SIP school shared,

"Yes. They used to come and tell us that the program is very good. This type of program should be there."

On the other hand, a few heads of the school and teachers reported that a few parents are not in favour of playing videos in the school, as videos are usually perceived to have entertainment utility. *"Parents feel that we are playing movies and not teaching."*
(School Head)

"Parents showed objection to schools using TV to teach." (Teacher)

Overall, the analysis highlights the importance of involving parents to raise awareness, provide support, and ensure vigilance, particularly regarding the security of DSP-TV usage.

3.3.13 Feedback on Content

There are a total of 260 Science videos and 1,078 Mathematics videos. Each Science chapter is divided into 1 to 8 topics (videos), with video durations ranging from 2 to 16 minutes, averaging 8 minutes per video. In Mathematics, each chapter is divided into 1 to 11 topics, with videos lasting between 1 and 11 minutes, averaging 4 minutes (data provided by the CSF team).

Although the number of Mathematics videos is nearly five times higher than that of Science, Science videos were played more frequently. Additionally, Science videos had a longer average duration. Backend data analysis further confirmed that, overall, Science videos were not only played more often but also had a higher total viewing time compared to Mathematics videos. (For more details, refer: Back-end data analysis, Table 4.6.6: Grade wise- Subject-wise play duration). The preference for Science videos may be linked to data suggesting that students found the content

more engaging due to its story-based format. Compared to Mathematics videos, Science videos were appreciated for their narrative structure, which helped capture students' interest. Both students in FGDs and teachers in interviews expressed a preference for the storytelling approach and real-life connections presented in the Science videos (For more details, refer: Findings of FGD, Figure 4.1.10).

"Content should be upgraded timely with syllabus and requirements. For Science, it is best but the Math contents should be reviewed." (Teacher)

"Like in Science, Math should also be taught through activities, otherwise it becomes very boring."
(7th Graders)

The survey data analysis also indicated that Science teachers scored their liking of teaching DSP higher (marginally statistically significant) than the Math teachers.

3.3.14 Challenges in Teaching and Learning with DSP-TV

- **Infrastructure:** Electricity especially in the rural schools was found to be a major infrastructural hindrance in running the DSP-TV. However, the classroom observations also noted electricity in most of the observations resumed within 10 minutes (For more details, refer: Findings from Classroom Observations,Sub-section: 4.2.8(iv) Technical problems during DSP class)

  During the interview, the Assistant Director of School Education also highlighted the issue of shortage of electricity and the fact that the education department does not have jurisdiction over the electrical and power department. She mentioned that the electricity supply is interrupted four to five times daily, even at the DEO office. This situation is worse in rural areas as compared to urban areas, though all schools have access to electricity connections. However, regular use of DSP-TV becomes difficult in the absence of electricity.

  School Heads also mentioned the need to update infrastructure and its safety as one of the challenges faced in the implementation of DSP-TV.

  "Theft is an issue in rural areas. Cable is also stolen. We have kept the TV in a central lock." (School Head)

  The School Heads also mentioned lack of personnel to implement DSP-TV.
  (For more details, refer: Findings of School Head Interview, Figure 4.4.26)

  Block Resource Centres (BRC) members also emphasized on the issue of space. They stated that most schools have only two or three classrooms, and the school infrastructure (including buildings, etc.) is often in poor condition.

- **Multiple Focus in Classroom:** Students in the FGD indicated that the coordination between the teacher's blackboard writing, the playing of DSP-TV videos, and the teacher's explanation was not always seamless. At times, the simultaneous use of these methods caused confusion among students. For instance, *"When we watch on TV, if the teacher writes on the board, we can't take notes" (9th Graders)*

- **Quality of Videos:** Multiple sources highlighted the need for updates to DSP-TV videos to enhance their effectiveness. Suggestions included improving alignment with textbook sequencing, making the content more comprehensive and activity-based, and introducing engaging elements to Mathematics videos—similar to the storytelling approach used in Science videos—to make them more interesting. Additionally, there were recommendations to improve text legibility within the videos to ensure better readability for students. *"It's blurry, we can't read quickly from the video." (7th Graders)*

- **Teachers' Competence:** Teachers' lack of competence in operating the DSP-TV was observed in one-fourth of the classes observed. In terms of starting the DSP-TV, sourcing the videos, able to pause, rewind and forward the videos smoothly (For more details, refer: Findings from Classroom Observations, Sub-section: 4.2.8(ii) DSP operation in the classroom by the teacher)

- **No/Lack of Teacher Training:** Teachers and school heads reported that training on DSP-TV usage was limited to a one-time demonstration, which they felt was insufficient. They emphasized the need for comprehensive training that goes beyond just operating DSP-TV. This includes guidance on effectively integrating DSP-TV into their teaching, enhancing instructional methods, and preparing for these classrooms—such as incorporating DSP-TV into lesson planning for better engagement and learning outcomes (For more details, refer: Findings from Teachers Interviews, Sub-section: 4.3.6.10 (ii) Teacher Training on DSP-TV Usage by Muskaan Dreams).

During the FGD, members of the BRC shared that teachers are struggling to use DSP-TV in their classes due to a lack of capacity and skills. Teachers did not receive adequate training, which affected their ability to use technology in their teaching. Despite the fact that the younger teachers are able to upskill themselves to take classes using technology, they are not able to use DSP-TV in the classroom due to overload of other work than teaching.

The Assistant Director of School Education at the DEO office expressed her concern regarding teacher training as well. She shared the need for a manual or recordings of earlier training sessions, that could be used by even school heads for the training of teachers in case teachers who received training were retired or transferred. Additionally, she also suggested a well-structured virtual training program for all teachers. She expressed her concern over the communication gap regarding regular updates between the district education department and Muskaan Dreams and suggested more regular updates by the implementing organisation for a smoother implementation.

3.3.15 What Factors Were Related to Usage?

Variables showing a strong association with Usage

- **Gender:** There was a statistically significant difference between male and female teachers on their reported usage of DSP-TV in the survey. Female teachers had reported (in Teacher Engagement Survey) higher usage of DSP-TV than male teachers. This finding contradicted the backend usage data, where male teachers had used more videos (TicTac Learn) than the female teachers (For more details, refer: Back-end data analysis, Figure 4.6.6). The interview data indicated most teachers used both YouTube and TicTac Learn on DSP-TV.

- **Teacher Digital Competence to Operate DSP-TV:** Regression analysis revealed factors related to the teacher's digital competence in operating DSP-TV significantly predicted usage. Specifically, teachers' being able to navigate the video content in DSP-TV significantly positively predicted higher usage.

  No other factors or categories in the survey data significantly predicted or were related to usage of DSP-TV.

- **Factors Showing Significant Association with Digital Competence in Teachers:** Younger teachers, less experienced teachers and teachers teaching at elementary grades reported higher digital competence in using DSP-TV than their counterparts.

- **Support for Teachers to Implement DSP-TV:** Support was explored regarding training and direct support from the implementation partner.

Most of the teachers in SIP than in SNP active schools reported that they received the training or orientation at least once from the implementation partner. The training was related to operating or using DSP-TV.

As stated by a teacher, *"Many of us did not know how to use a pen drive. They taught us. They taught us how to use content in pen drive, how to plan lessons and had also discussed how to combine TV content learning with traditional ways of learning. They also discussed how to integrate TV learning into the timetable."*

Many heads of SNP schools reported that their teachers either received no training or had inadequate orientation on using DSP-TV. Similarly, some SIP school heads also mentioned that their teachers did not receive any training. This highlights a gap in teacher preparation, which may impact the effective implementation of DSP-TV in classrooms.

A school head shared, *"No, the teacher did not undergo any training by Muskaan Dreams."*

The school heads reported that training was required for the teachers in DSP-TV use. As stated by a school head, *"We do not have a trained teacher so we are not able to use the TV for use" (School Head).* (For more details, refer: Findings of School Head Interview, Figure 4.4.39).

Some teachers reported for the requirement of training on use of DSP and pedagogy. As shared by a teacher from a SIP school, *"A training session should be conducted because the teachers are not aware of how to include DSP-TV in the lesson plan so it might be that the training session will help us to enable the DSP-TV in our daily lesson plan."*

Another teacher from a SNP school shared that, *"They should organize subject training. I personally feel the contents are unorganized and some are missing according to the lesson.*

4. Findings

The findings from the FGD, CRO, Teacher Interviews, and HM Interviews have been mentioned under nine themes: usage, access, participation, value-benefit, choice and decision making, challenges, monitoring and support, home and parental perception, and suggestions.

Table 4.1

Themes/Tools				
Themes/Tools	**FGD**	**CRO**	**Teacher interview & Engagement Survey**	**School Head Interview**
Usage	✓	✓	✓	✓
Access	✓	✓	✓	✓
Participation	✓	✓	✓	
Value-Benefit	✓	✓	✓	
Choice & Decision Making	✓			✓
Challenges	✓	✓	✓	✓
Monitoring & Support	✓		✓	✓
Home and Parental Perception	✓			✓
Suggestions	✓		✓	✓

4.1 Findings from Focus Group Discussion (FGD)

In this study, a total of 64 government schools were sampled across two districts of Madhya Pradesh (Gwalior and Indore), comprising 21 Schools Implementing (SIP) and 43 Schools Non-Implementing (SNP). Among these, three were exclusively for boys (Govt. Boys Middle Schools) and six were exclusively for girls (Govt. Girls Middle Schools) while and most of the schools (55/ 64) were co-educational, including Govt. Higher Secondary Schools (GHS) and Govt Middle Schools (GMS).

4.1.1 Purpose of FGD

FGDs were conducted to understand student engagement in DSP, which features multimedia e-content on TV. These discussions were designed to have semi-structured interview questions, creating a structured yet adaptable setting for students to express their experiences, insights, and feedback about the program. Through FGDs, students and researchers delved into nine central themes, which provided a comprehensive understanding of the program's influence on learning via DSP-TV-based classrooms. The summary has been presented under these themes (the questionnaire had many more themes) such as Usage, Access, Participation, Value-Benefit, Choice and Decision Making, Challenges, Monitoring and Support, Home and Parental Perception, and Suggestions.

4.1.2 Method of Selection of FGDs

The selection of classes for conducting FGDs was based on classroom observations. Only those classrooms where observations were conducted (15 SIP schools and 12 SNP Schools) were used for the FGDs. The researchers aimed to conduct two FGDs in each school—one in Math class and one in Science class. Schools where both FGDs were conducted included 10 SNP and 14 SIP schools, while schools where only one FGD was conducted included 2 SNP and 1 SIP schools.

In the co-educational schools where classroom observations were conducted, the sampling for FGDs was based on attendance and gender distribution during classroom observations, resulting in separate FGDs for boys and girls. If more girls were present at the time of observation, girls were chosen for the FGD in that classroom, and the same applied to boys. The researchers conducted separate FGDs

for boys and girls to maintain homogeneity, a fundamental principle of FGDs (Nagle & Nichelle, 2016; Greenbaum, 1998, p.32). This separation allowed the researchers to focus on gender-specific issues of engagement, aiming to identify any differences in behavior, practices, access, and perceptions between boys and girls in classes using DSP-TVs. By considering the distribution of students in the class based on attendance on the day of observation, researchers ensured a representative and balanced selection for the FGDs. Mixing boys and girls in the same FGD can lead to unequal participation due to socio-cultural dynamics, power imbalances, or gendered expectations that shape how individuals express themselves in group settings.

Before conducting the FGDs, researchers in the field sampled each group using random selection. This involved a method that included three counts and concluded once it reached 30% of the total number of students present in the class and in classrooms where the sample of 30% was more than ten students, the researchers stopped the counting at ten participants. The FGDs had a minimum number of participants of 4 and a maximum number of 10.

4.1.3 Method of Data Collection

The FGDs were conducted by research team members with selected groups of students. After selecting students for the FGDs, researchers ensured a safe space for all participants, typically an open area in the school or a separate classroom. Teachers were asked to remain away during the FGDs to prevent their presence from influencing student responses.

Initially, students were introduced to the researcher and the study, and informed about what to expect from the FGDs. Researchers asked questions and built on students' responses throughout the discussion.

4.1.4 Tools of Data Collection: FGD Questionnaire

For the FGDs, two distinct questionnaires were used for SIP and SNP schools. The SNP schools' questionnaire comprised 32 questions, while the SIP schools' questionnaire had 34 questions. Both sets of questions were open-ended, aiming to understand the use and accessibility of DSP-TVs in classrooms, classroom practices, content, and the perceptions of students and parents regarding DSP-TV learning. Sample questions included:

- Who runs the DSP-TVs? How much time does it take to start? What challenges are faced in the starting?
- Which do you prefer – DSP-TV or Non-DSP-TV classes? Give reasons.
- Do you think DSP-TV content is more useful than books? Could you explain how?

4.1.5 Data Collection and Documentation

i. Recording Responses

The data collection process for the FGDs involved the use of handwritten notes and audio recordings in smartphones. The questionnaire included open-ended questions, and when students in a group provided different answers to the same question, researchers tallied the responses through a show of hands, recording this as numerical data or frequencies. For instance, if 4 out of 10 students in a FGD preferred Math videos over Science videos, this was noted. Researchers also documented the reasons behind students' preferences, perceptions and practices, using follow up questions.

When documenting student responses, researchers aimed for consensus, defined as 80-100% agreement among students, with the unit of analysis being the total number of FGDs. When responses were varied and multiple different answers were given to the same question within the same group, the unit of analysis shifted to the total number of responses across all FGDs. There are four variables for which responses were used as the unit of analysis in FGDs: student preference for class types, comparison of student questioning practices between DSP-TV and non-DSP-TV classes, effectiveness of DSP-TV content in terms of memory retention, and student choice of activities in DSP-TV classes.

For varied responses, researchers used terms such as 'most' (more than 75%), 'many' (60%-74%), 'several'(40%-59%), 'some' (15%-39%) and 'a few' (0-14%) along with the corresponding frequency in brackets, to accurately represent the data.

ii. Analysis

Subsequently, the handwritten notes and audio recordings from the data collection were transcribed into English. These transcriptions were then imported into MAXQDA, a qualitative data analysis software, for thematic analysis. During the coding process, relevant codes were assigned to the FGD transcriptions, which were then organized into themes and sub-themes. The summary presented here is structured according to the respective themes and questions outlined in the questionnaire.

iii. Participants- School, Class Grade, Subject and Gender of the Students at FGD

FGDs were carried out in a subset of the sampled schools, specifically in 27 out of the 64. Among these, 15 schools belonged to the category of Schools Implementing (out of 21 SIP), while 12 schools were Schools Non-Implementing (out of 43 SNP). The reason for this selective participation lies in the criteria set for conducting FGDs. Notably, schools falling under SNP categories 4 and 5 (where the utilization of DSP-TV had ceased for more than three months), schools falling under SIP schools (where the utilization of DSP-TV had ceased for more than three months) along with those experiencing electricity shortages, teacher absence or damaged devices, were excluded from observation and FGD sessions.

Below is a table presenting schools where FGDs were not conducted and the constraints:

Table 4.1.1

Number of Schools Where FGDs were Not Conducted and the Constraints				
Sr. no	**Reasons of Exclusion from FGDs**		**Number of Schools**	**Total**
1	**Schools in SNP, where FGDs Didn't Happen**			
	Schools in SNP category 4 and/or 5	Schools experiencing electricity shortages	21(SNP)	31
	Schools in SNP category 1,2,3	Schools experiencing issue in locating the device	2(SNP)	
	Schools in SNP category 1,2,3	Schools experiencing missing content in pendrive	3(SNP)	
	Schools in SNP category 1,2,3	Schools experiencing loss of pendrive	3(SNP)	
	Schools in SNP category 1,2,3	Schools experiencing malfunctioning of electricity related parts (switches, wiring, etc.)	2(SNP)	
2	**Schools in SIP, where FGDs Didn't Happen**			
	Schools in SIP category 1,2,3	Schools experiencing electricity shortages in SIP	4(SIP)	6
	Schools in SIP category 4 and/or 5	Schools experiencing damaged devices	1(SIP)	
		Schools experiencing stealing of TV	1(SIP)	

In total, there were 37 (31 SNP and 6 SIP) such schools that did not undergo FGDs due to these constraints. This data also suggests that about 28.5% of SIP schools and 72% % of SNP schools were not available for data collection for FGDs indicating non-functioning of DSP.

CROs were conducted in 53 classes (30 in SIP and 23 in SNP). After these observations, the researchers initiated FGDs and discovered that classes had not been held for the past three months in some schools, leading to the cancellation of FGDs in two instances.

Overall, 51 FGDs were conducted (29 in 15 SIP schools and 22 in 12 SNP schools). Of the 51 FGDs, 22 were with boys' groups and 29 were with girls' groups. The table below details the number of FGDs conducted based on gender and school type.

Table 4.1.2

Number of FGDs Based on School Type, Gender and Strength							
Sr. no	School Type	FGD with Boys	FGD with Girls	Total FGDs	Boys (Total)	Girls (Total)	Total Student Strength
1	SIP	11	18	29	65	121	186
2	SNP	11	11	22	74	59	133
Total		**22**	**29**	**51**			**319**

Among the 29 SIP FGDs conducted, 15 FGDs were carried out following observations in Science classrooms, while the 14 FGDs were carried out following observations in Math classrooms. Below is a table that summarizes SIP FGDs subject wise:

Table 4.1.3

FGDs in SIP Schools Subject Wise			
SIP Science FGDs (N- 15)		SIP Math FGDs (N-14)	
Class Grade	Number of FGDs	Class Grade	Number of FGDs
6th	2	6th	0
7th	4	7th	5
8th	5	8th	5
9th	2	9th	2
10th	2	10th	2

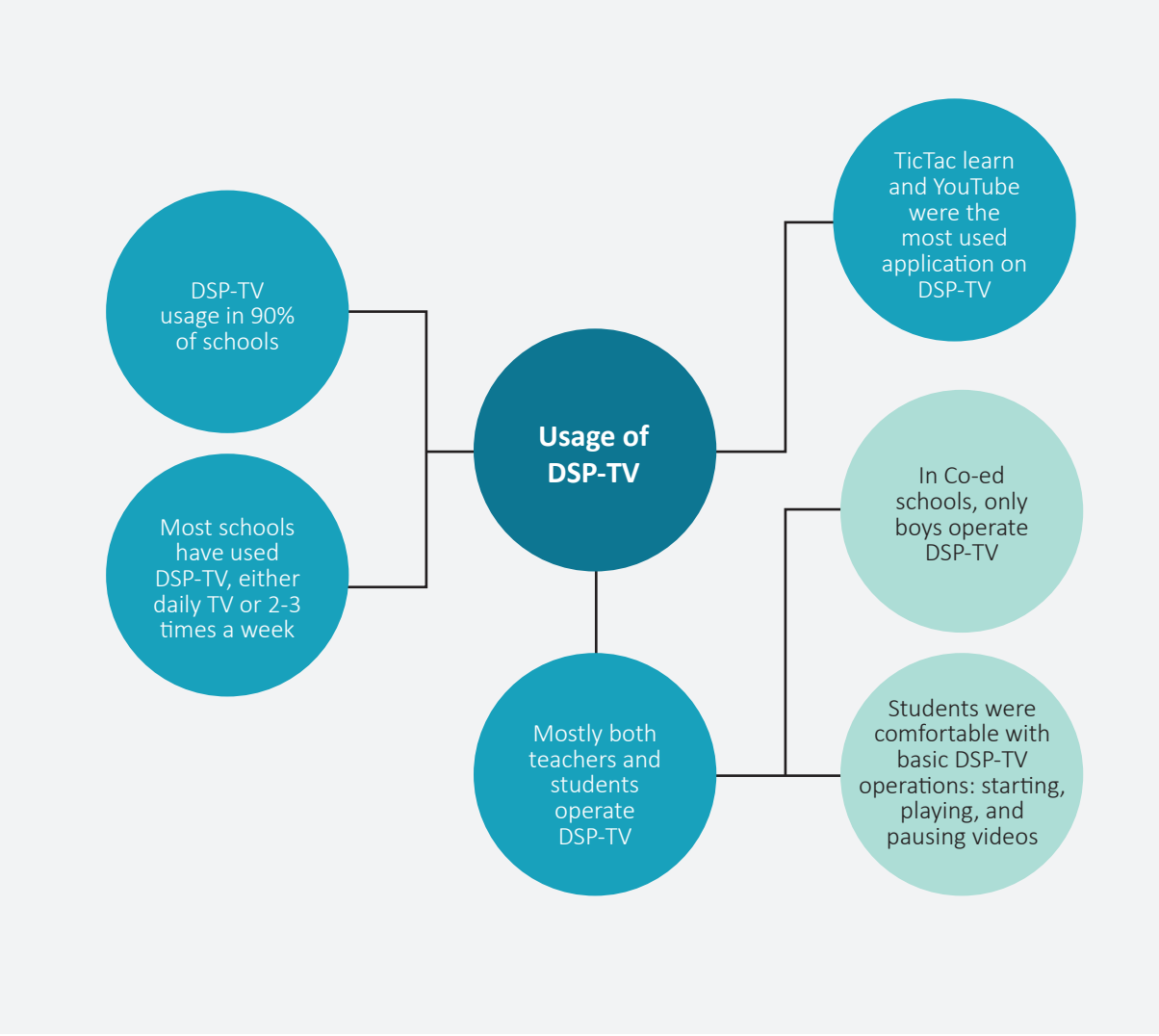
Among the 22 SNP FGDs conducted, half were carried out following observations in Science classrooms, while the remaining half followed observations in Math classrooms. Below is a table that summarizes SNP FGDs subject wise:

Table 4.1.4

FGDs in SNP Schools Subject Wise			
SNP Science FGDs (N-11)		SNP Math FGDs (N-11)	
Class Grade	Number of FGDs	Class Grade	Number of FGDs
6th	2	6th	1
7th	2	7th	2
8th	4	8th	4
9th	0	9th	1
10th	3	10th	3

4.1.6 Usage of DSP-TV

Figure 4.1.1: Finding from FGD - Usage of DSP-TV



i. Summary of Findings from FGD: Usage of DSP-TV

Findings on the usage of DSP-TV in schools showed that 90% of the active schools where FGDs were conducted had integrated the device into their educational practices. TicTac Learn and YouTube emerged as the most frequently used applications on DSP-TV.. Both teachers and students generally operate the TV, although in co-ed schools, only boys were observed operating it. Students reported comfort with basic operations such as starting, playing, and pausing videos. The frequency of DSP-TV usage varied between daily or 2-3 times a week.

ii. Frequency of Weekly Usage

The frequency of usage of DSP-TV was documented. A conversion method to standardize various frequency descriptors into a consistent measurement of days per week was employed in MAXQDA. The weekly usage of DSP-TV was reported in 26 FGDs in SIP schools (out of 29 total FGDs) and 20 FGDs in SNP schools (out of 22 total FGDs).

The weekly usage of TVs in SIP and SNP schools and the number of FGDs reporting are shown in the bar graphs below:

The x-axis in Fig. 4.1.2 represents how often DSP-TVs were used in SIP schools, while the y-axis indicates the count of FGDs (26 in SIP schools) reporting that particular frequency of usage. In a specific instance within SIP FGD, it was noted that the DSP-TV was utilized approximately once every two months. Another scenario revealed that the DSP-TV was employed only twice a month. These occurrences may be linked to students' inability to recall the most recent instance of DSP-TV usage at school, suggesting infrequent usage in their schools.

The x-axis represents the reported frequency of usage of DSP-TV in SNP schools and the y-axis shows the count of FGDs (20 SNP) that noted this frequency of usage (Fig. 4.1.3).

Therefore, the data highlights the usage of DSP-TVs in most SIP and SNP schools (46/51 FGDs) and the differences in usage frequency between SIP and SNP schools in the graphs, with some SIP schools showing notably infrequent use of DSP-TVs.

Figure 4.1.2: Frequency of Usage SIP schools (FGD)

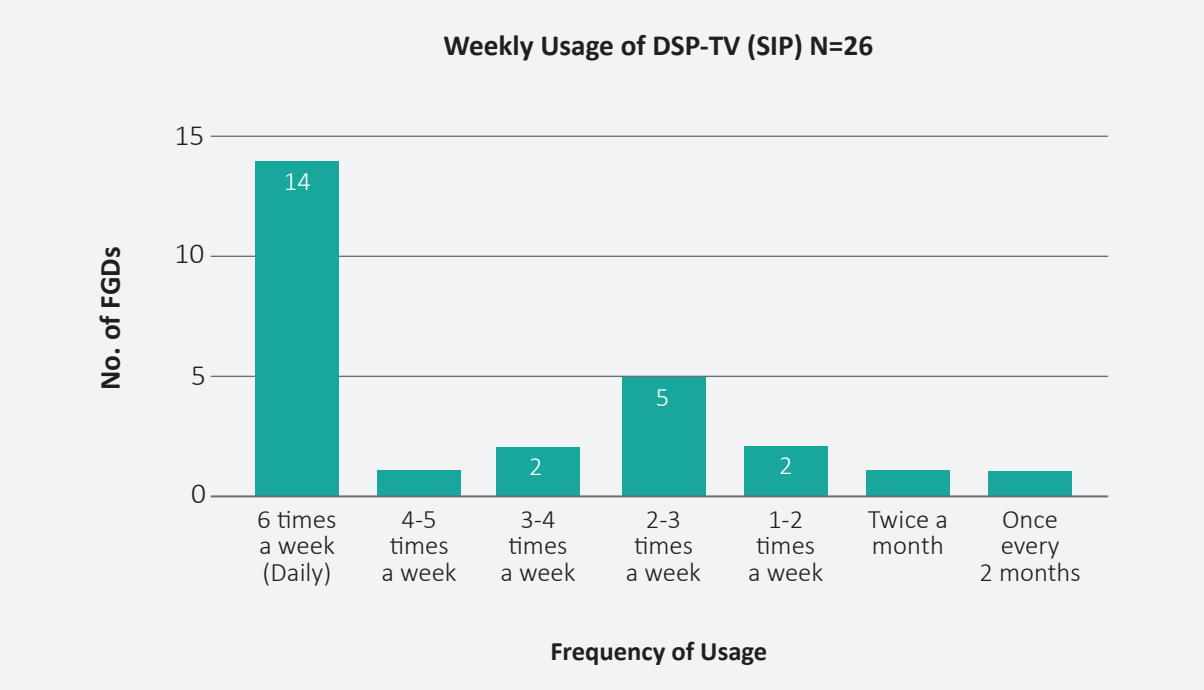
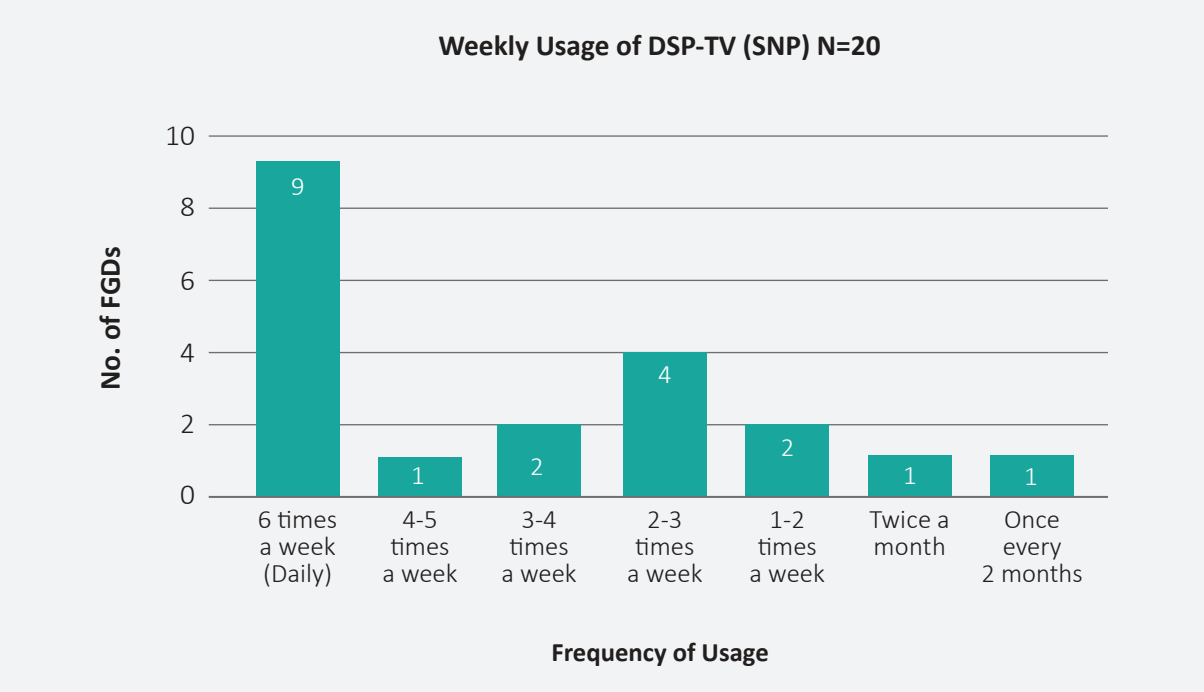


Figure 4.1.3: Frequency of Usage SNP Schools (FGD)



iii. Operating DSP-TVs

In both the SNP and the SIP schools, there was a comprehensive exploration of student involvement in operating DSP-TVs, highlighting varying levels of proficiency and gender dynamics.

- **Who Operates the DSP-TV?**

In SIP schools, out of the 29 FGDs held, several groups (16/29 FGDs) predominantly mentioned both students and teachers to have operated the TV and remote. In contrast, few (9/29 FGDs) groups indicated schools where only teachers manage the DSP-TV without student involvement. There are a few instances (3/29 FGDs) of senior students operating the TVs, as exemplified by the statement,

"Teachers bade class k bacho ko bulati hai aur vo TV chalate hai./Teachers call upon older students and they operate the TV." (7th grader)

The remaining one FGD among the 29 FGDs in SIP schools did not respond to this questionnaire item.

Among those SIP schools, where both teachers and students operate the TVs, when enquired on the gender of the students who help teachers in operating the TVs, many students (6/16 FGDs) reported boys being able to operate and not girls. For instance, *"Hamare class me zyadatar, teacher hi TV chalate hain, ek student (ek ladka) hi hai jisko Tv chalana aata hai. Mostly the teacher runs th e TV, one student (a boy) can also operate."* (8th Grader)

Conversely, many students (10/16 FGDs) also reportedthat both boys and girls could operate the TV in their class. For instance, "*Hamare class me dono ladke aur ladkiya TV chala skte hai/ In our class, both boys and girls can operate the TV."* (7th Grader)

In the SNP data, out of the 22 FGDs held, many groups (13/22) predominantly mentioned both students and teachers operate the TV and remote. In contrast, a few (7/22) groups indicated that only teachers manage the DSP-TV without student involvement, with two instances where of students reporting of male teachers solely operating the TVs, as exemplified by the statement,, *"Zyadatar sir chalate hai TV, Mam ko nahi aata"/ Mostly, the male teachers operate the TV, the female teachers don't know how to operate the tv."* (10th Grader). The remaining 2 FGDs among

total 22 in SNP schools, did not respond to this questionnaire item.

Among those SNP schools, where both teachers and students run the TVs, when enquired on the gender of the students who help teachers in operating the TVs, many (7/13) FGDs showed boy students being able to operate and not girls. For instance, *"Hamare class k zyadatar ladko ko aata hai, girls ko nahi ata/Most boys in our class know how to operate the tv, but the girls don't." (10th Grader)* and *"Saare ladke chala sakte hai, ladkiya nahi kyuki hume chalana nahi aata/All the boys can operate it, but not the girls because we don't know how to operate it."*
(9th Grader).

A few (6/13) FGDs reported that both boys and girls could operate the TV in their class. For instance, *"Jab teacher ko koi kaam hota hai to dono boys aur girls class me TV chala sakte hai/ When our teacher is occupied, both boys and girls can operate the TV in the class.*" (6th Grader).

In the combined data from SIP and SNP schools, out of 51 FGDs, 29 reported both students and teachers operating the TV, 16 indicated only teachers manage the TV (with 2 noting solely male teachers), and 3 noted senior students operate the DSP-TV, with 3 FGDs not responding. Among the 29 FGDs where both students and teachers operate the DSP-TV, 13 stated only boys operate it, while 16 reported both boys and girls can operate the DSP-TV.

- **Type of Operation on DSP-TVs**

In SIP schools, out of the 29 FGD surveyed, 25 reported that students were comfortable with operations like 'starting, playing, rewinding, pausing, and changing content' on the DSP-TV.

However, the data highlights a varied level of proficiency among students in operating TVs and remote. For example, all possess basic features (starting, playing and pausing the videos) in operating the TV, only a few (13/25) are adept at advanced features (rewinding and changing content). Notably, all the 13 groups who could perform advanced features were boys, suggesting a gender disparity in technical proficiency with DSP-TVs. For instance, *"Zyada tar ladke remote handle karte hain, videos ko aram se start, rewind aur pause kar sakte hain/Most boys handle the remote, can start, rewind and pause videos easily."*
(9th Grader)

Many students (8/25) attribute their familiarity with TV operations to home use and guidance from teachers. For instance, *"Hum ghar pe TV chalate hain isliye hamein remote ka pata hai. Sir ne bhi hamein remote chalana sikhaya hai/We run TV at home so we are familiar with the remote. Sir has also taught us how to operate the remote"* (9th Grader), and another student added *"Sir ne hamein videos aur YouTube se connect karna aur handle karna sikhaya hai/Sir has taught us how to handle and connect to videos and YouTube."*
(8th Grader)

In SNP schools, it was found that students who were given the chance by the teachers to operate could perform functions like 'pause, play, rewind, forward, stop and search' on the DSP-TVs. For instance, *"Hum log videos ko play, pause, rewind, forward, stop kar sakte hai/ We can play, pause, rewind, forward, and stop videos"* (7th Graders), and *"Hamar class k bache sab kar sakte hai TV par jaise play, pause, stop, rewind aur search bhi/ The children in our class can do everything on the TV, like play, pause, stop, rewind, and even search."*
(10th Graders)

In combined data from SIP and SNP schools, out of 51 FGDs, 47 reported students were comfortable with basic DSP-TV operations like starting, playing, and pausing videos. However, proficiency in advanced features like rewinding and changing content was noted in 21 FGDs (13 SIP and 8 SNP). Notably, in SIP schools, all 13 groups proficient in advanced features were boys, highlighting a gender disparity. Many students (18/51 FGDs) credited their familiarity with TV operations to home use and teacher guidance.

- **Additional Digital Tools Used by Teachers**

In understanding the adoption of additional digital tools by teachers during classes, findings from both the SIP and the SNP show similar trends. Most of the SIP (24/29 FGDs) indicated

that teachers primarily rely on the DSP-TV, with minimal use of other digital devices. However, a few groups (5/29 FGDs) noted instances where teachers resort to using personal phones and mobile data for instructional purposes on the TV, by using YouTube videos in their phones to play content on the TVs.

Similarly, SNP findings align with SIP, showing that many (14/20 FGDs) reported no utilization of additional digital devices by teachers in class. Despite this, a few groups (6/20 FGDs) highlighted the occasional use of personal phones and mobile data by teachers for instructional needs, often using YouTube videos as supplementary material.

Overall, both SIP and SNP data indicated that teachers frequently used DSP-TV for teaching, and sometimes used personal phones and mobile data as supplementary instructional tools, particularly when incorporating content from platforms like YouTube. Notably, there were no instances reported of teachers utilizing other devices for accessing digital resources in the FGDs.

In combined data from SIP and SNP schools, out of 49 FGDs, 38 indicated that teachers primarily rely on DSP-TVs with minimal use of other digital devices. However, 11 FGDs reported instances where teachers used personal phones and mobile data to play YouTube videos on the TVs for instructional purposes. This trend was observed in both SIP (5/29 FGDs) and SNP (6/20 FGDs) schools.

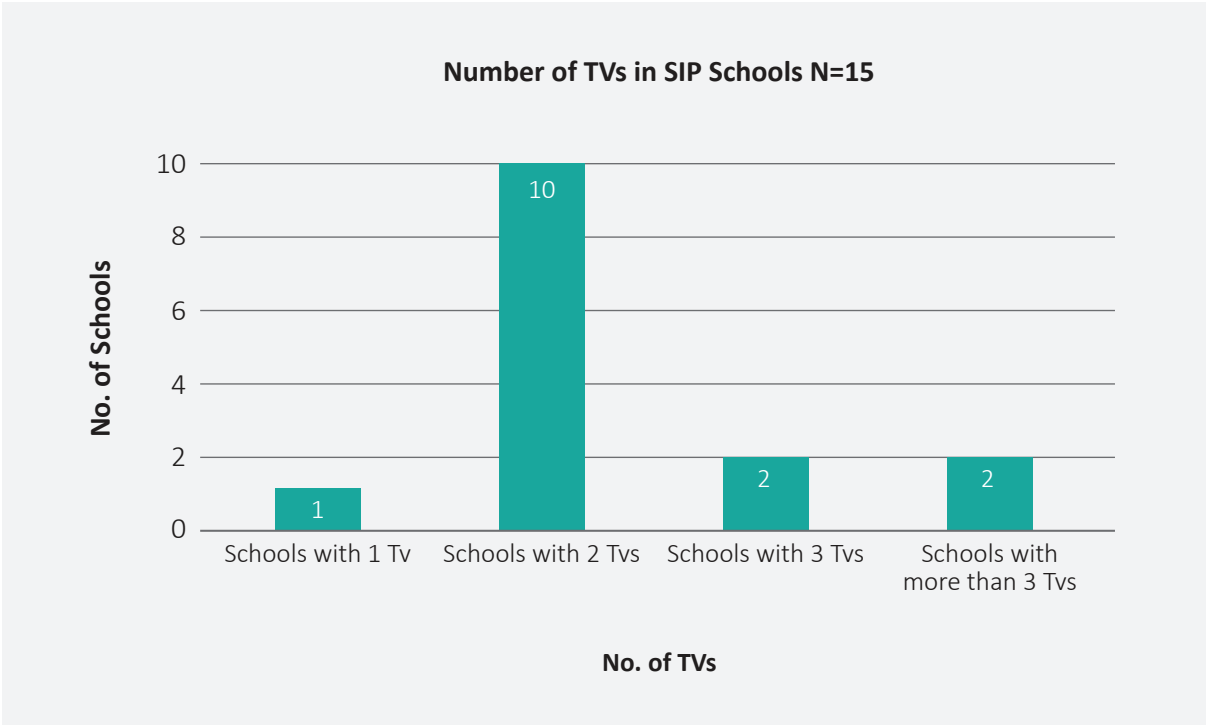
4.1.7.Access to DSP-TV

i. Number of DSP-TVs

The researcher gathered and analyzed responses from FGDs conducted in both SIP and SNP schools to determine the number of TVs mentioned by students in each group. The researcher checked that students in both FGDs within the same school reported the same number of TVs and found that students across all FGDs in the SIP and SNP schools reported similar numbers of TVs for the two separate FGDs (FGD1 and FGD2). By counting show-of-hand responses, the researcher recorded the number of TVs present in each school, categorizing them as schools with one TV, two TVs, three TVs, or more than three TVs.

The count of TVs across the 15 SIP schools, which hosted a total of 29 FGDs, was documented. The bar graph below illustrates the distribution of TVs in SIP schools.

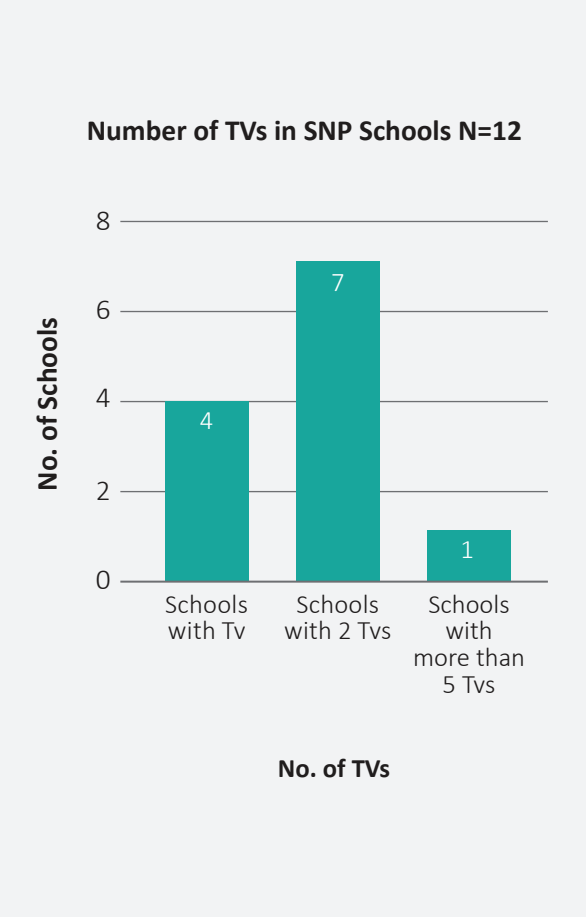
Figure 4.1.4: Number of DSP-TVs in SIP in Schools (FGD)



The x-axis in the Fig, 4.1.4 represents the number of reported DSP-TVs and the y-axis represents the number of schools (15 SIP).

The total count of TVs across the 12 SNP schools, which hosted a total of 22 FGDs, was documented. The bar graph below illustrates the distribution of TVs in SNP schools.

Figure 4.1.5: Number of DSP-TVs in SNP Schools (FGD)



The x-axis in Fig. 4.1.5 represents the number of reported DSP-TVs and the y-axis represents the number of schools (12 SNP).

ii. Awareness of TicTac Learn

In both the SNP and the SIP, an evaluation was conducted to gauge students' familiarity with the term "TicTac Learn" as it pertains to their TV viewing experiences.

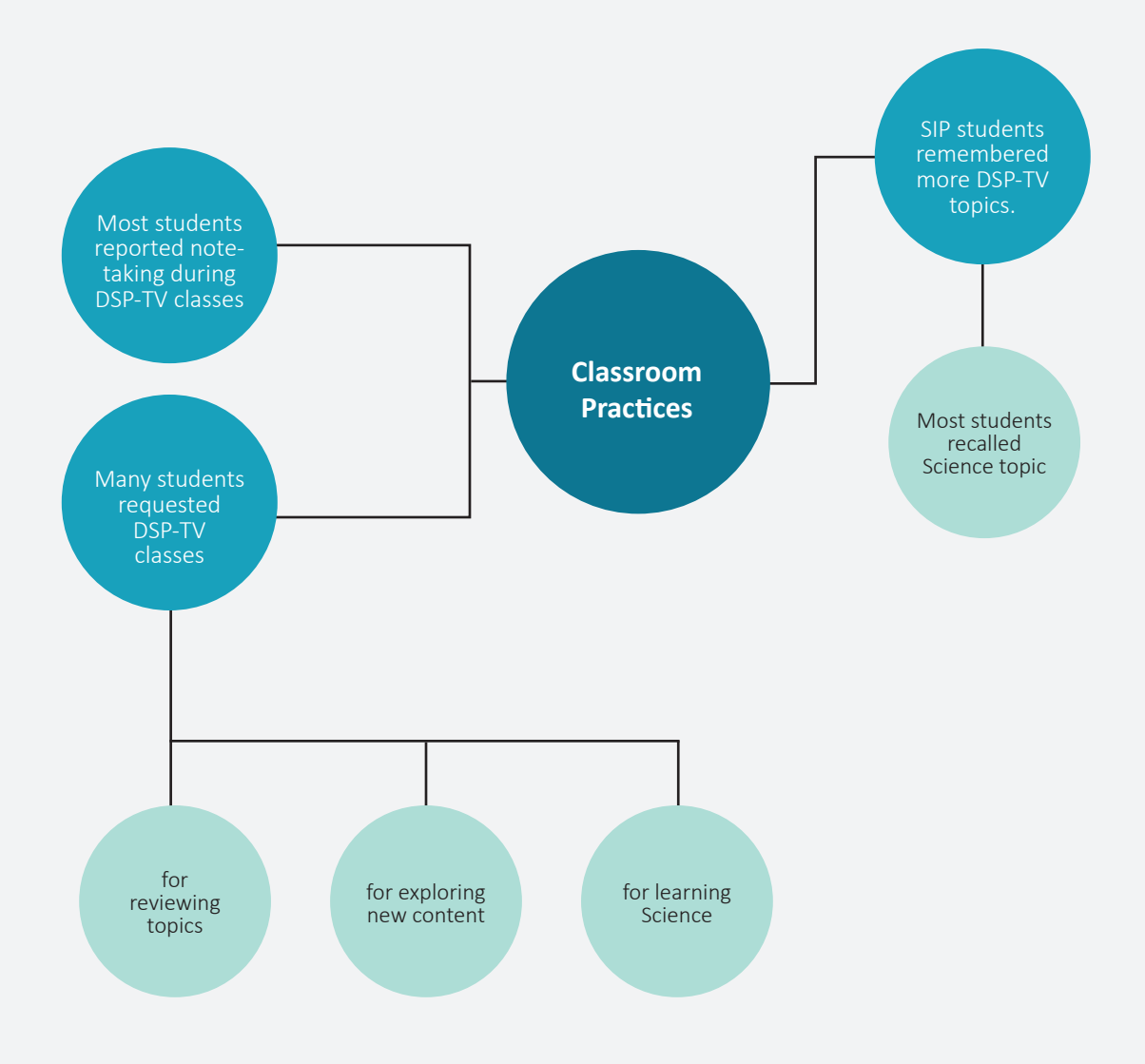
In SIP schools, data from most (28 /29 FGD) discussions revealed that students had never heard or noticed the term "TicTac Learn'' while the MME was played on the TV.. However, there was one exception where students reported noticing "TicTac Learn'' at the start of the videos, as described by one group who remarked,
"Ye Padhai ki videos hoti hai jo hum TV pr dekhte hai/These are educational videos that we watch on TV."
(8th Graders)

Similarly, in SNP schools, findings from most (20 /22 FGDs) discussions indicated that students had never heard or noticed the term "TicTac Learn" while the videos was played on the TV. Nevertheless, there were two instances where students reported noticing "TicTac Learn" at the beginning of the videos.

In combined data from SIP and SNP schools, out of 51 FGDs, 48 revealed that students had never heard or noticed the term "TicTac Learn" on the TVs. Only 3 FGDs reported students noticing "TicTac Learn" at the start of the videos (1 SIP and 2 SNP). This indicates a general lack of familiarity among students with the term "TicTac Learn" in their TV viewing experiences.

4.1.8 Classroom Practices

Figure 4.1.6: Finding from FGD: Classroom Practices



i. Summary of Findings from FGD: Classroom Practices

Findings from FGDs on classroom practices indicated that most students engaged in note-taking during DSP-TV classes, underscoring their active participation. Many students expressed a preference for DSP-TV sessions, particularly for reviewing topics, exploring new content, and learning Science. Students in the SIP showed a higher recall of DSP-TV topics, with the majority of them remembering Science videos in particular. This highlights the effectiveness of DSP-TV in enhancing subject retention, especially in Science.

ii. Note Taking

In combined data from SIP and SNP schools, out of 51 FGDs, 41 reported that students engage in note-taking during DSP-TV classes. Among these, 22 FGDs indicated that students take notes both independently and when instructed by the teacher, 12 FGDs noted that students take notes solely on their own initiative, especially for challenging or important information, and 7 FGDs reported that students only take notes when explicitly instructed by the teacher. The remaining 10 FGDs (6 SIP and 4 SNP) reported that students do not take notes during DSP-TV classes.

In both SIP and SNP schools, questions were asked about note-taking during DSP-TV classes. The data highlights the common practice of note-taking among students, indicating a blend of independent initiative and teacher guidance in the learning process.

In SIP schools, most students (23/ 29 FGDs) reported engaging in note-taking during DSP-TV classes. Among them, many (13/23 groups) mentioned taking notes both independently and when instructed by the teacher, as exemplified by the quotes, *"Hum apne aap bhi notes banate hain aur jab teacher kahe ki likhna zaroori hai, tab bhi/We make notes ourselves as well as when the teacher says that it is important to write"* (9th Graders), and *"Hum kabhi-kabhi apne aap notes lete hain. Jab kuchh important hota hai toh teachers hamein bhi notes lene ko kehte hain, isliye hum likhte hain/We take notes ourselves sometimes. Teachers also ask us to take notes when something is important so we write."*
(7th Graders)

Some students (6 /23 FGDs) rely solely on their own motivation to take notes, especially when faced with challenging or important information. For example, *"Hum khud notes banate hain jab kuch yaad rakhna mushkil lagta hai/We make notes ourselves when something seems difficult to remember"* (6th Graders) and *"Jab hum kuch samajh nahi paate, hum usse likh kar phir teacher se puchte hain. Hum wahi bhi note kar lete hain jo hum achhe se samajh lete hain, taki baad mein dekh sakein/When we don't understand something, we write it down and then ask the teacher. We also jot down what we comprehend well for future review."*
(7th Graders)

A few students (4 /23 FGDs) indicated that they only take notes when explicitly instructed by their teachers. For instance, *"Hum notes banate hain jab teacher kehti hai ki likhna zaroori hai/ We make notes when the teacher says that it is important to write"* (10th Graders) and *"Haan, hum notes banate hain jab sir hamein keh dete hain/Yes, we make notes when sir tells us to."*
(8th Graders)

The remaining 6/29 FGDs in SIP schools, students reported that they do not take notes during DSP-TV classes as they don't feel the need.

In SNP schools, a similar trend is observed, with most students (18/22 FGDs) reporting making notes during DSP-TV classes. Among these, several students (9/18 FGDs) mentioned taking notes both independently and when instructed by the teacher. For instance, *"Jab kuch yad karne k liye likhna ho. Kabhi kabhi jab teacher bolte hai to bhi likh lete hai jaise formula/When we need to write to remember something. Sometimes, when the teacher tells us, we also write, like formulas"* (9th Graders) and *"Hum khud bhi likhte hai jab kuch important hota hai. Sir bhi bolte hai to hum note kar lete hai/We also write ourselves when something is important. We also take notes when sir tells us to."*
(8th Graders)

Many students (6/18 FGDs) said they make notes on their own without teacher prompting. For instance, *"Hum khud notes banate hai taki badme ye yaad rahe aur revise bhi kar paye/We make notes ourselves so that we can remember them later and also revise"* (7th Grader) and *"Hum notes banate hai khud se jab hume kuch zaruri lagta hai ya mushkil lagta hai/We make notes ourselves when we feel something is important or difficult."*
(9th Grader)

A few students (3/18 FGDs) said they make notes only when explicitly instructed by the teacher. For instance, *"Jab mam bolti hai tab likhte hai/ We write when ma'm asks us to."*
(9th Grader)

In the remaining 4 out of 22 FGDs in SNP schools, students reported that they do not take notes during DSP-TV classes.

iii. Students Remembered Topics

In both the SNP and the SIP schools, students' recall of topics learned in DSP-TV classes was assessed.

In SIP schools, most students (25/29 FGDs) groups remembered and mentioned the topics learned in DSP-TV classes. Most of the students recalled topics from science (16/25 FGDs), such as 'Jeevo me poshan' (Nutrition among organisms), 'Sharak/Amal/Lavad'(Acid, Bases and Salt), and 'Paryavaran Suraksha' (Environment safety). Additionally, topics from Mathematics were mentioned by some students (9/25 FGDs), including 'Aakdo ka prabandhan'(Data handling) and 'Do char wale sameekaran'(Equations with two variables). However, 2 out of 29 student groups had no memory of the last topic learned on the DSP-TV and 2 out of 29 student groups did not respond to the question.

Similarly, in SNP schools, many students (14/22 FGDs) groups remembered the topics learned in DSP-TV classes. Among these, several students (7/14 FGDs) named topics from Science such as 'Bal tatha Daab (Force and Pressure), Ushma(Energy), Poshan(Nutrition), Saur Mandal(Solar syatem) and some (6/14 FGDs) named topics from Mathematics such as 'Bahupad (Polynomials), Do char wale sameekaran (Equations with two variables) and Aakdo ka Prabandhan (Data handling)'. Additionally, a few students (1/14 FGDs) mentioned topics learned on YouTube for subjects other than Math and Science, such as 'English me Lencho chapter' and *"Humne English me video dekhi chapter Seagull ki/ We watched a video in English on the chapter "Seagull."* However, 8 out of 22 student groups either had no memory of the last topic learned (5/8 FGDs) on the DSP-TV or did not respond (3/8 FGDs) to the question.

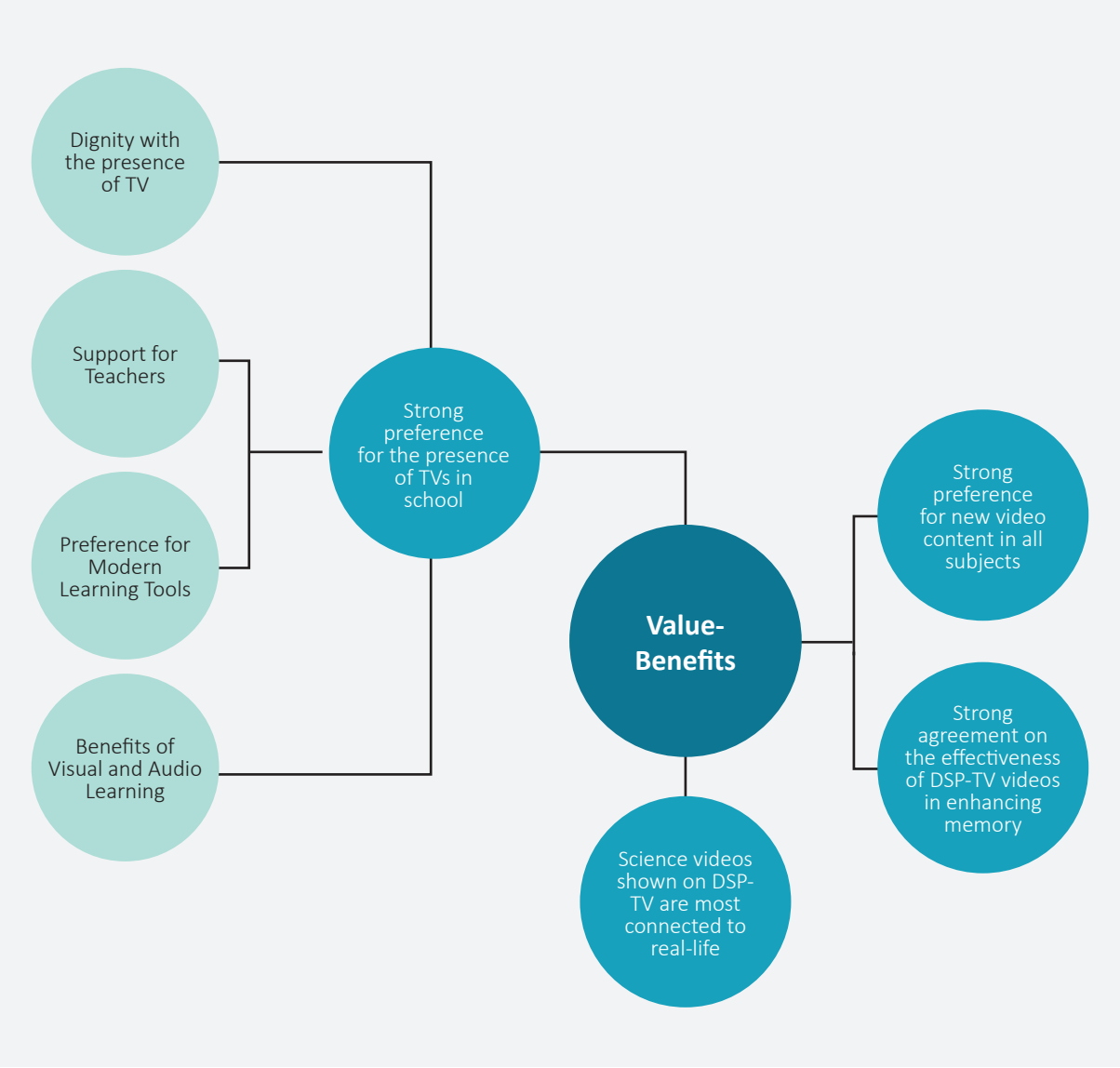
In combined data from SIP and SNP schools, students' recall of topics learned in DSP-TV classes was assessed. Out of 51 FGDs, 39 groups remembered and mentioned the topics learned. Most students recalled Science topics, with 23 FGDs citing subjects like 'Jeevo me poshan,' (Nutrition among organisms), ''Bal tatha Daab((Force and Pressure),' and 'Saur mandal,' (Solar system) and 15 FGDs recalling Mathematics topics such as 'Aakdo ka prabandhan'(Data handling) and 'Do char wale sameekaran'(Equations with two variables). Additionally, 1 FGD mentioned non-Math and Science topics learned via YouTube, like 'Lencho chapter' in English. However, in 10 FGDs students had no memory of the last topic learned (7 FGDs) or did not respond to the question (3 FGDs).

4.1.9 Value-Benefits: Student Perceptions of DSP-TV Classes in Schools

i. Summary of Findings from FGD: Value Benefits

Findings from FGDs on Value-Benefits of DSP-TV, students expressed a strong preference for the presence of DSP-TV in their schools, associating it with a sense of dignity and pride. They recognized its role in supporting teachers and voiced a preference for modern learning tools, valuing the combination of visual and audio learning that DSP-TV offers. Science videos, in particular, were seen as highly relatable to real-life experiences. There was widespread agreement that videos significantly enhanced memory retention, and students showed a strong preference for receiving new videos content across all subjects.

Figure 4.1.7: Finding from FGD: Value-Benefits



ii. Perception of Students on Presence of DSP-TVs in the School

Findings of FGDs from 15 SIP schools indicate a strong preference among students for the presence of TVs in their school environment. Most (27/29) FGD groups reported a liking towards learning from DSP-TVs in their school. The reason for liking DSP-TV varied as below:

- ***Benefits of Visual and Audio Learning:*** Many students (8/27 groups) highlight the benefits of visual learning through TV, such as clear explanations, the use of images, videos, and animations, which aid in comprehension, revision, clearing doubts and imparting new information. For instance, *"TV par dekhi aur suni hue cheeze ache se samjh aa jati hai to acha lagta hai/Watching and listening to things on TV and understanding them well feels good"*, and in another instance, *"Ache se samjh me aata hai TV se, photos aur aawaaz se samjhna asan hota hai, aur ise hum kabhi bhi dekh skte hai/Understanding through TV is easy because it's easy to comprehend through photos and sound, and we can watch it anytime"* and *"Acha lagta hai TV se nayi nayi cheez dekh kar padhne me/It's nice to read by watching new things on TV."*

- ***Preference for DSP-TV Classes: DSP-TV Makes learning easy:*** There's a notable preference among some students (7/27 FGDs) for TV classes in school because they find it easier to understand concepts through videos. For instance, "*Acha lagta hai kyuki dekh kar aur sun kar samajhna aasan ho jata hai/It feels good because understanding becomes easier by watching and listening"* (7th Graders) and *"Saral tareeke se batate hai videos me/Videos make it easy to understand by explaining things in a simple manner." (8th Graders)*

A few students (3/27 FGDs) appreciate the flexibility of being able to access TV content anytime. For instance, '*'Ache se samajh me aata hai TV se, aur ise hum kabhi bhi dekh sakte hai/ TV helps us understand things well, and we can watch it anytime"* (10th Graders) and '*'Ache se samjh me aata hai TV se, photos aur aawaaz se samjhna asan hota hai, aur ise hum kabhi bhi dekh skte hai/Understanding through TV is easy, as it's easy to comprehend through photos and sound, and we can watch it anytime." (8th Graders)*

iii. Dignity with the Presence of DSP-TV in School

- ***Comparison with Private Schools:*** Some (6/27 FGDs) students express positive sentiments towards TVs in school, appreciating the use of technology in education, comparing their school with other perceived better or private schools indicating a desire for parity or advancement in resources. For instance, *"Saare ache schools ki tarah haamre school me bhi TV se padhate hai/Just like all good schools, our school also teaches using TV"* (7th Graders) and "*Achi baat hai k hamare school me bhi, bade schools ki tarah TV se padhate hai/It's a good thing that in our school too, like in big schools, teaching is done through TV."* (9th Graders) One group mentioned the comparison of their school (rural) with schools in cities. 5/6 students in this group noted *"Gaon me bhi schools me TV hona achi baat ha, kyukii hamare dost jo shehar jate hai unke school me hota ha TV/ It's good to have TVs in village schools too, because our friends who go to the city have TVs in their schools." (9th Graders)*

- ***Preference for Modern Learning Tools:*** Few (3/27 FGDs) students express a preference for incorporating technology into their learning. They mention enjoying learning through TV because it provides a different perspective and helps them grasp concepts that might be challenging through traditional methods alone.

  *For instan*ce, 'TV pe padhna acha lagta hai, ye achi bat hai k hamare school me bhi TV jaise naayi cheezo se padha rahe hai/It's nice to study using TV; it's good that our school is also teaching w*ith new things like TV" and "Sab jagah technology aa rahi hai, to hume bhi usske istemal se pardhne me acha lagta hai/Technology is coming everywhere, so we also enjoy studying using it."*

In SNP Schools, all 22/22 FGD groups reported a liking towards learning from DSP-TVs in their school. The reasons for liking DSP-TV varied as discussed below:

- ***General Liking of Devices in the School:*** Many students (7/22 FGDs) said they like that their school has a TV because they like studying from it. For instance, *'Bahot acha lagta hai k TV se padhte hai/It feels very good to study on TV" and "TV se padhna Acha lagta hai/We like studying on TV."*

  A few among these (2/7 FGDs) said they liked TV under certain conditions. One group pointed to the condition of usage of DSP-TV for entertainment in the form of 'Bal sabhas' (Children's Assembly) on Saturdays as a reason to like TV in school *"Bal Sabhas hoti hai tab acha lagta hai/It feels good when there's Bal Sabhas (Children's Assembly."* Another group pointed to the regular operation of DSP-TV as a condition to like it in their school, saying "*Acha lagta hai jab TV istemal hota hai/It feels good when TV is used."*

- ***Comparison with Private:*** Interestingly, many (7/22 FGDs) students also compared the presence of TV in their school with a private school and gave this as a reason for liking TVs in their school. For instance, '*Hamare schoole me bhi private schools jaise achi cheeze hai/* Our school also has good things like private schools.

- ***Learning Beyond Textbooks:*** Some students (6/22 FGDs) expressed their appreciation for having a TV in school because it contributes to learning outside their course material. For instance, *"Acha lagta hai kyuki TV se dekh kar hamare paas kitab ke bahar cheeze samjhne ka mauka hota hai/It feels good because through TV, we get the opportunity to understand things beyond the books"* and *"TV ko dekhkr hum kuch naya seekhte hai. Jo padhkar samjh nahi ata vo dekhkar aata hai/ By watching TV, we learn something new. What we don't understand by reading, we grasp by watching."*

- ***Support for teaching:*** A few students (2/22 FGDs) also noted that the usage of TV supports teachers, stating that *"TV se samjhne me acha lagta hai aur teacher ko bhi padhane me madad milti hai/It feels good to understand through TV, and it also helps the teacher in teaching."*

In combined data, students in SIP and SNP schools overwhelmingly prefer DSP-TVs, with 49 out of 51 FGDs expressing a liking for them. In SIP schools (27/29 FGDs), reasons include enhanced visual and audio learning (8 FGDs), easier learning (7 FGDs), flexible content access (3 FGDs), and perceived school advancement (6 FGDs). SNP schools (22/22 FGDs) similarly appreciate DSP-TVs, citing enjoyment in studying (7 FGDs), parity with private schools (7 FGDs), broader learning opportunities (6 FGDs), and teacher support (2 FGDs).

iv. Perception on Video for All Subjects

In SIP schools, most of the students (28/29 FGDs) expressed a preference for new video content in all subjects. This indicates a strong desire among students for multimedia resources to supplement their learning across the curriculum. They cited reasons as explained below:

- ***Benefits of Visual Learning:*** Some (6/28 FGDs) students agree that videos aid in learning by providing visual explanations, which help in understanding topics faster and more clearly. For instance, *"Hum chahte hain ki sabhi vishyon mein video ho kyunki video achi tarah se samajhne mein madad karti hai, jaldi samajhne mein madad karti hai, kyunki usme tasveerein hoti hain/We want videos in all subjects because videos help in learning fast with images"* and *"Har vishay mein humein dekh kar padhne ka mauka milega, aur samajhne mein bhi asani hogi/Sare vishye me dekhkr padhne ko milega, aur samjh ayega/ In every subject we would get opportunity to learn via watching and our understanding will be easier. In every subject we would learn by watching and we would understand better."*

- ***Enhancing Comprehension and Joy:*** Many (11/28 FGDs) students express that learning becomes simpler to understand and more enjoyable with the use of videos in all subjects. They believe that videos enhance comprehension and make learning more fun. For instance, ''*Videos me jo dekhte hai usse mushkil topic bhi asani se samajh me aajate hai/ What we see in videos makes difficult topics easier to understand"*, *"Agar videos hongi, to dekhne mein maza ayega aur samajhne mein jaldi hojayega/Videos hongi to dekhne me maza ayega aur jaldi samjh ayega/ If there are videos, then we would enjoy watching them and we would understand faster", "Har vishay mein videos hone chahiye kyunki yeh tasviro ke saath padhne mein madad karte hain, jo dekhne aur seekhne dono ko mazedaar banata hai/Videos in all subjects should be there because videos help in learning with images that makes watching and learning fun."*

- ***Accessibility and Convenience:*** Some students (6/28 FGDs) observed that some teachers in their schools already use YouTube videos in their teaching, which influenced their shared agreement in the necessity of having videos for all subjects. They note that YouTube is

already being utilized by teachers in some subjects, indicating familiarity and acceptance of this teaching method. For instance, *"Hum chahte hain ki aur subjects mein TV ho, kyun ki YouTube ko teachers dusre subjects mein padhane ke liye istemal karte hain/We would like to have TV in other subjects, as YouTube is used by teachers in other subjects"* and *"YouTube k jaise bahot sari videos ho sab subjects k liye to acha hoga/If there are many videos like YouTube for all subjects, it would be good."*

- ***Teacher Support:*** Some students (5/28 FGDs) mentioned that videos served as a helpful resource when teachers are unavailable, allowing them to continue learning independently. For instance *"Kabhi kabhi jab mam nahi hote to hum video se dekhkr pardh skte hai/Sometimes when teachers are not available, we can study by watching videos"* and *"Video se hona chahiye sare subjects ki padhai kyuki isse teacher ki bhi madad hojati hai/All subjects should be taught through videos because it also helps the teachers."*

On the other hand, only one FGD group disliked the idea of having videos for all subjects, expressing a dislike because of boredom. 4/5 students in this group mentioned, *"Video se bore ho jate hai, acha nahi lagta, maza nahi aata isliye sab subjects me nahi hona chahiye/Videos get boring, they don't feel good, it's not fun, so they shouldn't be in all subjects."*
(8th Grader)

Interestingly, this is the school where students in the FGDs reported daily usage of DSP-TV for learning.

In SNP schools, most (18/22) FGD groups expressed a preference for new video content in all subjects. They cited reasons as explained below:

- ***Enhancing Comprehension and Enjoyment:*** Many (10/22 FGDs) students express that learning becomes simpler to understand and more enjoyable with the use of videos in all subjects. They believe that videos enhance comprehension and make learning more fun. For instance, *''Video se dekhkr samjhna aasan hota hai/Understanding through videos makes learning easy"*(7th Graders) and *"Nayi cheze dekhkr pardhene ko milegi to maza ayega/ If we get to learn by seeing new things, it will be enjoyable."*
(10th Graders)

- ***Benefits of Story-like Content:*** Some students (6/22 FGDs) observed that videos which have content as characters and stories, helps students understand better. For instance, *"Videos sare subjects me achi lagegi kyuki stories k zariye padhne me samjh ayega/ Videos will be good for all subjects because understanding through stories will be easier"* (8th Graders) and *"Saare subject agar kahaniyo jaise dikhaye video me to ache se padhai hogi/If all subjects are taught through videos like stories, then studying will be more effective."*
(8th Graders)

- ***Alternative to Teachers' Presence:*** A few students (2/22 FGDs) mentioned that videos serve as a helpful resource when teachers are unavailable, allowing them to continue learning independently. For instance *"Jab teachers ko kaam hota hai to hum TV par khud se pardh sakte hai videos se. Isiliye sare subjecte me videos hona achi bat hogi/ When teachers are busy, we can study on our own through videos on TV. That's why having videos for all subjects would be a good thing."*
(9th Graders)

  On the other hand, the remaining 4/22 FGD groups, who disliked the idea of having videos for all subjects, explained their dislike by stating a preference for learning through teacher explanations. They mentioned, *"'Sir ache se samjhaye to samjhne me aasan hota hai' and 'Sir ache se hamari bhasha me samjhate hai'/ It is easier to understand when the teacher explains well,' and 'Teachers explain well in our language."*

Combined SIP and SNP data revealed a strong preference for new video content across subjects: 46 out of 51 FGDs expressed favor, highlighting benefits including enhanced visual learning (6 SIP FGDs), improved comprehension and

enjoyment (21 FGDs total: 11 SIP and 10 SNP), and convenience with existing YouTube use (6 SIP FGDs). Some students (7 FGDs total: 5 SIP and 2 SNP) noted videos as useful when teachers are absent. However, 5 FGD groups (1 SIP and 4 SNP) opposed videos, preferring teacher-led explanations for better understanding.

v. Student Preference of Type of Classes

In both the SNP and the SIP schools, student preferences regarding DSP and non-DSP (Traditional Classroom) classes were explored extensively. Here the analysis took into account the cumulative responses from all FGDs, rather than treating each discussion as an independent unit of analysis. This approach was used due to the diverse opinions and responses from students within each focus group.

In SIP schools, upon examining the preferences of students, several students (20/42 responses) favored DSP-TV classes. Meanwhile, some students (8/42 responses) preferred non-DSP-TV classes, and many students (14/42 responses) favored a combination of both TV and non-TV classes for learning.

The reasons given by those who preferred DSP-TV classes (20/42), show that several students (11/20 responses) find that these classes help them understand topics better through a combination of voice narration and visual aids like images and cartoons. For instance, *''TV me photos aur cartoons dekh kar ache se samajh me aata hai/Watching photos and cartoons on TV helps in understanding things well"* (8th Grader) and *"Cartoon aur kahani jaise dekhkar samjhne me asani hoti hai/Watching cartoons and stories makes it easier to understand''*
(8th Grader).

Many students (9/20 responses) appreciate the abundance of examples provided in TV classes, which they find helpful in understanding concepts thoroughly and retention of information. For instance, *''Acha lagta hai kyuki zyada examples mil jate hai. Exams me bhi madad milti hai/It's good because you get more examples. It also helps during exams"* (10th Grader) and *"video se aasani se samajh ajata hai aur lambe samay tak yaad bhi rehta hain/ videos. Explain concepts easily and help us retain them for a longer duration."*
(10th Grader)

The reasons given by those who preferred non-DSP-TV classes (8/42), all (8/8 responses) mentioned preference of learning through the teacher's explanations, blackboard and books, finding them more effective than TV classes. For instance *"Videos sirf chhote vyakhyan dikhate hain, lekin regular classes mein teachers puri tafseel se padhate hain/Videos show only short explanations, but teachers in regular classes teach in full detail"* (8th Grader)', and "*Hum teacher se puch sakte hai. TV wali class me utne ache se samjh nahi aata, teacher dwara padhaya samjh aa jata hai/We can ask the teacher. We don't understand well in the TV class, but we understand when the teacher teaches."*
(9th Grader)

The reasons given by those who preferred a combination of both TV and non-TV classes (14/42), all (14/14) responses mentioned the preference of usage of DSP-TV with teachers' explanation. For instance, *"Sirf TV dekhkar samjh nahi aate, jab tak teacher nahi samjhate hum sirf dekhkar nahi seekh sakte/Only watching TV doesn't help us understand; we can't learn just by watching until the teacher explains it"*
(8th Grader)

In SNP schools, several of the students, consisting of 14/35 responses, favored DSP-TV classes. Meanwhile, some students (12/35 responses) showed a preference for non-DSP-TV classes, and a few students (9/35 responses) favored a combination of both TV and non-TV classes.

The reasons given by those who preferred DSP-TV classes (14/35), many (8 /14 responses) mentioned TVs 'assists in learning' for instance *''Video dekh kar pardhna acha lagta hai, samjh aata hai/Watching videos to study is good, we understand", "Kathin cheeze asani se samjh me aajati hai/Difficult things become easy to understand."* While several students (6/14 responses) mentioned support for teachers when DSP-TVs are used and a reason for liking it. For instance *"Clarity ati hai smajhne me TV se.*

Teacher jo cheez book se nahi smjha pate, vo TV se smajh aajati hai/TV helps in understanding. Things that teachers cannot explain from the book, are understood through TV."

The reasons given by those who preferred non-DSP-TV classes (12/35), all (12/12 responses) mentioned preference of learning through a teacher using board and textbooks instead of TV. For instance *"Mam aur sir k samjhane se hume samjh aata hai, TV se nahi/We understand when mam and sir explain, not from TV", "TV me ache samjh nahi aata, teacher k padhane se aata hai/ We don't understand well from TV, we understand from the teacher's teaching"* and *"TV me samjh nahi aata, kyuki teacher se doubt nahi puch pate video wale class me/We don't understand from TV, because we can't ask doubts to the teacher in video classes."*

The reasons given by those who preferred a combination of both TV and non-TV classes (9/35), all (9/9 responses) mentioned the preference of usage of DSP-TV with teachers' explanation. For instance, *"Pehle video dekhe aur fir teacher use smjhaye to ache se samjh aa jata hai/First watching the video and then having the teacher explain it makes us understand it well", "Ache se samajhne k liye dono chahiye, teacher aur TVs/ Both are needed for better understanding, the teacher and TVs"* and *"Samjh ache se tabhi ata hai jab sir ya mam bataye/Understanding comes only when sir or mam explains."*

Combined data from SIP and SNP schools indicate a majority preference for DSP-TV classes, with 34 out of 77 responses favoring DSP-TVs. In SIP schools, several students (20/42 responses) preferred DSP-TVs for visual aids, examples (11/20 responses), and concept retention (9/20 responses), while some (8/42 responses) favored non-DSP-TV classes for teacher-led methods. In SNP schools, several students (14/35 responses) favored DSP-TVs for ease of understanding (8/14 responses) and clarity (6/14 responses), whereas non-DSP-TV classes were unanimously preferred (12/35 responses) for teacher-led methods. Those opting for a combination of both (9/35 responses) emphasized using DSP-TVs alongside teacher explanations (9/9 responses) to enhance learning comprehensively.

vi. Comparison of Student Practice of Questioning Between DSP-TV and Non-DSP-TV Classes

In both the SNP and the SIP schools, students' questioning habits in DSP-TV and non-DSP-TV classes were explored, showcasing a variety of preferences and reasons.

In SIP schools, several of the students (14 /30 responses) indicated asking questions in a similar manner in both DSP and non-DSP-TV classes. These students stated that they inquire when encountering difficulty understanding something, regardless of the class type. For instance, *"Hume dono me jab nahi ata tab puchlete hai/ We ask questions in both types when we don't understand"* (8th Grader) and *"Hume jab samjh nahi ata to hum puchte hai sawal dono hi tarah ki class me/We ask questions when we do not understand something, in both types of classes." (7th Graders)*

Some students (9/30 responses) mentioned asking more questions in non-DSP-TV classes. These 9 student responses provided two reasons for this observation. First, students believe they can concentrate better on the teachers' instruction in non-DSP-TV classes, providing more chances for interaction with the teacher and course materials. Second, students feel more at ease posing questions to teachers in non-DSP-TV classes. For instances, *"Bina video wali classes me zyada sawal puchte hai kyuki sir samjhate hai to samjh aata hai/We ask more questions in non-DSP-TV classes because we understand when sir explains"* (8th graders), *"Bina TV wale class me sawal-jawab likha jata hai. Video wali class me hum zyada sawal nahi puch pate, na hi likh pate hai/We ask more questions in regular classes as we do not get to write"* (8th Graders) and *"Bina TV wali class me hamara sara dhyaan book aur teacher par hota hai/Without TV we focus more because our focus is completely on the book and teacher." (9th Grader)*

A few responses (7/30 responses) note that some students asked more questions in DSP-TV classes. All of these groups mentioned that they inquire

when they face challenges in understanding a topic. For instance, *"Hum TV wali class me zyada sawal puchte hai kyuki samjh nahi aata to teacher batate hai/We ask more questions in the TV class because we don't understand, so the teacher explains"* (8th Graders) and *"Jab sir video chala kar, explain karte hai aur hame doubt hote hai, hum sir ko puch lete hai jo samjh nahi ata/ When sir plays videos, explains and we have doubts. We ask sir to expand on the concept."*
(7th Graders)

In SNP schools, an analysis of all 22 FGDs showed that some of the students (5/25 responses) reported asking questions similarly in both DSP and non-DSP-TV classes. These students mentioned that they ask questions whenever they have trouble understanding something, regardless of the class type. For instance, *"Hum dono tarah ki class me sawal puchte hai, jo cheez samjh nahi ati use samjhne k liye/ We ask questions in both types of classes to understand when we have doubts"* (6th Graders) and *"Bachen dono hi classes me sawal poochte rehte hai jab-jab unko samjh nahi ata hai/ Students ask questions in both types of classes whenever they don't understand something."*
(9th Graders)

Conversely, many students (17/25 responses) reported asking more questions in non-DSP-TV classes. Students gave two main reasons for this trend. Firstly, several (10/17 responses) said they could focus better on the teachers' instruction in non-DSP-TV classes, allowing for more interaction with both the teacher and the course materials. Secondly, several students (7/17 responses) said they are more comfortable asking questions to teachers in these non-DSP-TV classes. For instances, *"Sirf sir ya mam wali class me zyada samjh aata hai kyuki vo samjhate hai hume ache se, video wali class me hume sab kuch samhjh nahi ata/We understand more in classes with a teacher because they explain things well to us. In video classes, we don't understand everything"* (7th Grader), "*Jab TV se padhte hai to kitaab ya copy me itni jadi jaldi sab likh nahi paate, par sirf teacher wali class me jab maam book aur board pr batati hai to likh pate hai/When we study from the TV, we can't write everything down quickly in our books or notebooks, but in a teacher-led class, when the teacher explains on the board or from the book, we are able to write it down."*
(8th Grader)

A few students (3/25 responses) note that some students asked more questions in DSP-TV classes. Two of these groups mentioned that they inquire when they find a new or interesting topic. For instance, *"Hum TV wali class me zyada sawal puchte hai kyuki jab hum nayi cheeze dekhte hai to maza aata hai /We ask more questions in TV class because when we look at new topics and videos, we get excited."* (7th Graders) One FGD recorded that when they have doubts they ask questions in video classes. *"Jab sir video chalakr, explain krte hai aur hame doubt hote hai, hum sir ko puch lete hai jo samjh nahi ata/ When sir plays videos, explains and we have doubts. We ask sir to expand on the concept."*
(7th Graders)

In combined SIP and SNP schools data, student question-asking behavior shows that some (19/55 responses) inquire similarly in both DSP and non-DSP-TV classes, seeking clarification when they encounter difficulties. Specifically, some students (9/30 responses from SIP schools and 5/25 responses from SNP schools) ask more questions in non-DSP-TV classes, citing better focus on teacher instruction and comfort in interaction. Conversely, a few students (10/55 responses) note increased questions in DSP-TV classes, often due to curiosity about new topics or seeking clarification during videos instruction.

vii. Student Eagerness in DSP-TV Classes

Both SIP and SNP students were asked if they requested their teachers to use DSP-TVs in their classes.

In SIP schools, it was found that several (15/29 FGDs) of the students request their teachers to incorporate TV classes into their curriculum. Several reasons were cited for these requests, including the desire to revisit topics for better understanding, interest in exploring new topics and videos, preference for learning the subject of Science through TV, and lack of interest in traditional learning methods.

- ***Revisiting Topics for Better Understanding:*** Some students (3/15 FGDs) noted that they often request to revisit topics that they have previously covered or to review material for better understanding. For instance, *"Sir chala dete hai TV jab hum bolte hai koi topic samjah nahi aaya ya firse dekhna hai/ Sir turns on the TV when we say that a topic wasn't understood or we want to see it again"* (7th Grader) and *"Jab koi topic dobara dekhna ho/When we need to review a topic."* *(8th Grader)*

- ***Interest in New Topics:*** Some students (4/15 FGDs) express a desire to explore new topics and videos, leading them to request the use of TV. For instance, *"Hum teachers se bhi kai baar videos dikhane k liye bolte hai to hume nayi nayi cheeze dekhna acha lagta hai/We often ask teachers to show videos, we like to see new things."* *(8th Grader)*

- ***Preference of Science:*** Some students (3/15) prefer learning through TV, especially in subjects like Science, as they find it enjoyable and effective in aiding comprehension. For instance, *"Hum Science pardhne me request karte hai, vo dekhna acha lagta hai/We request to study Science, it feels good to watch."* *(8th Grader)*

- ***Disinterest in Traditional Learning Methods:*** Many students (5/15) request the use of TV when they feel disinterested in traditional learning methods like reading from books. For instance, "*Hum teachers se bhi kai baar videos dikhane k liye bolte hai jab bore hote hai book se pardhne se/We often ask teachers to show videos when we get bored of studying from books."* *(7th Grader)*

  In contrast, many students (14/29 FGDs) mentioned that they do not request their teachers to play the DSP-TV. Among these groups, many of the students (9/14 FGDs) explained that their teachers already utilize TV for instructional purposes, rendering additional requests unnecessary. For instance, *"Mam ni niyamit classes leti hain, isliye humein poochhne ki zarurat nahi hai/Mam takes regular classes so we don't need to ask"* (10th Grader) and *"Teacher dopahar ke baad roz DSP-TV class leti hain/Teacher takes DSP-TV class after lunch daily."* (6th Grader) A few (6/14 FGDs) groups specified that they refrain from requesting TV classes as they perceive it to be dependent on the teacher's mood. For instance, *"Jab sir ya mam ko padhana hota hai vo tabhi chalate hai/When sir or mam wants to teach, only then do they play the videos"* (9th Grader) and *"Jab teacher ka mann hota hai tab hi dekhte hai videos/We only watch videos when the teacher feels like it."* *(8th Grader)*

  In SNP schools, fewer students (8/22 FGDs) reported that they request their teachers to use DSP-TVs in class. Several reasons were cited for these requests, including the desire to revisit topics for better understanding and interest in exploring new topics and videos.

- ***Revisiting Topics for Better Understanding:*** From those who request, many students (5/8 FGDs) mentioned that they request the teacher for DSP-TV class/videos when they have some doubts in understanding. For instance, *"Jab kuch samjh nai ata to dobara se dekhne ke liye bolte hai/When we don't understand something, we ask to see it again"* (9th Graders) and *"Jab koi nayi video dekhte hai samjh nahi ati to dobara chalane ko bolte hai/When we don't understand a new video, we ask to play it again."* *(7th Graders)*

- ***Interest in New Topics:*** Among those who make requests, some (3/8 FGDs) indicated that they ask teachers to watch DSP-TV for access to new and enjoyable content. For instance, *"Jab hume kuch naya dekhne mann karta hai/When we feel like seeing something new."* *(7th Grade)*

  Many students (14/22 FGDs) in SNP school said they do not request their teachers to use DSP-TVs in class. Several students (6/14 FGDs) stated that teachers play TV regularly by

themselves therefore students do not request. For instance, *"Teacher khud hi TV ka istemal karta hai to hume zarurat nahi hoti/The teacher uses the TV themselves, so we don't need to"* (7th Graders) and *"Hamare sir apne aap hi hume TV se padhana hai tu hum nahi bolte unse/Our teacher teaches us using the TV on their own, so we don't request." (8th Graders)*

Some students (5/14 FGDs) stated lack of time for the teacher as a reason to not request. For instance, *"Koi period khali nahi hota/No period is free" (10th Graders) and "Jab teacher ko time milta hai tabhi TV pr padhate hai vo/The teacher teaches on TV only when they have time." (7th Graders)*

A few students (3/14 FGds) gave no reason for not requesting their teachers to use DSP-TVs in classroom learning.

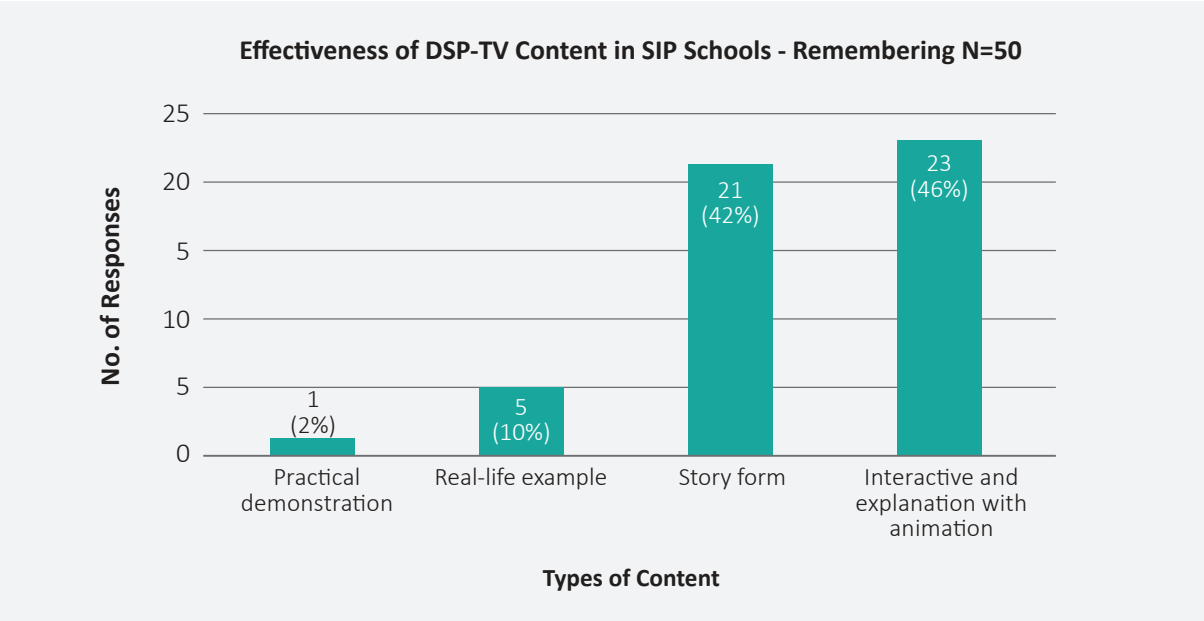
Combined data from SIP and SNP schools indicates that among 51 FGDs analyzed, 23 FGDs reflect students requesting TV classes. In SIP schools, 15 out of 29 FGDs show students seeking TV classes, citing reasons such as reviewing topics (3/15 FGDs), exploring new content (4/15 FGDs), and learning Science (3/15 FGDs). Conversely, 14 FGDs in SIP schools do not request TV classes due to teachers' regular use of TVs (9/14 FGDs) or variability in TV usage based on teacher mood (6/14 FGDs). In SNP schools, 8 out of 22 FGDs request DSP-TVs primarily for reviewing topics (5/8 FGDs) and exploring new subjects (3/8 FGDs), while 14 FGDs do not request DSP-TVs due to teachers' regular use of TVs (6/14 FGDs), insufficient teacher availability (5/14 FGDs), or reasons not specified (3/14 FGDs).

viii. Effectiveness of DSP-TV Content - Remembering

In both SIP and SNP schools, students were asked about the effectiveness of DSP-TV videos for remembering concepts.

In SIP schools, most of the students (28/29 FGDs), agreed that DSP-TV videos are effective in aiding memory and understanding. They specified certain types of content, such as interactives and explanations with animation (diagrams, flowcharts, and processes), story form, real-life examples and practical demonstration (explanation with activities) that assist in memory retention. The following chart depicts the commonly mentioned types of content that aid in comprehension and recall and the number of responses who mentioned them. The x-axis on the graph represents the types of content that aid students in remembering in SIP schools and the y-axis represents the number of responses (total 50 responses) mentioning the types (Fig. 4.1.8).

Figure 4.1.8: Effectiveness of DSP-TV Content in SIP Schools (FGD)



Similarly, in SNP schools, 16/22 student groups agreed on the effectiveness of DSP-TV videos for remembering and understanding. Among them, students specified certain types of content, such as interactives and explanations with animation (diagrams, flowcharts, and processes) and story form that assist in memory retention.

Many students (25/35) responses show that videos with characters (cartoons) and storylines aid in retaining information for an extended duration. A few students (10/35) groups emphasized that images and visuals improve their capacity to recall the material. For instance, one student remarked, *"Hum videos jo cartoons aur kahaniyan dikhate hain unhe dekhkar behtar yaad karte hain/We remember better with videos featuring cartoons and stories,"* (7th Graders) while another explained, *"Diagrams, flowcharts, ya process jaise visual madad hamen jaankari yaad rakhne me madad karte hain/Visual aids such as diagrams, flowcharts, or processes help us remember the information."* (8th Graders)

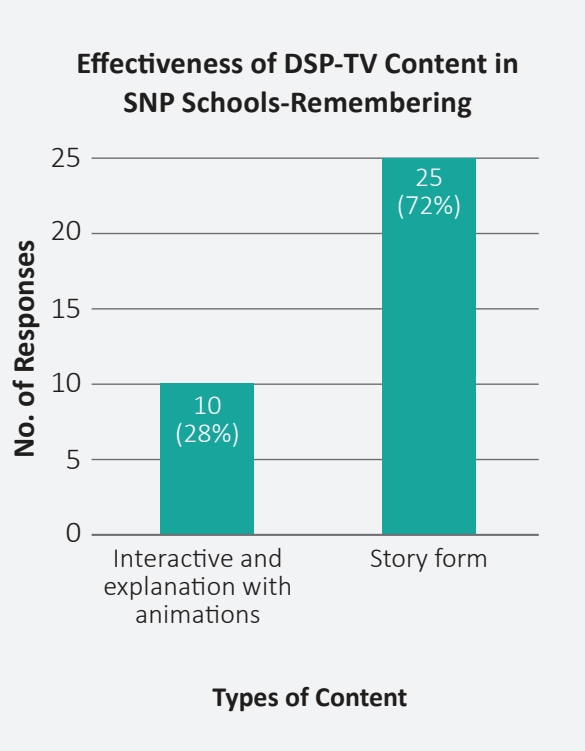
The following chart (Fig. 4.1.9) depicts the commonly mentioned types of content that aid in comprehension and recall and the number of responses who mentioned them. The x-axis on the graph represents the types of content that aid students in remembering in SNP schools and the y-axis represents the number of responses (total 35 responses) mentioning the types.

The combined analysis of SIP and SNP schools highlights students' widespread agreement (44/51 FGDs) on the effectiveness of DSP-TV videos in enhancing memory and understanding.

ix. Effectiveness of DSP-TV content - Relating with real-life

In both SIP and SNP schools, students were asked about the connection of DSP-TV videos to real-life scenarios.

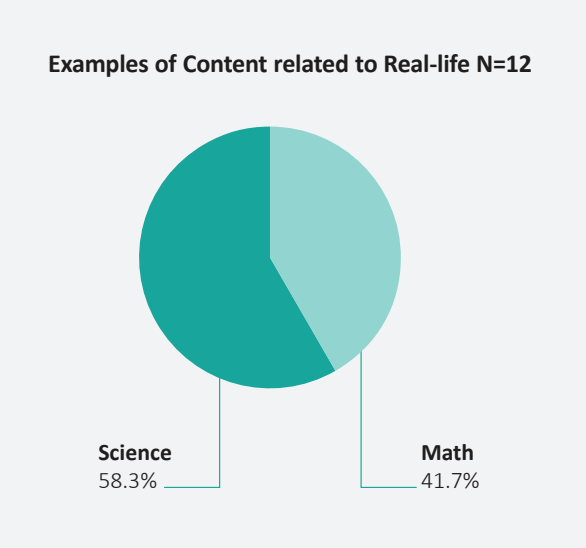
Figure 4.1.9: Effectiveness of DSP-TV Content in SNP schools (FGD)



In SIP schools, most students (22/29 FGDs) agreed that the videos shown on DSP-TV are connected to real-life scenarios. These students provided examples to support their agreement. The data shows that several students (13/22 FGDs) in SIP schools find Science content to be more related to real-life situations, while some students (9/22 FGDs) find Math content to be more related to real-life situations. While some (7/29 FGDs) students did not respond to this question.

Among some of the students who gave examples (12/29 FGDs), the Fig. 4.1.10 shows students mentioning examples from Math (5/12 FGDs) and Science (7/12 FGDs) in SIP schools.

Figure 4.1.10: Examples of Content Related to Real Life



Similarly, in SNP schools, 18 out of 22 FGDs agreed that the videos shown on DSP-TV are connected to real-life scenarios. Among these, examples were recorded from 7 out of the 18 FGDs, demonstrating the relatability of the videos with real-life situations.

For instance: *"Jaise jod ghatav hum karte hai, hisab jodte hai vo hum saman laane me madad krta hai/Like we do addition and subtraction, it helps us in buying things."*

"Ghar par jab mai aur mummy sofa utha rahe to usse yaad aaya k school me Bal aur Daab wali video me esa hi hua tha/At home, when mom and I were lifting the sofa, it reminded me of the video in school where a similar thing happened with Bal and Daab(Force and Pressure)."

"Kyuki jaise paachan kriya haamre shareer me hoti hai, vo humne video me dekha k kya kya hota hai usme.Ye hamare jeevan se sambandhit hai/Because as digestion process happens in our body, we saw in the video what happens in it. It is related to our lives."

Interestingly, 8/18 groups noted that the Science content played on DSP-TV was more closely linked to real-life experiences. For instance, *"Science me hume zyada dekhi hui cheeze milti hai videos me/ We get to see more things in Science videos" (8th Grader) and "Science me hume bahot se cheeze dekhkr lagta hai ye hamari roz ki zindagi se judi hui hai/In Science, we feel like we're connected to our daily lives by seeing many things."* (6th Grader)

While there were few (4/22 FGDs) students who did not respond to this question.

In combination, both SIP and SNP schools acknowledge the relevance of DSP-TV videos to real-life scenarios (40/51 FGDs).

4.1.10 Choice and Decision Making

i. Student Choice of Activities on DSP-TV Classes

In both SIP and SNP schools, students were surveyed about their preferences for accessing DSP-TV content extensively. They were asked about their preferred activities to watch on the TV. The most commonly mentioned activities and their frequencies are documented and represented in bar graphs.

Fig. 4.1.11 shows the type of content preferred in SIP schools on the x-axis of the graph and the number of student responses mentioning the type on the y-axis (total 36 responses).

Figure 4.1.11: Students' Preference of Content in SIP schools

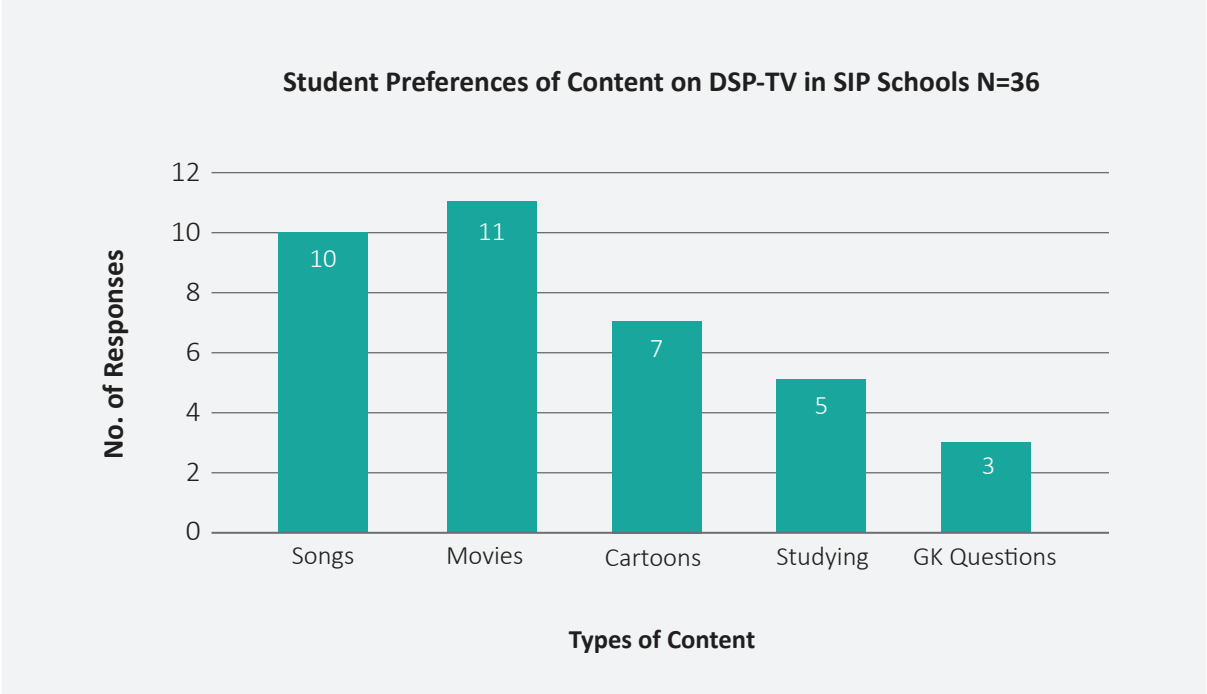
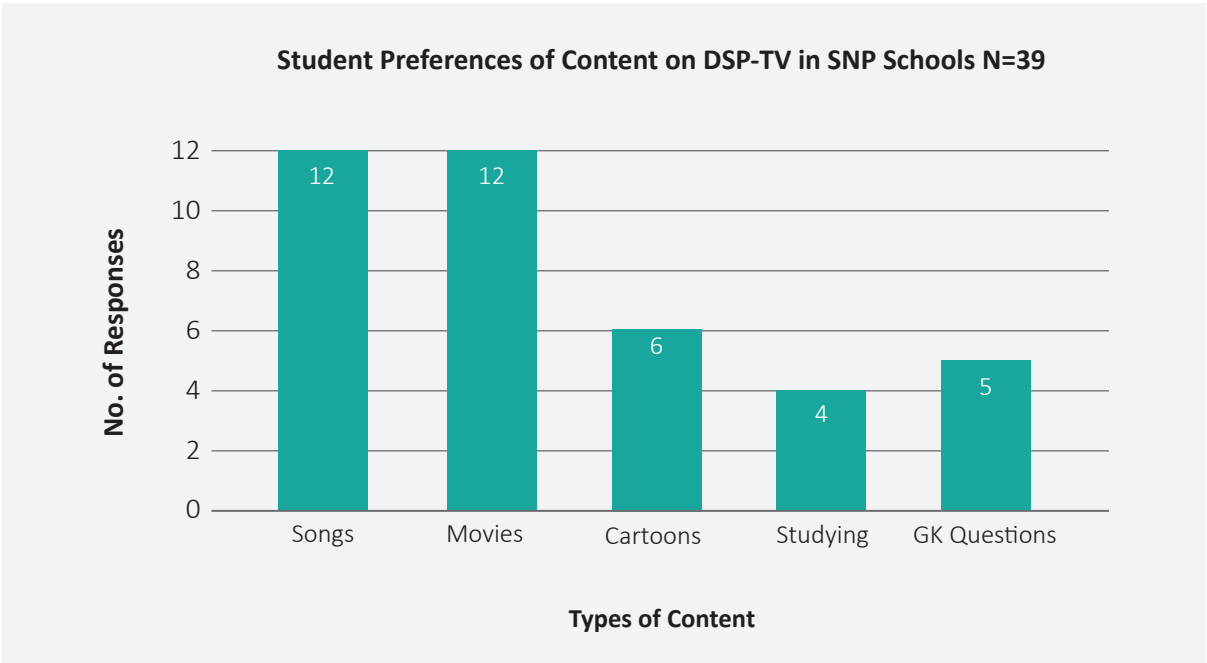


Fig. 4.1.12 shows the type of content preferred in SNP schools on the x-axis of the graph and the number of student responses mentioning the type on the y-axis (Total 39 responses).

Combined data from SIP and SNP schools reveals that out of 75 student responses, preferences for DSP-TV content were distributed as follows: movies (23/75), songs (22/75), cartoons (13/75), studying (9/75), and general knowledge (GK) questions (8/75).

Figure 4.1.12: Students' Preference of Content in SNP schools



ii. Teacher Presence for DSP-TV Learning

In both SIP and SNP schools, students were asked whether they would be willing to participate in DSP-TV classes without a teacher present. The overwhelming consensus from both types of schools was a strong preference for having a teacher alongside the TV during classes.

In SIP schools, an overwhelming majority of students (28/29 FGDs) express a desire for a teacher to be present in the class along with the TV.

All students participating in the 28 FGDs unanimously preferred having a teacher alongside the TV during classes. They asserted that solely watching TV is insufficient for understanding, emphasizing the importance of a teacher's ability to explain concepts and clear doubts. Across all groups, it was highlighted that lacking a teacher's presence would hinder their comprehension of the material and ability to resolve doubts. For instance, *"Teacher k bina sirf video dekhne hume sab kuch samjh nahi ata. Sirf video dekhkar khud samjhna mushkil hai/Without the teacher, just watching the video doesn't make us understand everything. It's difficult to understand just by watching the video"*(8th Graders) and *"Agar samjh nayi ayega to hum teacher se puch sakte hai/If we don't understand, we can ask the teacher."*
(6th Graders)

For one of the FGDs, the data indicates that out of 10 respondents, 9 believe that learning has been achieved through television-based classes. They express this sentiment by stating that even if teachers were not available, they would still benefit from these classes. This suggests a positive perception of the effectiveness of TV-based learning, particularly in the absence of teachers. For instance, *"Learning achi hui hai TV wale class se kyuki ab agar teacher bhi nahi hote to hum pardhne ko kuch hota hai/Learning has improved from the TV classes because now even if the teacher is absent, we still have something to study."*
(8th Graders)

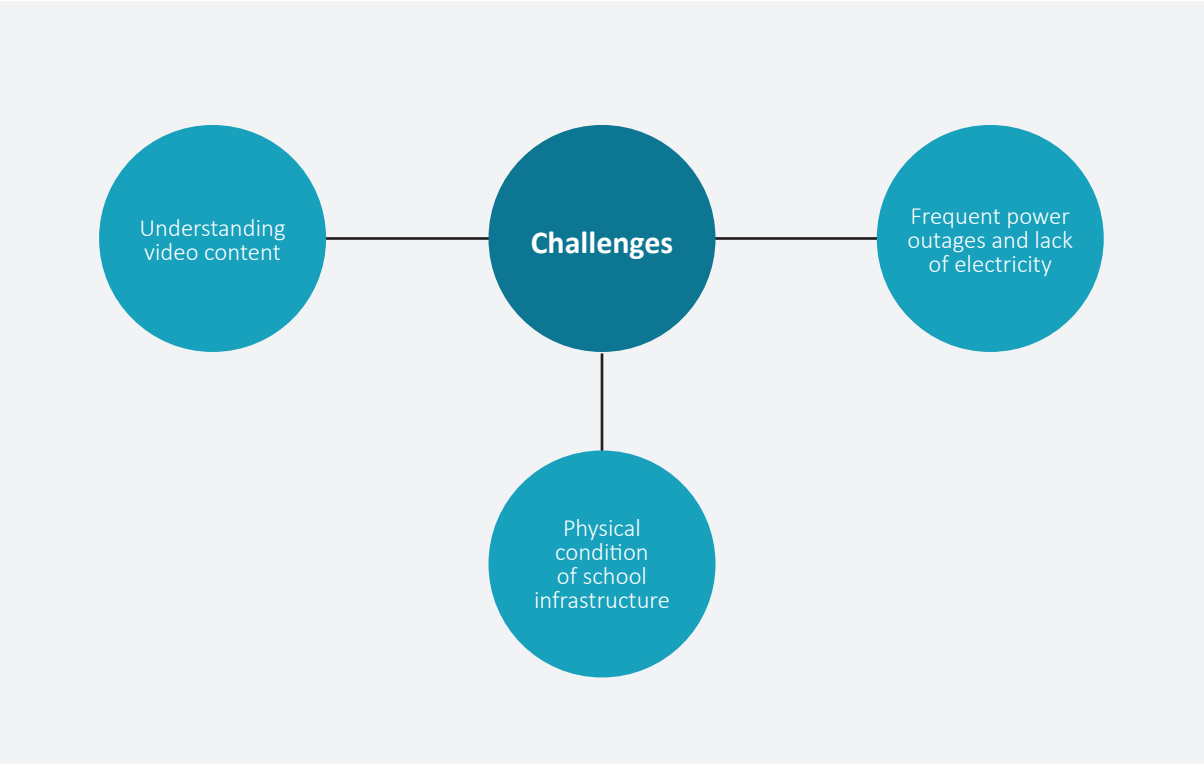
Similarly, in SNP schools, all 22 FGDs unanimously preferred having a teacher present, emphasizing the necessity of a teacher's guidance for effective learning.

All respondents (22/22 groups) expressed a strong preference for having a teacher present in the class alongside the TV. They believe that merely watching TV alone is insufficient for understanding, and having a teacher who can explain concepts is essential. Many students (16/22 groups) mentioned that without a teacher's presence, they would struggle to comprehend the material and clear doubts. For instance, *"Samjhne ke liye teacher ki zarurat pardhti hai, jo TV pr nahi hota vo hum mam se puch skte hai/We need a teacher to understand, what's not clear on TV we can ask our teacher"* and *"Hum teacher se apne doubt puch skte hai, TV se nahi/We can ask our teacher about our doubts, not the TV."* Additionally, some students (6/22 groups) highlighted concerns about noise and distraction in the absence of a teacher, indicating that a teacher's presence contributes to maintaining discipline and facilitating focused learning. For instance, *"teacher k bina class me sab bache makkari karenge, pardhege bahot kam/Without a teacher, all the kids in the class will be mischievous, and they'll study very little"* and *"teacher k bina bache bahot shor machate hai/Without a teacher, the kids make a lot of noise."*
(7th Graders)

Combined data shows that out of a total of 51 FGDs across both SIP and SNP schools, 50 FGDs indicated a preference for having a teacher present during DSP-TV-based classes, underscoring the critical role of teachers in facilitating effective learning through DSP-TV content and maintaining class discipline.

4.1.11 Challenges

Figure 4.1.13: Findings from FGDs - Challenges



i. Summary of Findings from FGD: Challenges

Students identified several challenges associated with DSP-TV usage. Frequent power outages and the lack of electricity were major obstacles, often disrupting lessons. Additionally, the poor physical condition of school infrastructure further hindered effective use of the TV. Students also mentioned difficulties in understanding video content, which impacted their ability to fully benefit from DSP-TV classes. These challenges collectively highlight the need for infrastructural improvements and enhanced support to maximize the educational potential of DSP.

ii. Challenges

In both SIP and SNP schools, students were questioned about encountering challenges in DSP-TV classes, revealing insights into the difficulties they face.

In SIP schools, the majority of students (21/29 FGDs) reported not encountering any challenges in DSP-TV classes. However, some students (5/29 FGDs) acknowledged facing difficulties, primarily related to electricity supply and a few students (3/29 FGDs) mentioned facing difficulties due to infrastructure. These challenges included frequent power outages and lack of electricity in rural areas, hindering the consistent use of DSP-TVs in school. Students expressed concerns about the unreliable power supply, which disrupts their learning environment. For instance, *"Light jati rehti hai bahot/The power keeps going out a lot"* (6th Graders) and *"Gaon me bijli ki kami hai, classes ki chhat bhi tooti hui hai, aur blackboard bhi theek se padhne layak nahi hai/ There's a shortage of electricity in the village, the roofs of the classrooms are also broken, and the blackboard is unclear to read."*
(8th Graders)

Conversely, in SNP schools, while some students (7/22 groups) reported not facing any challenges, many students (15/22 groups) acknowledged difficulties in DSP-TV classes. These challenges were primarily related to lack of electricity in rural areas and the lack of clarity and focus in video classes. Students mentioned frequent disruptions due to power outages, affecting their ability to engage with the educational content.

- ***Lack of Electricity in Rural Areas:*** Many students (8/15 FGDs) pointed to the lack of electricity in their village as a challenge in the DSP-TV classes. For instance *"Baar baar light jaati rehti hai/The power keeps going out repeatedly"* (9th Graders) and *"Bijli na hone se disturb hota hai/We get disturbed when there's no electricity."* *(6th Graders)*

- ***Lack of Clarity and Focus in Video Classes:*** Several students (7/15 FGDs) pointed to the challenge faced by students in clearly understanding the videos along with teacher explanation and use of board alongside the video content. For instance *"Jab TV pr dekhte hai to teacher agar board par likhe to hum note nahi kar pate/When we watch on TV, if the teacher writes on the board, we can't take notes"* (9th Graders) and *"Dhundla dikhta hai, video se fatafat padha nahi jata/It's blurry, we can't read quickly from the video."* *(7th Graders)*

Combined data from SIP and SNP schools shows that 28 out of 51 FGDs reported not encountering any significant challenges. However, 23 FGDs identified various issues, including electricity supply problems in villages (13/23 FGDs), video content clarity (7/23 FGDs), and infrastructure issues within schools (3/23 FGDs).

4.1.12 Monitoring and Support

i. Visitors from Muskaan Dreams

In both the SNP and the SIP schools, there's a consensus regarding the limited involvement of visitors from Muskaan Dreams, in monitoring or observing learning via DSP-TVs.

Findings in SIP schools reinforce this trend, with many group discussions (19/29 FGDs) reporting no visits from Muskaan Dreams representatives to assess learning on DSP-TVs. Only a few groups (2/29 FGDs) acknowledged visits by Muskaan Dreams staff. The remaining groups (8/29 FGDs) said they had no memory of any one visiting their school in the last three months.

Similarly, SNP data (after Muskaan Dreams team completed the two years of support) reveals that most students (18/22 FGDs) reported no visits from Muskaan Dreams officials to observe learning through DSP-TVs. Only a few students (2/22 FGDs) mentioned such visits, and the rest of the groups (2/22 FGDs) had no memory of any visits in the last three months.

Combined data from SIP and SNP schools reveals a consensus (37/51 FGDs) that no representatives from Muskan Dreams had visited their schools, indicating Muskaan Dreams' limited involvement in monitoring or observing learning through DSP-TVs. A small number of students (6/51 FGDs) acknowledged these visits, while some (10/51 FGDs) had no memory of any such visits in the past three months.

4.1.13 Home and Parental Perception

i. Smartphones and Activities by Parents

In both SIP and SNP schools, students confirmed that their parents own smartphones, indicating a widespread adoption of this technology among parents. In SIP schools, all students (29/29 FGDs) confirmed that their parents own a smartphone. The most commonly reported activities among parents on smartphones include using WhatsApp and YouTube, followed by Paytm and calling. While other activities such as gaming, Facebook, watching videos/serials, online payment, and using other Apps are also mentioned, they have a lower frequency. Specifically, Paytm was mentioned in 7 responses, YouTube in 14 responses, and WhatsApp in 15 responses, with calling mentioned in 9 responses.

Similarly, in SNP schools, all students (22/22 FGDs) confirmed their parents' ownership of smartphones. The most commonly reported

activities among parents include using Paytm, YouTube, and WhatsApp. Additionally, parents in SNP schools engage in a variety of other activities on their smartphones, including gaming, online shopping, accessing news, making bill payments, engaging with social media platforms like Facebook, video calling, utilizing ride-sharing services like Ola, and digital payment platforms like PhonePe and Google Pay. Specifically, Paytm was mentioned in 8 responses, YouTube in 16 responses, and WhatsApp in 15 responses.

Overall, the data from both SIP and SNP schools highlight the prevalence of smartphone ownership among parents (51/51 FGDs) and the diverse range of activities they engage in using their smartphones, with communication and entertainment platforms like WhatsApp and YouTube being the most frequently used across both school types.

ii. Parental Perception of DSP-TV

In both SIP and SNP schools, students were asked about their parents' opinions regarding the presence of DSP-TVs in schools. The findings show two main perceptions among parents: positive and indifferent.

Responses from students in SIP schools show two perceptions of parents on DSP-TVs in School:

- ***Positive***
  Most students indicated that parents are aware of this method of teaching and generally view it favorably. Most (28/29 FGDs) students in the discussions said their parents feel positive about the use of TV for learning in school. Parents are generally supportive of their children studying through a TV in school, with most students reporting that their parents appreciate this method of learning. A significant majority of students in FGD group sizes, ranging from 4/4 to 10/10, mention their parents' approval of TV-based learning in all the 28 FGDs in SIP schools.

Several parents (14/28 FGDs) appreciate the modern approach to education and believe it contributes to their children's academic progress. For instance, *"TV par padhai karne se bache hoshiyar hojaenge/Children will become smarter by studying on TV"* (7th Graders) and *"Bade school me nayi cheeze aa rahi hai, hamare bacho k school me bhi esi modern cheezo se padhaye to achi baat hai/New things are coming to big schools. It's good if our children also study using such modern things in their school."*
(8th Grader)

Some students (8/28 FGDs) specifically mentioned that their parents feel proud or reassured knowing that their children are studying with the aid of TV technology. For instance, *"Hamare parents puchte hai kya padhaya, kya sikha. Aur kehte hai k achi baat hai k smart TV se pardhai ho rahi hai/ Our parents ask what we learned, what was taught. And they say it's good that teaching is being done through a smart TV"* (9th Graders) and *"Vo bolte hai achi baat hai k government school me TV se padhate hai, ab sab digital hogaya hai/They say it's good that they teach through TV in government schools; now everything is digital."*
(8th Graders)

A few students (6/28 FGDs) also noted the comparisons parents make between government schools and private schools, acknowledging the presence of television in government schools. For instance, *"Achi baat hai TV lagi hai ye suvidha mil rahi hai Private school ke jaise/It's good that the TV is installed; we're getting facilities like a private school"* (7th Graders) and *"Vo kehte hai k jaise private schools me TV se pardhate hai, vese hi agar sarkari school me bhi TV se pardhate to bahot acha hai/They say that just like in private schools where they teach using TVs, it is great that government schools also teach using TVs."*
(10th Graders)

- ***Indifferent***
  In just one group, students mentioned not being aware of their parents' opinion regarding the presence of television in school. This lack of knowledge might stem from the student never discussing the TV in school with their parents or their parents never inquiring about it. This student said *"Humare parents kya sochte hai hame nahi pata/We don't know what our parents think."*
  (7th Graders)

In SNP schools, responses from students interviewed also show perceptions of parents on DSP-TVs in School:

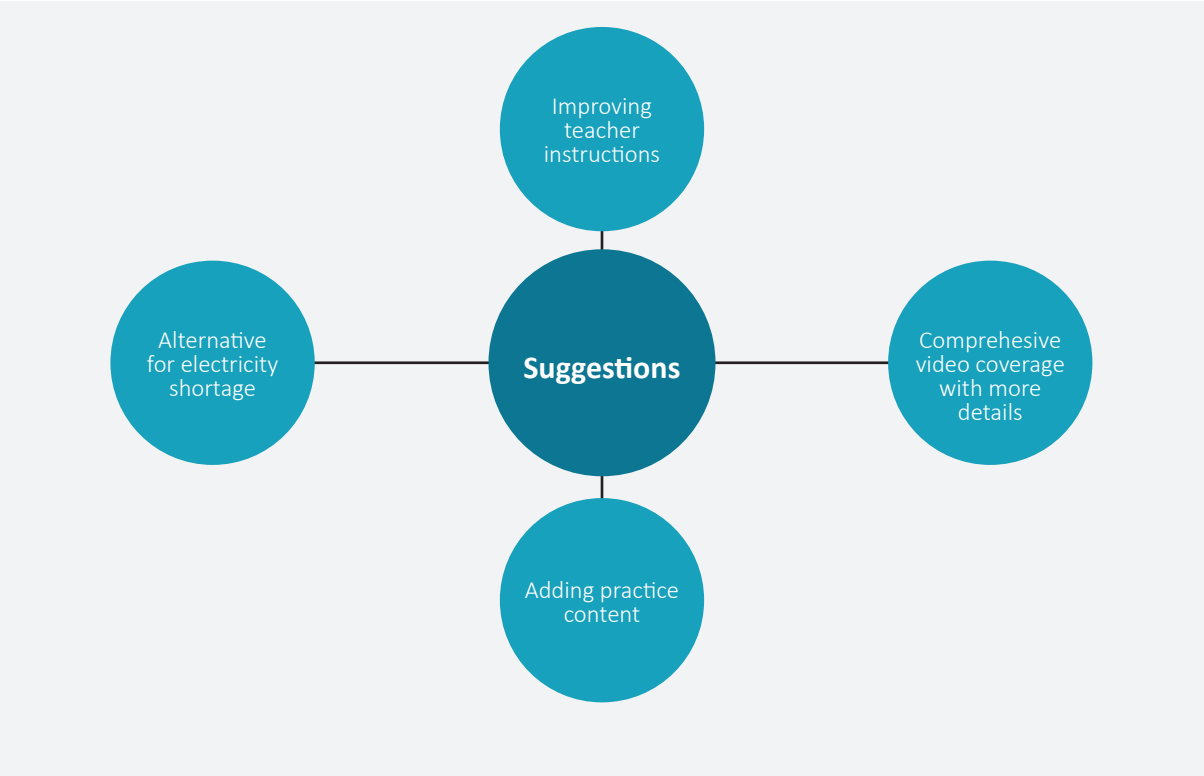
- ***Positive***
  Most students (19/22) FGD groups said their parents feel positive about the use of TV for learning in school. Parents are generally supportive of their children studying through a TV in school, with most students reporting that their parents appreciate this method of learning. A significant majority of students, ranging from 4/4 to 10/10, mention their parents' approval of TV-based learning in all the 19 FGDs. Reasons cited by some students (7/19) for their parents' approval include the belief that studying through TV could enhance comprehension and provide access to modern educational resources. For instance, *"Puchte hai k kya pardha TV par aur kehte hai k TV nayi technology hai, usse achi pardhai hoti hai/They ask if we study on TV and say that TV is a new technology and studying on TV is better"* (7th Graders). Many parents (12/19) express satisfaction with the availability of technological resources in their children's school, viewing it as a positive aspect and an improvement over previous school. For instance, *"Pichle school me jaha padhte the waha TV nahi tha to vo bolte hai k usse ye school better hai/In our previous school where we used to study, there was no TV, so they say that this school is better."*

- ***Indifferent***
  A few students (3/22 FGD) said their parents do not feel anything about the presence of TV in the school. The 3 responses recorded in SNP schools suggest that parents of these students either do not know about TV in school or have never asked their children about TV in school. For instance, *"Hamare maa-baap ko school mein TV ke baare mein pata nahi hai. Hum kabhi nahi bataye/Our parents don't know about the TV in school. We've never told them"*and *"Hamre parents ne kabhi school mein TV ke baare mein nahi pucha/Our parents have never asked about the TV in school."*

Combined data from both SIP and SNP schools show that most parents had positive perception (47/51 FGDs) towards using DSP-TVs for learning in classes and while only a few (4/51 FGDs) show parents' indifference towards the presence of DSP-TVs in their children's schools.

4.1.14 Suggestion

Figure 4.1.14: Findings from FGDs - Suggestions



i. Summary of Findings from FGD: Suggestions

Students in FGDs offered several suggestions to improve DSP-TV classes. They recommended finding alternatives to address electricity shortages, ensuring uninterrupted access to the TV. Additionally, students expressed a desire for more practice content to reinforce their learning. They also suggested that the videos provide more comprehensive coverage, with additional details across a wider range of subjects. Furthermore, students emphasized the need for improved teacher instructions to better complement the video lessons, enhancing overall understanding and engagement.

In both SIP and SNP schools, students were asked for suggestions to enhance DSP-TV classes, revealing insights into their preferences and needs.

In SIP schools, while several groups (13/29 FGDs) had no suggestions to offer, the remaining groups (16/ 29 FGDs) provided valuable recommendations.

ii. Alternative for Electricity Shortage

Among these, practical solutions to address electricity-related issues were highlighted by a few groups (2/16 FGDs). For instance, *"Inverter chahiye, plugs theek karane chahiye/We need an inverter, and the plugs should be fixed."* (8th Graders) Students emphasized the need for inverters and proper maintenance of electrical outlets to mitigate disruptions caused by power outages.

iii. Enhancing Engagement

Additionally, there were suggestions (8/16 FGDs) to make the videos more engaging and interactive, especially in subjects like Math, by incorporating additional examples and activities. For instance, *"Science ki taraha, Math me bhi activities k zariye samjhana chahiye wrna vo bahot bore karta hai/Like in Science, Math should also be taught through activities, otherwise it becomes very boring."*
(7th Graders)

iv. Adding Practice Content

Few students (2/16 FGDs) suggested providing questions or assignments at the end of the videos for practice and reinforcement learning. For instance, *"Videos k end me questions for homework hone chahiye/There should be questions at the end of the videos for homework."*
(10th Graders)

v. Comprehensive Video Coverage

Many students (4/16 FGDs) expressed the desire for more comprehensive video coverage across all subjects, with a focus on providing clear explanations in simple language. For instance, *"Videos aur honi chahiye, jisme aur examples ho jisse aur ache se samjh me aaye. Sare subjects k liye ese hi bahot sari videos honi chahiye/There should be more videos with additional examples to aid better understanding. There should be plenty of such videos for all subjects.''*
(7th Graders)

Similarly, in SNP schools, while several groups (9/22 FGDs) had no suggestions, the remaining groups (13/22 FGDs) provided insightful recommendations. Among these 13 groups, which shared suggestion detailing the following recommendations:

vi. Alternative for Electricity Shortage

Some students (4/13 FGDs) suggested addressing the issue of power cuts and having alternatives. For instance, *"Bijli k liye kuch upaaye hona chahiye/There should be some solutions for the electricity problem"* and *"Inverter aur wifi hona chahiye school me/The school should have an inverter and Wi-Fi."*

vii. Comprehensive Video Coverage

Several students (7/13 FGDs) suggested adding more detailed videos for all subjects and to cover more topics. For instance *"Sare subjects k liye videos honi chahiye taki parhai aur rochak ho sake aur samjhne me asani ho/There should be videos for all subjects so that studying becomes easier and more interesting"*, *"Syllabus k sab topics k liye videos hone chahiye/There should be videos for all topics in the syllabus"* and *''Video me har cheez jo book me di gayi hai vo ache se explain nahi ki jati. Thodi aur badi hojaye videos to acha hoga/Everything given in the book isn't explained well in the videos. It would be better if the videos were a bit longer."*

viii. Improving Teacher Instructions

A few students (2/13 FGDs) also recommended better explanations by teachers during class time to supplement the video content by one of the groups, mentioning *"agar class me teacher video ko aur ache se samjhaye to acha hoga/"It would be good if the teacher in class explains the video more effectively."*
(9th Graders)

Combined data from both SIP and SNP schools indicate that a significant number of students (29/51 FGDs) provided suggestions, while a notable proportion (22/51 FGDs) did not offer any. Recommendations included addressing concerns such as electricity shortages (6/29 FGDs), advocating for comprehensive videoscoverage (11/29 FGDs) across subjects, and suggesting improvements in teacher explanations (4/29 FGDs) to facilitate better understanding alongside video content.

Additional Question Items Asked in SIP Schools

Participation/ Value-Benefit: Student Eagerness for Coming to School for DSP-TV Classes in SIP Schools

On inquiring if students wait eagerly for coming to school for DSP-TV learning classes, most of the students (22/29 FGDs) expressed their excitement and mentioned waiting eagerly for DSP-TV classes. Many (14/22 FGDs) expressed a preference for

TV learning over traditional methods, citing increased understanding and enjoyment. For instance, *"Neyi cheeze dekhne ko milti hai to acha lagta hai/It's feels nice to see new things"* (7th Grader) and *"Videos se pardhne me maza ata hai/Studying through videos is enjoyable."*
(9th grader)

Some students (8/22 FGDs) eagerly anticipate TV classes for the opportunity to learn through stories and examples, finding them more memorable and enjoyable. For instance, *"Video me jo examples hote hai use samjhne me madad milti hai/The examples in the video help me understand"* (8th Grader), "*Hum sab khush hokar dekhte hai TV pr cartoon aur kahani jaise/We all happily watch like cartoons and stories on TV"* (7th Grader) and *''Video dekhne me kuch naya dekhkr yaad rehta hai topic, fir book se Padhte hai to samjh ajata hai/ Watching a video helps me remember the topic when I see something new, and then when we read the book, we understand it."*
(9th Grader)

On the other hand, some students (7/29 FGDs) said they do not wait eagerly for the DSP classes. Several students (4/7 FGDs) noted a lack of eagerness for DSP classes providing no specific reason for their disinterest.

One group attributed their lack of anticipation to concerns about the reliability of TV usage, including uncertainty about when the TV will be operational and issues with power supply. For instance *"Hume pata hota hai ek baar hi chalayega hafte me, aur light bhi nahi hoti hai TV chalane k liye/We know it only works once a week, and there isn't electricity to run the TV either."*
(6th Grade)

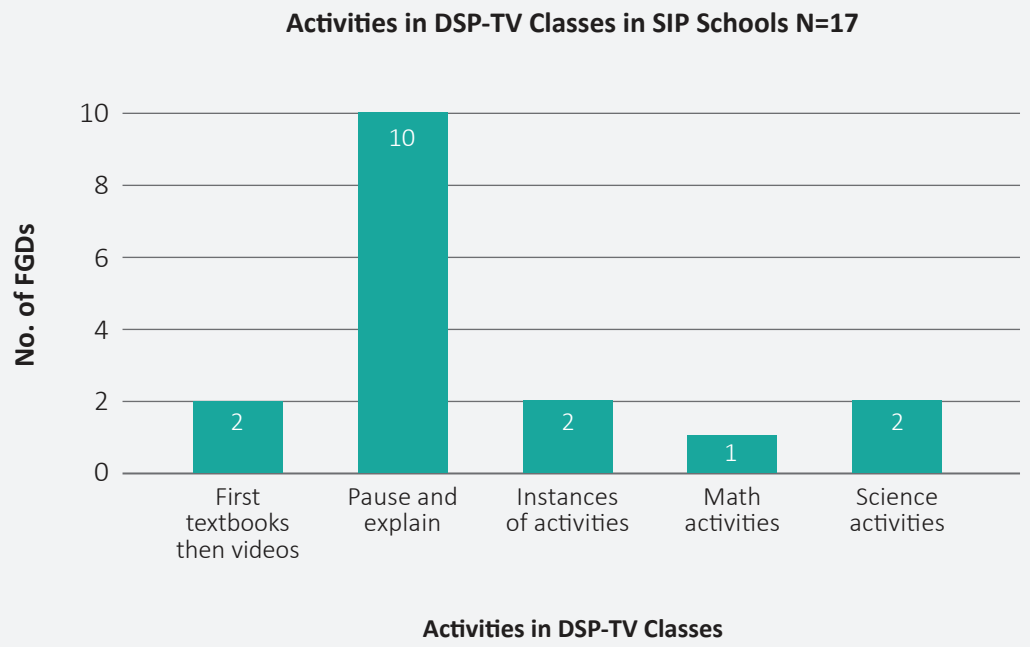
One FGD mentioned the reason for not waiting for TV classes as teachers already use the TV frequently. 5/5 students in this group said *"Hum itna intezar nahi karte kyuki teacher khud hi TV se padha dete hai/We do not wait eagerly as teachers frequently use DSP-TV in our class."*
(10th Grader)

Additionally, one group stated that they do not eagerly await TV classes because they believe the explanations provided by the teacher are sufficient for understanding, unlike what they experience through TV instruction. For instance, *'Maam ke samjhane se samjh ajaaata hai, TV me samjh nahi aata/When maam explains, we understand; we don't understand from the TV."*
(8th Grader)

Usage: Activities in DSP-TV Classes

On understanding how the DSP-TV classes are conducted, students in the FGDs were prompted to explain the activities that take place in DSP-TV classes. The graph below (Fig. .1.15) gives a summary of the findings of some activities in the SIP schools.

Figure 4.1.15: Activities in DSP-TV classes in SIP schools



The x-axis on the graph (Fig. 4.1.15) represents the activities that take place in DSP-TV classes in SIP schools and the y-axis represents the number of FGDs mentioning the activities (17/29 FGDs in SIP schools).

The data indicates that while there is a significant focus on MME with explanations provided by teachers, hands-on activities are less common, particularly in Math classes.

Usage: Type of Content Played on DSP-TV

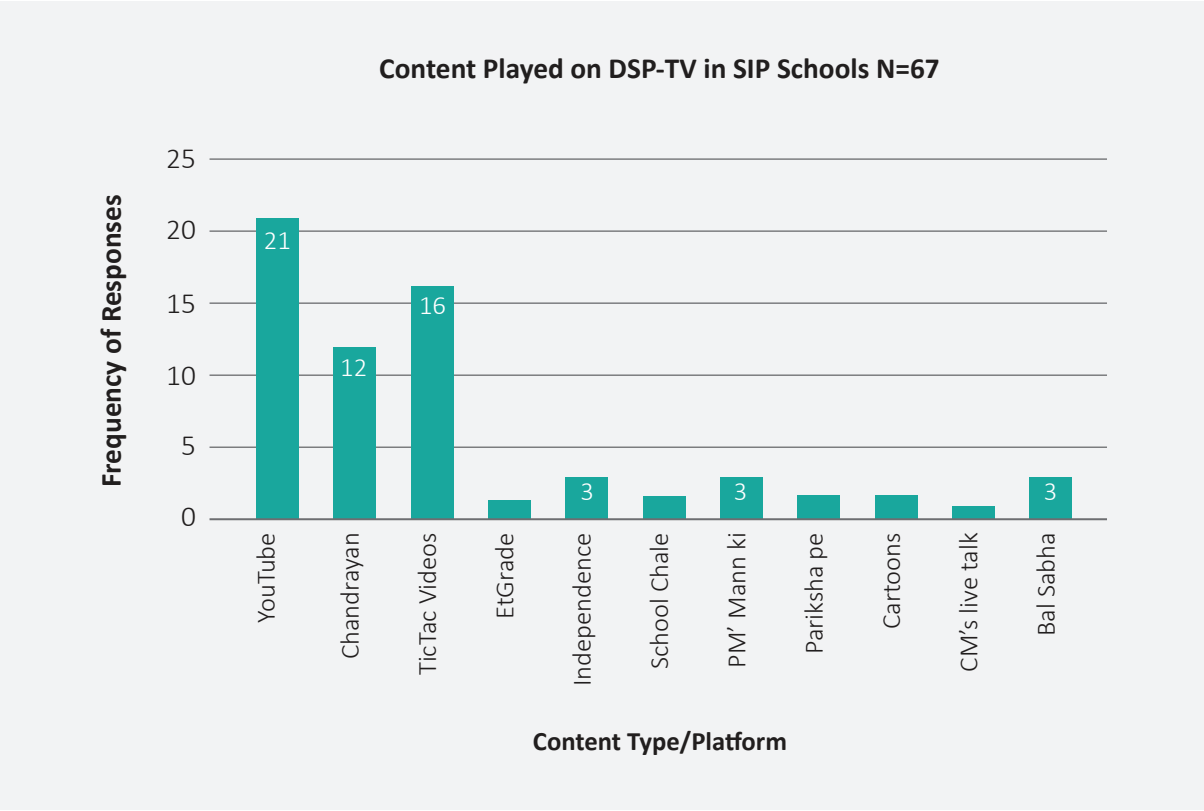
In SIP schools, when asked the type of content students see on DSP-TV classes, the students described various activities and platforms that they observed on DSP-TVs.

The Fig. 4.1.16 shows these content types and the frequency of responses in the FGDs.

The x-axis on the graph represents the content type played on DSP-TVs and the y-axis represents the number of responses in SIP FGDs (Fig. 4.1.16).

This data indicates a significant usage of YouTube, with various topics and events being accessed through this platform, including educational content, government programs, and entertainment.

Figure 4.1.16: Content Played on DSP-TV in SIP Schools



Cases

Case 1: Student fear in operating DSP-TV

In two SIP schools, the data from two student FGDs reveal a fear regarding the handling of TVs and remotes in school settings. Despite having the capability and experience with similar technology at home, students are cautious and prefer not to handle the school's equipment out of fear of causing damage. For instance, all 7/7 in one FGD have TV and smartphone at home and know how to operate, but they report *''Humein darr hai ki agar school mein TV ko kuch ho gaya to, isliye hum ise haath nahi lagate hain./We fear that what if something happen to TV in school that is why we refrain from handling''.*

Another example mentioned is the school policy that forbids students from handling TV and remote to avoid technical problems or damage. For instance, all 5/5 students in this focus group discussion (FGD) stated, *"Kisi bhi student ko TV ya remote handle karne ki permission nahi hai taaki koi technical problem ya damage na ho/We fear that what if something happens to the TV in school; that is why we refrain from handling it."*

Notably, both these FGDs involved students from senior grades, 8th and 10th, highlighting a lack of autonomy and trust in students regarding the management of materials related to their learning.

4.2 Findings of Classroom Observation

For this study, 64 schools were sampled, of which 21 were SIP and 43 were SNP. 53 CROs (30 in SIP and 23 in SNP) have been conducted in both SIP and SNP schools in Gwalior and Indore districts, Madhya Pradesh. Out of 53, 31 CROs were conducted in urban areas, while 22 CROs were carried out in rural areas.

The tables below include the total number of school and classroom observations in both SIP and SNP categories and a breakdown of classroom observations in urban and rural areas.

Table 4.2.1

Sampled School and Number of CROs in Rural and Urban Areas			
Category	**Total**	**SIP**	**SNP**
Schools Sampled	**64**	21	43
CROs	**53**	30	23
Number of Students	**870**	524	346

Table 4.2.2

Classroom Observations by Urban and Rural			
CROs Locality Wise	**Total**	**SIP**	**SNP**
Urban	**23**	13	10
Rural	**30**	17	13

4.2.1 Purpose of Classroom Observation

A In this study, CROs were conducted to gain insights into the process of using DSP-TV in subject classrooms and the engagement of students and teachers with DSP-TV.

4.2.2 Tool for Classroom Observation

A CRO tool was developed to document the observations. A pilot was conducted in two classrooms to improve and validate the tool. The final tool included 44 open-ended and closed-ended questions under eight themes that aimed to understand the accessibility of DSP-TV by students and teachers, the use of DSP-TV in the classroom, pedagogy used by teachers, classroom interaction between students and teachers, and student engagement in classrooms.

4.2.3 Method of Sample Selection

The school selection process is described in the section above. The classrooms observed were from five class grades: Grades 6, 7, 8, 9, and 10 were the focus of TicTac Learn content, as the materials were specifically designed for students in these grades.

Grades in a selected school were chosen based on convenient sampling, determined by the availability of teachers using DSP-TV in Science and Math classes on the day of the field visit by the research team, timetable schedule, or flexibility of the teacher to conduct the class in the DSP-TV classroom. In each of the selected schools, an attempt was made to observe one grade or section in Math and another in Science classroom. However, making two observations in each school visited did not materialize. Each school was visited a maximum three times to complete data collection on time. However, due to administrative constraints such as denial of permission, absence of teachers and School Heads, power-cut etc. data collection was not possible in some schools even in three visits. The following table gives the details of the number of CROs conducted in SIP and SNP category schools from each grade and subject-wise distribution:

CROs were carried out in 53 classrooms, 26 in Science and 27 in Math covering approximately 870 students.

Below is the distribution of subject-wise CRO.

Table 4.2.3

Subject and Grade-wise Distribution of CROs							
Science CROs				Math CROs			
Class Grade	SIP	SNP	Total No. of CROs	Class Grade	SIP	SNP	Total No. of CROs
6th	2	2	4	6th	0	1	1
7th	4	2	6	7th	6	2	8
8th	5	4	9	8th	5	4	9
9th	2	0	2	9th	2	1	3
10th	2	3	5	10th	2	4	6

4.2.4 Method of Classroom Observation

The data collection process for the CROs included using the observation tool and handwritten running notes. The observations were documented using the CRO tool, and the researchers also noted them in detail as running notes during the session. The observers sat at the back of the class and did not interfere with the teaching-learning in the classes.

These running notes were then transcribed into English. The transcribed running notes files were then put into MAXQDA, a qualitative data analysis software, for coding. The coding process entailed assigning appropriate codes to the transcribed texts. Following this, the codes were categorized into emerging themes and subthemes. Finally, the codes and themes were combined into findings. Some of the quantitative data derived from classroom observations using the CRO tools were analyzed using the SPSS, a statistical data analysis software widely used in research.

- **Routine Class and Schedule for Observation**

  53 CROs were conducted in both SIP and SNP schools. Out of the 53 CROs, 8 CROs (2 SIP and 6 SNP) were scheduled as a part of the class routine, and 45 CROs (28 SIP and 17 SNP) were conducted solely for research observation purposes. This information was gathered from initial conversations with school heads and teachers, who provided their daily schedules.

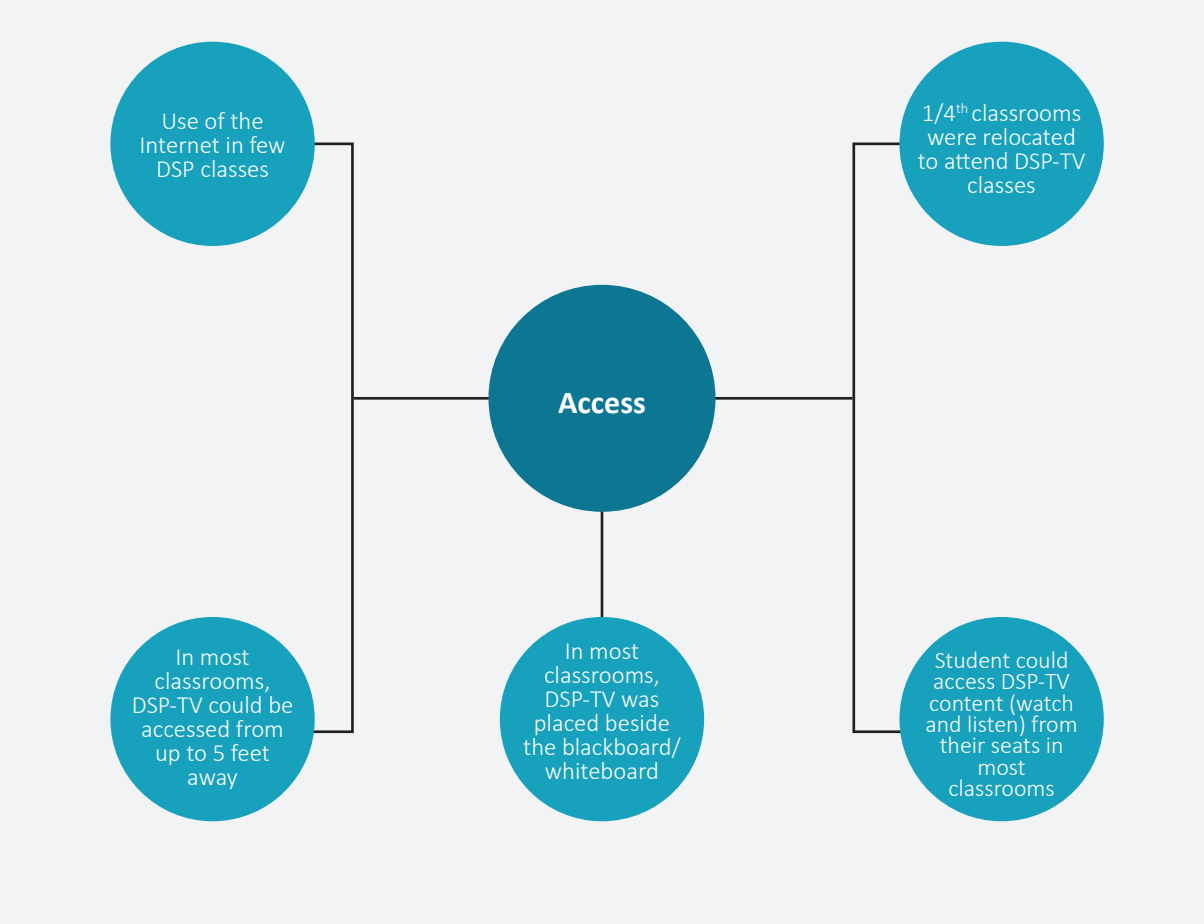
- **Shift of Class to Dedicated DSP-TV Space for Observation**

  It has been observed that the students from 13 out of 53 classrooms (6 SIP and 7 SNP) were shifted to dedicated DSP-TV spaces to run these classes, indicating more classes using the DSP-TV in rotation.

  The section delves into the findings of the CROs, bifurcated into themes of access, usage of DSP-TV, classroom participation, challenges, the case of multiple-teacher teaching, contextualized learning, and group study. These themes also consist of many subthemes. The observations and findings from these 53 classrooms are thematically summarized below.

4.2.5 Access to DSP-TV

Figure 4.2.1: Findings from CRO - Access to DSP-TV



4.2.5.1 Summary of Findings from Classroom Observations: Access to DSP-TV

Findings on the access to DSP-TV in the classrooms revealed that in most classrooms students could watch and listen to the DSP-TV content from their seats and the DSP-TV was mostly installed besides the blackboard/ whiteboards. The DSP-TV remote was functional from up to 5 feet away. It was also noticed in some schools that students were relocated from their original classrooms to a different room where the DSP-TV was installed in order to attend DSP-TV integrated classes. Though TicTac Learn videos were provided to teachers on a pendrive a few teachers did use the internet in the classes to access the content.

i. Seating Arrangements and Access to DSP-TV Content

In the 53 CROs for DSP-TV classes, the seating arrangements were examined across co-ed, girls', and boys' schools. Many classes were (37/53) in co-ed schools, some classes were (10/53) in girls' schools, and a few were (6/53) in boys' schools.

Within the co-ed schools:

In most (30/37) classrooms (16 SIP and 14 SNP), boys and girls are seated separately on different benches.

In a few (3/37) classrooms (3 SIP), boys and girls were seated separately on the floor.

A few (4/37) classrooms (4 SNP) had boys and girls seated together on the same benches, which belonged to lower grades (6th and 7th).

Overall, across all 53 classrooms:

In several (31/53) classrooms, students (12 SIP and 19 SNP) were seated on benches in rows. In some (18/53) classrooms, students (16 SIP and 2 SNP) sat in rows on the floor. Students sat on the floor scattered in a few (4/53) classrooms (2 SIP and 2 SNP).

This study shows that in co-ed schools, boys and girls often sat on different benches. In smaller classes, they either shared benches or sat on the floor. Most classrooms, no matter the school, had rows of benches or floor seating. Only a few classrooms had a more casual, scattered floor seating setup.

While observing DSP-TV classes, the researchers made observations on the seating arrangement of students in the classes and the accessibility of DSP-TV content.

- **Watching-** In most (52/53) classes (30 SIP and 22 SNP), the seating arrangements enabled students to watch the DSP-TV content clearly. In one (1/53) class (1 SNP), the seating arrangement did not enable students to watch DSP-TV content clearly. In this class (girls school), a girl mentioned that she was unable to see the video clearly from the back bench where she was sitting. The teacher then asked her to come and sit in the front of the class.
- **Listening-** In most (52/53) classes (30 SIP and 22 SNP), the seating arrangements enabled students to listen to the DSP-TV content clearly. In one (1/53) class (1 SNP), the seating arrangement did not enable students to listen to DSP-TV content clearly. In this classroom (co-ed School), a boy mentioned that he was unable to hear the audio and asked to rewind the audio-visual content being played. Then, the teacher increased the volume of the DSP-TV video.

ii. Placement of the DSP-TV in Context to the Blackboard/Whiteboard in the Classrooms

While observing the DSP-TV classes, the placement of DSP-TVs in relation to the whiteboard/blackboard in each classroom was noted. The table below summarizes the data on the placement of the TVs and the frequency of each placement.

Table 4.2.4

Placement of the DSP TV	
Placement of DSP-TVs	**Frequency**
DSP-TV is placed beside the blackboard/whiteboard	44/53 (28 SIP and 16 SNP)
DSP-TV is placed on top of the blackboard (blackboard/whiteboard could not be used)	1/53 (SNP)
DSP-TV placed way above the blackboard/whiteboard	2/53 (SIP)
DSP-TV without blackboard/whiteboard	2/53 (SNP)
DSP-TV and blackboard/whiteboard are in opposite directions	4/53 (SNP)

In most (45/53) classrooms where the CRO was conducted, the DSP-TV was placed alongside the blackboard/whiteboard on either the left or right side. In one of the classrooms, the DSP-TV was placed (installed) on the blackboard and covered the entire blackboard, making it inaccessible during class. In two of the classrooms, the DSP-TV was placed above the blackboard, so the students had to stretch their necks up to watch the DSP-TV.

In two classrooms, the DSP-TV was placed at the center of the wall, while a whiteboard rested on the floor against the wall. The students sat on benches, and if the teacher had used the whiteboard during class, they would not have been able to see it. However, the board was not used. Additionally, in both classrooms, half of the space was repurposed for office use. Due to a shortage of space in the school, almirahs were

used as partitions to separate the classroom from the office area.

iii. Distance of the Remote

In order to understand the smooth functioning of DSP-TVs, the researchers observed the distance of the remote from the TV. Out of the 53 CROs, the distance of the remote from the DSP-TV and the holder of the remote of the DSP-TV was up to 5 feet during most (52/53) of the CROs (27 SIP and 25 SNP) and up to 5-10 feet during only 1 CRO which made it possible for the holder of the remote to navigate at ease.

iv. Access to the Internet

To understand the internet's accessibility for teachers, the researchers observed how many teachers used the internet in class and for what purposes. In a few (5/53) classes (1 SIP and 4 SNP), the teachers have used the internet to access the TicTac Learn content or other video content from YouTube. The TicTac Learn content does not require the internet to play, as it is given to the schools on a pen drive provided by Muskaan Dreams. During CRO, the teachers accessed the TicTac Learn content through a pen drive or connected the DSP-TV with Wi-Fi.

In those few schools where the teachers used the internet during class, teachers accessed the internet either through the dongle provided by Muskaan Dreams (1 SIP) or through the school's internet connection (2 SNP), or the teacher used her/his mobile internet connection (2 SNP).

Out of the 53 CROs, the internet was not used by the teachers during most (48/53) of the CROs (26 SIP and 22 SNP). Internet was used during only a few (5/53) CROs (1 SIP and 4 SNP) to play TicTac Learn videos (two SNP classes), to provide updated content provided in the pen drive (1 SIP class), to access e-platforms such as Diksha for more clarity on the topic (1 SNP class) and to play YouTube videos (1 SNP class).

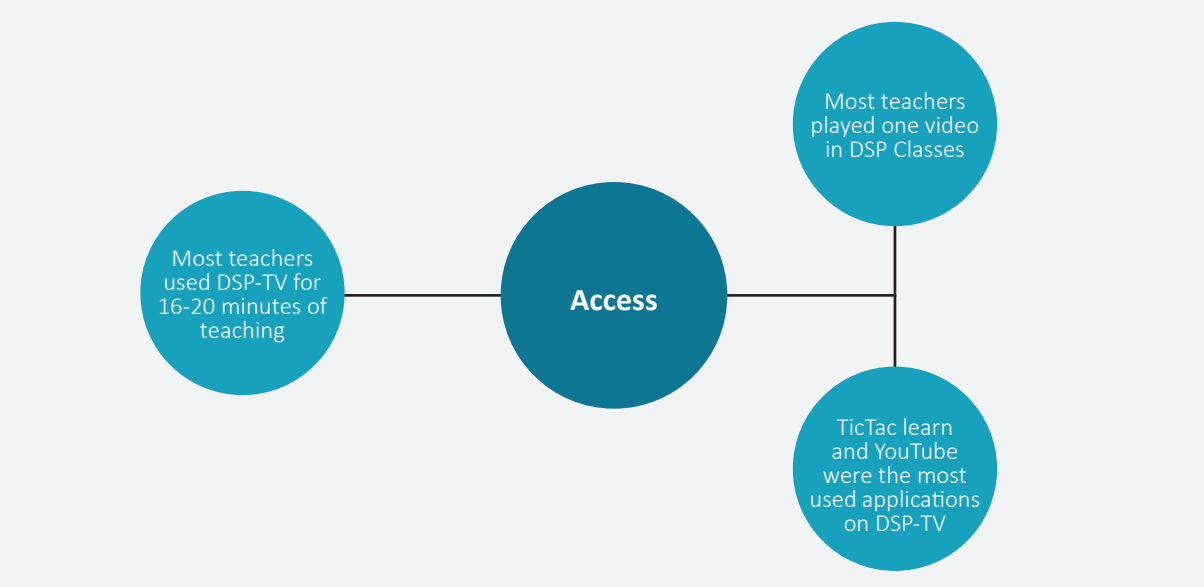
v. Speed of the DSP-TV Content

In one class (1/53, SNP), students found the content speed difficult to understand. However, in most of the classes (52/53, 30 SIP and 22 SNP), researchers observed that the speed of the content was appropriate for the students.

During observations of DSP-TV classes, the speed of the videos played by teachers was noted. In most (51/53) classes (30 SIP and 21 SNP), the teacher found the DSP-TV content speed neither too fast nor slow. In a few instances (2/53 classes, both SNP), the teacher found the speed of the DSP-TV content fast, making it neither too fast nor too slow.

4.2.6 Usage of DSP TV

Figure 4.2.2: Findings from CRO - Usage of DSP-TV



i. Summary of Findings from Classroom Observations - Usage of DSP-TV

Findings of usage of DSP-TV revealed that many teachers played only one video during the DSP-TV classes and most teachers used the DSP-TV for around 16 to 20 minutes of teaching. Furthermore it was observed that TicTac Learn and YouTube were the most used applications on the DSP-TV.

ii. Usage of DSP-TV Content

The findings reflect that of the 53 CROs, TicTac Learn Videos were shown to students in most (50/53) classes (27 SIP and 23 SNP). Only YouTube videos were shown in a few (3/53) classes (3 SNP).

There were no instances where DSP-TV content and YouTube videos were used simultaneously in any class.

iii. Duration of the Class Observation

During the CRO's, the researchers observed the class until the DSP-TV class was completed. Out of the 53 CROs, some (9/53) CROs (7 SIP and 2 SNP) were observed for 10-15 minutes, while many (15/53) CROs (5 SIP and 10 SNP) were observed for 16-20 minutes. Further, some (10/53) CROs (5 SIP and 5 SNP) were observed for 21-25 minutes, and some (11/53) CROs (6 SIP and 5 SNP) were observed for 26-30 minutes, whereas very few (3/53) CROs (1 SIP and 2 SNP) were observed for 31-35 minutes and a few (5/53) CROs (4 SIP and 1 SNP) were observed for 36-40 minutes.

Table 4.2.5

Duration of the Class							
Count		Duration (in minutes)					
		10-15	16-20	21-5	26-30	31-35	36-40
Category	SNP	2	10	5	5	2	1
	SIP	7	5	5	6	1	4
Total		**9**	**15**	**10**	**11**	**3**	**5**

Overall, the CRO data indicate that the most common observation duration that was followed was 16-20 minutes with 15 CROs, and the next most common observation duration was 26-30 minutes with 11 CROs. This duration includes the time the teacher took to start the DSP-TV, settle the students, and so on before they started the session.

Table 4.2.6

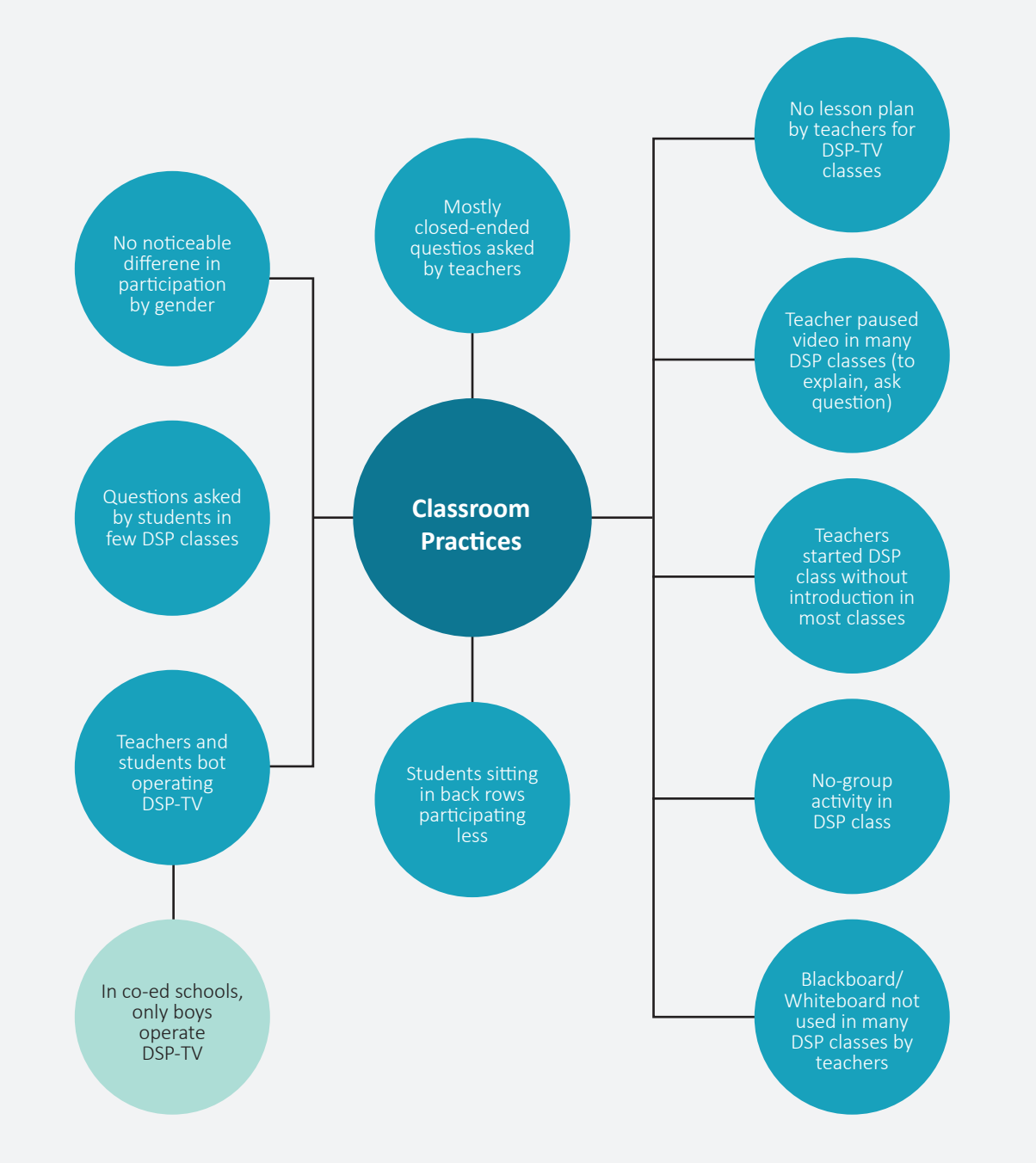
Number of Videos Played in the Class							
Science CROs (N=26)				Math CROs (N=27)			
No of Videos	SIP	SNP	Total No. of videos	No of Videos	SIP	SNP	Total No. of videos
1	9	11	20	1	7	11	18
2	2	2	4	2	2	0	2
3	2	0	2	3	3	0	3
5	0	0	0	4	2	0	3
5	0	0	0	5	1	1	2

In most Science classes (20/26) (9 SIP and 11 SNP), the teachers played one video for each class. In some (4/26) classes (2 SIP and 2 SNP), the teachers have played two videos in the class, and in a few (2/26) classes (2 SIP), the teachers have played three videos. These videos were for the same topic.

In many (18/27) Math classes (7 SIP and 11 SNP), the teachers have played one video in the class. The teachers played two videos in a few (2/27) classes (2 SIP). The teachers played three videos in a few (3/27) classes (3 SIP). The teachers played four videos in a few (2/27) classes (2 SIP). The teachers played five videos in a few (2/27) classes (1 SIP and 1 SNP). These videos were for the same topic.

4.2.7 Classroom Practices

Figure 4.2.3: Findings from CRO - Classroom Practices



This theme includes classroom participation, the time elapsed, the method of introduction of the DSP-TV class, explaining pause and resuming of the videos, the physical movement of the teachers in class, the method used to end the DSP-TV class, student participation in the DSP-TV class by seating arrangements, students' responses to the teachers' questions in DSP-TV class, students operating DSP-TV and single or combined class.

i. Summary of Findings from Classroom Observations - Classroom Practices

Classroom observations highlighted that in most cases teachers began the class without any introduction of the DSP-TV content. In many classes teachers did pause the videos to explain certain concepts or to ask questions, however mostly closed-ended questions were asked by teachers and no group activities were conducted. Only in a few DSP-TV classes did the students ask questions with students sitting in the back rows participating less. Furthermore in many classes the teachers did not use the blackboard/white board either while teaching with the DSP-TV. Teachers also indicated that they did not make any lesson plans for the DSP-TV classes. It was observed that both students and teachers operated the DSP-TV however in co-ed schools, only boys operated the TV.

ii. Lesson Planning

To understand the practice of using a lesson plan during the DSP-TV classes, the researchers found that none (53/53 CROs) of the teachers had prepared a lesson plan for the DSP-TV class.

iii. Alignment Between the DSP-TV Content and the Teaching Method

While observing the DSP-TV class, the teacher's explanation was noted, whether the teacher was just explaining the video or using their own examples to explain as well.

In most (46/53) classes (26 SIP and 20 SNP), the teacher explained the video shown. In a few (7/39) classes (4 SIP and 3 SIP), the teacher explained the video with real-life examples of her own.

iv. Time Elapsed to Start the DSP-TV

This shows the time elapsed at the beginning of the DSP-TV class when turning on the DSP-TV to find and play the content.

During CRO, the tool also recorded the time the teacher took to start the class using DSP-TV. Out of the 53 CROs, in 46 CROs (25 SIP and 21 SNP), observation has been documented to understand the time elapsed in the preparation before starting the DSP-enabled class. In a few (7/53) CROs, the duration was not recorded. In most (43/53) of the CROs (23 SIP and 20 SNP), the DSP-TV started within five to six minutes after the class began. The teachers in a few (3/53) CROs (1 SIP and 2 took more than 10 minutes to start the class. In this period, the teachers tried connecting the DSP with Wi-Fi and finding the content to play.

v. Approaches to Introducing DSP Content in Class

Two different methods of introducing DSP content in class were observed:

- **Played DSP Content Without an Introduction:** In most (43/53) of the classes (23 SIP and 20 SNP), as observed, the teacher started the DSP content without introducing or explaining the DSP content or topic.
- **Introduced the Topic Before DSP Content:** During the observation, it was witnessed that in very few classes, the teacher first introduced the topic in some (8/53) classes (5 SIP and 3 SNP) and then started the content on the DSP-TV. For example, in one of the classes, the Science (7th grade) teacher opened the DSP-TV content but didn't play the video. Instead, the teacher initiated a discussion by writing the topic's name on the smart board and asking a question based on the topic's title. The teacher then elaborated on the subject by inferring from the responses of the students and subsequently showed the class the DSP-TV content related to the topic.

In a few classes (2/53 in SIP), the initiation of the class could not be observed because the class was already in progress.

vi. Methods of Explanation: Pausing vs. Continuous Playback in DSP Classes

Teachers employed different approaches to explain the DSP-TV content during lessons.

- **Pausing for Explanation:** In most classes (39 out of 53, including 22 SIP and 17 SNP), teachers paused the video at least once to explain the content. Along with pausing, they engaged students by asking questions, encouraging them to solve problems on the blackboard, prompting them to take notes, and occasionally rewinding the content for better understanding.
- **Continuous Playback:** In some instances, teachers allowed the DSP-TV content to play without pausing, relying on the video itself to deliver the explanation.

These variations highlight different instructional strategies used to facilitate student comprehension in DSP-enabled classes..

- **Asked Questions:** In many (25/39) classes (14 SIP and 11 SIP), the teachers asked questions after pausing.
- **Explained the Content:** The teacher explained the DSP content after a pause in several (22/39) classes (13 SIP and 9 SNP).

In some of the classes (12/53), the teacher did not pause (7 SIP and 5 SNP) even once while explaining the content. The teacher conversed with students in one class while the video was on. In this case, the students listened to the teacher and did not focus on the content of the DSP-TV.

There were very few (2/53) classes (1 SIP and 1 SNP) where the teacher explained the content once the DSP-TV content was finished.

Additional Teaching Strategies During Paused DSP Content. Apart from questioning and explaining, teachers employed other strategies to reinforce learning while pausing the DSP-TV content:

- **Note Making-** In some (11/39) classes (6 SIP and 5 SNP), during observation, it was noticed that the teacher asked students to make notes from the DSP-TV content.
- **Rewinding the Content-** In a few classrooms (4/39), the teacher rewinds the content during the classes (2 SIP and 2 SNP). The teacher was found to rewind the DSP-TV content so the students could either make notes or understand it properly.
- **Problem-solving on Board by Students-** In a few (3/39) classes (2 SIP and 1 SNP), the teachers asked the students to solve the problem on the board. This has occurred in Math class only, as observed during the DSP-TV class.

vii. Frequency of Teachers Pausing Videos to Explain Content

In some (13/53) classes (9 SIP and 4 SNP), the teacher let the video play for the entire duration. In several (26/53) classes (13 SIP and 13 SNP), the teacher paused the video between 1 and 5 minutes. In some (14/53) classes (8 SIP and 6 SNP), the teacher paused the video after every minute.

viii. Frequency and Types of Questions Asked by Teachers

In some (10/53) classes (7 SIP and 3 SNP), the teacher did not ask questions to the students. In some (21/53) classes (11 SIP and 10 SNP), the teacher asked questions occasionally. The teacher frequently asked questions in several (22/53) classes (12 SIP and 10 SNP).

Open-ended questions: In a few (6/43) classes (3 SIP and 3 SNP), teachers have asked open-ended questions. One of the teachers in high school asked. For example, a Grade 7th Science teacher, while explaining body parts, asked, *"Why can't we stretch our body parts more than a certain angle?"* In another 7th (B) grade Science class, the teacher asked, *"Paudha kaise bada hota hai, usko bade hone ke liye kya kya chahiye hota hai/How does the plant grow, what does the plant need to grow?"* In another 9th-grade Science class, the teacher asked, *"Kya koi bata sakta hai ke ladka aur ladki awaj me fark kyun hota hai/Can anyone tell why there is a difference between voices of boys and girls?"* After pausing the video in an 8th-grade Science class, the teacher asked, *"Ped paudhon aur janwarno ka sanrakshan kyun jaruri hai/Why is it important to*

protect plants and animals?" In a 6th grade Science class, the teacher asked after pausing the video, *"Bahut sare electronic upkaran me lal and peela wire kyun hai/Why is there a red and yellow wire in most of the objects?"* In a 7th Grade Science class, the teacher asked after pausing the video, *"Maila jal kya hai/What is polluted water?"* questions: In many (37/43) of the classes (20 SIP and 17 SNP), the teachers were observed asking closed questions. For example, in a Grade 6th Science class, referring to the video, the teacher asked, *" khoon kis rang ka hota hai/ What is the color of blood?"*

Closed-ended questions: In many (37/43) of the classes (20 SIP and 17 SNP), the teachers were observed asking closed questions. For example, in a Grade 6th Science class, referring to the video, the teacher asked, *"khoon kis rang ka hota hai/ What is the color of blood?"*

Apart from questions, the teachers also asked about understanding. For instance, in a 7th-grade Math class, the teacher said, *"Smajah aa gaya na/ Understood."* In another 10th-grade Science class, the teacher asked at the end of the class, *"Samajh nahi aaya toh pucho/If you did not understand, then ask?"* In another 9th-grade Science class, the teacher said, *"Sabko samajh aaya/ All of you understood?".* In these instances, it was observed that the students passively nodded.

ix. Frequency and Types of Questions Asked by Students

In most classes (46/53) (26 SIP and 20 SNP), students did not ask any questions. In a few classes (7/53) (4 SIP and 3 SNP), students did ask questions.

- **Types of Questions Asked by Students** In all the classes where students did ask questions (7/7) (3 SIP and 4 SNP), the questions were related to the DSP-TV content. A girl in a 7th-grade Science class asked, *"Sir mithya dharna kya hota hai"/Sir, what are false concepts."* The teacher paused the video and explained the meaning of the word *"mithya/false."*
- **Gender-Wise Variation in Questioning** Gender-based differences in questioning were noted in the seven observed classes. In most (4/7) of these classes, girls were more active in asking questions, with this trend being seen in three SIP classes and one SNP class. Conversely, boys asked more questions in the other three classes (1 SIP and 2 SNP).

x. Students' Responses to Teachers' Questions in DSP-TV Class

This section deals with the student's responses to the questions asked by the teacher during the DSP class.

- **Some Students Responded** - It has been witnessed during observation in several classes (23/43) that students responded to the questions asked by the teacher in a DSP-TV class. (11 SIP and 12 SNP)
- **All Students Responded in Chorus** - In some (9/47) classrooms (5 SIP and 4 SNP), observations showed that all the students responded in chorus.

In one of the Math classes, the teacher showed a small puzzle card with different types of questions and answers. The teacher joined and removed the different cards to show how the formula originated. Meanwhile, the teacher asked questions. All of the students were found to be interacting. The puzzle card was prepared by a girl in the class, and the teacher asked everyone to give a big round of applause for creating the puzzle.

- **One or Two Responded -** In a few (4/43) of the classes (2 SIP and 2 SNP)
- **Only One or Two Students Responded -** to the teacher's questions in the class.
- **No One Responded -** It has been observed in some (7/43) classrooms (5 SIP and 2 SNP) that none of the students responded to the questions asked by the teacher.
- **No Questions Asked -** In some (10/53) classrooms (7 SIP and 3 SNP), the teacher did not ask the students questions at all.

xi. Classroom Participation Scenario Among Boys and Girls

Out of the observed classes, 6 were girls' schools (4 SIP and 2 SNP), and 9 were boys' schools (7 SIP and 2 SNP). There was no noticeable difference in classroom participation between boys and girls in many classes (28/38) (14 SIP and 14 SNP). In a few classes (5/38) (all SIP), girls were more actively participating than boys. In the other few classes (5/38) (all SNP), boys were more actively participating than girls.

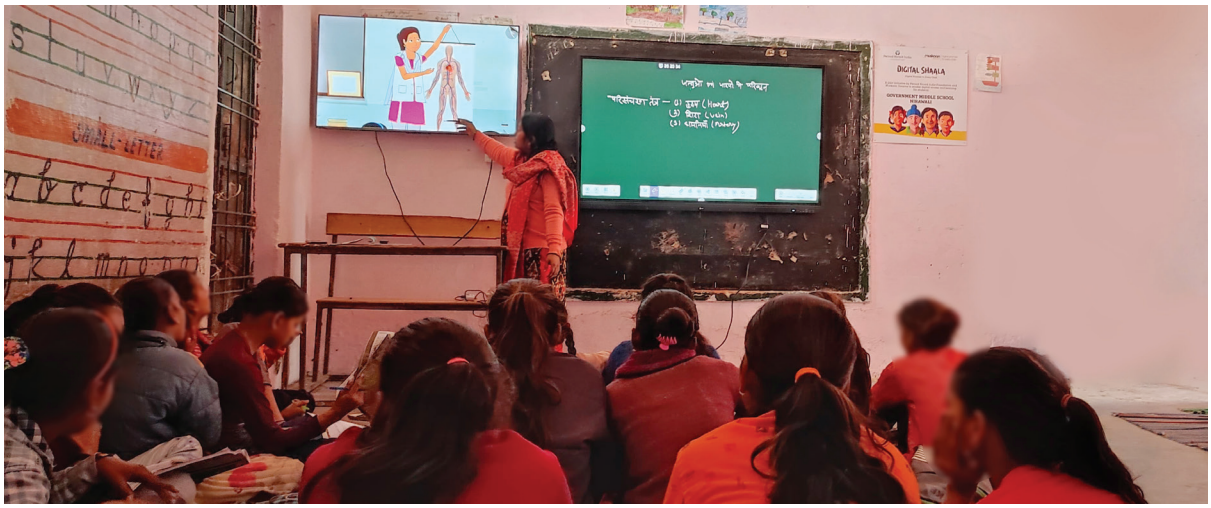
xii. Physical Movement in Class by Teachers and Students

During the observation, it was noticed that in e very few (3/53) classes (3 SIP), the teacher had active physical movements and asked students to have some movements.

Some Interesting Instances: During a 6th-grade Science class, the teacher explained body parts and asked the students to touch their ears and move them with their hands to demonstrate the flexibility of the ear due to its softness. The teacher mentioned that we could move our ears in any way we wanted and then asked a question that could similarly move all body parts. The teacher asked the students: *"khade ho aur zameen par padi lakdi uthao/ Please stand up and pick up the piece of wood that is lying on the floor."* The teacher asked another student to demonstrate the movements in body parts after the student picked up the piece of wood. *"jao darwaja khola aur band karo, ladka uth ke jaata hai aur darwaja kholta aur band karta hai/ Tthe teacher asked one of the students to get up and close the door. The boy gets up and opens the door and then closes it."* The teacher further said, *"kya darwaja charo taraf ghuma sakte hai/ Can we move the door all around."* All of the children replied in chorus, "*No if we try, it will be broken."* Witnessing students' active participation and interaction with the teacher and the DSP during the entire observation was fascinating. The teacher also explained the movement of body parts, such as legs and hands, when we walk and eat, emphasizing that there is a limit to the extent to which we can bend our body parts. If we try to exceed that limit, it will result in breakage.

In another 7th-grade Science class, the teacher taught blood flow in body parts. The teacher asked the students to place their palms on their hearts and feel their heartbeats. The students did as instructed, and the teacher asked them what they felt. The students responded in unison, saying that they could feel their heartbeats. It was observed that the students actively participated and enjoyed the lesson.

Photo 1: Photo by Researcher, A Science Class in Middle School



xiii. Use of the Board in DSP-TV Classes

Board Used: In some classes (20 out of 53, including 11 SIP and 9 SNP), teachers used the board to explain concepts, write questions, or highlight important points during the DSP-TV lesson.

Board Not Used: In many classes (33 out of 53, including 19 SIP and 14 SNP), teachers did not use the board at all during the DSP-TV session.

xiv. Methods Used to Conclude DSP-TV Classes

Various approaches were observed in how teachers concluded DSP-TV lessons.

- ***Swift Conclusion:*** In many classes (33 out of 53, including 17 SIP and 16 SNP), teachers wrapped up the lesson by summarizing or explaining key points orally or on the board. For example, in one girls' school, the teacher explained a problem on the blackboard at the end of the DSP-TV content and asked students to solve it in their notebooks. In another class, the teacher engaged students by asking questions, clarifying content, and then closing the session.

- ***Abrupt Ending:*** In some classes (20 out of 53, including 13 SIP and 7 SNP), the lesson ended without a clear summary or explanation. In one Math class, the teacher stopped the TicTac Learn video midway and ended the session despite having explained the topic earlier on the board. Similarly, in an 8th-grade Science class, the teacher stopped the DSP-TV content abruptly and shifted directly to an exercise book without a transition. In another instance, a Math teacher suddenly stopped the video but then provided a brief summary before concluding the class.

- ***Teacher Leaving the Class Midway:*** In a few observations (7 out of 53, including 6 SIP and 1 SNP), teachers physically left the class without pausing the DSP-TV content, leaving students to watch the video on their own. This appeared to be a regular practice. In one example from a girls' high school, a teacher stepped out for a minute but returned shortly after. However, during the absence, some students lost focus and became distracted. In another case, a Science teacher left the class to take a phone call but did not pause or rewind the video upon returning. Similarly, in a Math class, the teacher left without pausing the DSP content, and by the time they returned, the video had ended. Instead of rewinding it, the teacher moved on to the next part of the lesson.

  These varied methods highlight differences in classroom management and instructional strategies in DSP-TV-enabled lessons.

xv. Student Participation in the DSP-TV Class and the Seating Arrangement

This section deals with the student's seating arrangements and their participation in the class.

- ***Students Interacting with Seating Arrangements/ Front Rows:*** In some (16/53) of the DSP-TV classes (12 for SIP and 4 for SNP), it was noticed that all of the students were actively interacting in the classroom during the classroom interaction.

  Some of the examples of active interaction were reading the content on the screen, nodding to the teacher's explanation, or attempting to answer some of the questions asked by the teacher in a DSP-TV class. Sometimes, the students responded to the teachers in chorus; sometimes, the teacher picked up specific students and asked questions. It has been noted that teachers asking questions prompted students to actively attempt to answer. Sometimes, the teacher gave them sufficient time to come up with answers, and sometimes, the teacher continued explaining further after the students responded.

- ***Students in Back Rows:*** Not all students were seen interacting in most (37/53) classes (18 SIP and 19 SNP). In most cases, the teacher focussed mostly on the students sitting in front rows, irrespective of whether students were sitting on the floor or benches. In one of

the girls' high schools, the student's strength was 34 in the class at the time of observation. It was observed that the teacher was more interactive with the students closely sitting in front rows. It has been further noted that students watched the video carefully, but the remaining students at the back did not interact much. Many of the backbenchers were found to be reading books, writing in their notebooks from books, resting their heads on the desk, and talking to peers while the DSP-TV content was playing on the screen.

- ***Teachers' Physical Mobility:*** In some cases, there was little space for the teachers to physically reach students until the end of the class. The students were sitting on a mat or carpet on the floor, and it was not always feasible for the teacher to move to the students sitting at the back of the room due to the students' sitting arrangements in the class. In a few instances, if the students were sitting on benches and there was a passage between rows, the teacher moved to the end. It has been observed that when the teachers moved physically in the entire class, the students' participation increased. However, it cannot be said that teachers' physical proximity was related to focusing on the front or not focusing on sitting at the back of the class.
- ***Students Operating DSP-TV in the Classroom:*** Operation of DSP-TV by Gender: During the observation, two different navigation patterns for the DSP by gender in the classroom were identified.

In some (14/53) classes, students handled the DSP or co-handled along with teachers. Among the 14 schools, five classes were in all-girls schools, three classrooms were in boys' schools, and 20 classes were in co-ed schools.

Table 4.2.7

Students Operating DSP-TV						
Gender	**No. of Classrooms**					
	All Girls schools (N= 5) (SIP = 4, SNP = 1)		**All Boys schools (N= 3) (SIP= 2, SNP, 1)**		**Co-ed schools (N= 20) (SIP= 9, SNP= 11)**	
	SIP	SNP	SIP	SNP	SIP	SNP
Girls operating DSP-TV	4 (3 for 6th) Grade and 1 for 10	0	Not applicable	Not applicable	0	0
Boys operating DSP-TV	Not applicable	Not applicable	0	0	5 (2 for 7th, 2 for 6th and 1 for 9th	5 (2 for 10th, 2 for 8th, 1 for 9th and 2 for 10th

This table shows that in classes where students operated the DSP-TV, there was a notable difference based on school type and gender. All-girls schools had instances where girls were actively involved in operating the DSP-TV, while in all-boys and co-ed schools, this was not observed during the study.

xvi. Single or Multi-grade Classes

The teacher taught a single-grade class in most (41 out of 53) schools at the time of observation. The further bifurcation of single grades is 24 for SIP schools and 17 for SNP schools. The remaining classes (12/53) were combined classes with more than one grade student sitting

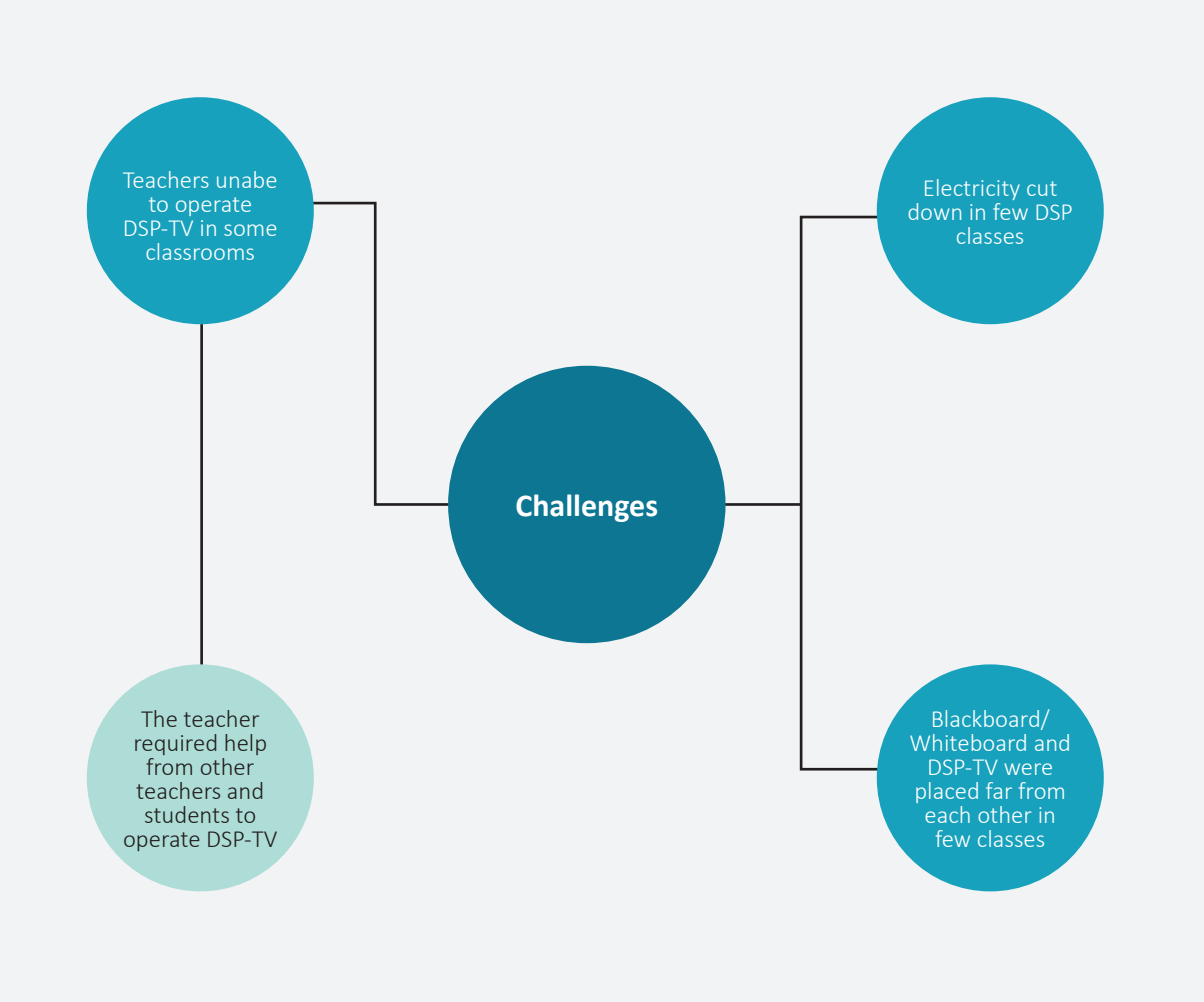
together. Out of these 12 combined classes (6 SIP and 6 SNP) in two classes, the students from higher grades interacted more with the teacher. In these two combined classes, students from lower grades showed a lack of participation when the content was not relevant to them. For example, in one of the classes, 6th and 8th-grade students were sitting together, and students of grade 6th were less active since the content used was of 8th grade. In other classes, the 6th, 7th, and 8th grades sat on benches in separate rows. The teacher used content from grade 6, but the higher-grade students (grades 7 & 8) actively participated. Initially, the teacher focused more on the grade 8 students who were actively participating in the class. However, the attention was later shifted to the 6th-grade students as the content used in the class was from grade 6th.

xvii. Group Activities in DSP-TV Classes

The observation checklist included questions to assess both individual and group activities. However, it was noted that none of the 53 observed DSP-TV classes incorporated any group activities.

4.2.8 Challenges

Figure 4.2.4: Findings from CRO - Challenges



i. Summary of Findings from Classroom - Challenges

Classroom observations revealed several challenges teachers faced while using DSP-TV for lessons:

- **Electricity Disruptions:** In some classes, power outages hindered the use of DSP-TV, disrupting the teaching process.
- **Operational Difficulties:** Some teachers struggled to operate the DSP-TV and required assistance from other teachers or students.
- **Classroom Setup Issues:** In a few classrooms, the blackboard or whiteboard was placed far from the DSP-TV, making it difficult to use both simultaneously.

ii. DSP-TV Operation in the Classroom by the Teachers

- **Able to Operate DSP Properly-** In several (31/53) DSP classrooms (23 SIP and 8 SNP), the teachers were able to navigate DSP-TV. For example, turning on DSP-TV, finding the content in pendrive, connecting DSP-TV with Wi-Fi, playing the DSP-TV content, rewinding, forwarding, and adjusting the volume.
- **Not Able to Operate DSP Properly-** In some (22/53) DSP-TV classrooms (7 SIP and 15 SNP), the teacher could not operate DSP-TV and required help from fellow teachers and students. The teacher helped in finding the content in the folder or connected it with Wi-Fi to play the video.

iii. Teacher Supported by Others in Navigating the DSP-TV

- **Support from Students:** In some (14/53) classes (9 SIP and 5 SNP), the students helped the teacher operate the DSP-TV, as noticed during the DSP-TV classroom observation. It has been observed that in a high school, during the Math class, the teacher tried to connect the DSP-TV with Wi-Fi for five minutes but could not. Then, the teacher asked a boy to connect, and the boy connected the DSP-TV with Wi-Fi, and the class started.
- **Support from Another Teacher:** In a few (8 out of 53) classes (3 SIP and 5 SNP), it was observed that a teacher needed assistance with activating the DSP-TV during their interaction with students on the blackboard. For instance, one teacher had difficulty opening the DSP-TV and eventually called another teacher for help. The other teacher found out that the battery of the remote was dead, so it was not functioning, so she rushed to another class to bring the remote from another DSP-TV. The teacher said, *"Diwali se pehle toh sab theek the, badhya chal raha tha aisa koi issue nahi tha / Before Diwali, it was working properly, and there was no issue."*

iv. Technical Problem During DSP-TV Class

Technical issues were observed in 8 out of 53 classrooms. The table below lists the problems and the number of classrooms affected.

Table 4.2.8

Technical Problems	
Problems	**Number of Classrooms (SIP/SNP)**
DSP got switched off	1/53 (SNP)
DSP visual content disappeared, and the only sound was playing	1/53 (SIP)
The sound cut off from DSP, but the visual was playing	2/53 (1 SIP, 1 SNP)
Electricity/ power cut, which switched off the DSP-TV during DSP Class	4/53 (3 SIP, 1 SNP)
* The above table reports the technical problems faced by teachers during the classroom observations.	

During a classroom observation, the DSP-TV got switched off. In one of the classes, the DSP-TV switched off three times during the first video, and the teacher started the DSP-TV again. In this entire process, 4-5 minutes had lapsed. The teacher could not find out why the DSP-TV was getting switched off. In another middle school, the content suddenly disappeared on DSP-TV; however, the sound of the video continued. A boy student fixed it and rewound the DSP-TV content so everyone could see the missing part.

In a few (2/53) classes, the sound of the DSP-TV suddenly disappeared. It has been observed that the students were reading the Hindi subtitles of the content on the screen. In other schools, the sound disappeared, the teacher could not find the issue, and the DSP-TV content ended.

During observation in a few (4/53) classes, the electricity was gone. In such circumstances, the teacher continued to teach using conventional methods. In three classes, the electricity came in less than 10 minutes, but in one of the cases, it came after 30 minutes. The teacher then completed the DSP-TV video and ended the class after an explanation.

Case study of Teaching by Multiple Teachers During Observation

It has been observed that in a few classes, more than one teacher was taking the class. This is a unique case, and it occurred only because of the presence of researchers for observation. During a high school Math class, one teacher navigated the video while the other teacher from a middle school used the board for detailed discussion with the students. The latter teacher asked everyone questions. Suddenly, the school's principal entered the class and realized the light was insufficient. The principal asked the teacher to pause the DSP-TV and ask the students questions. Another teacher used the board to explain the problem-solving process.

It has been further noticed that there was an interaction between both teachers. One of the teachers said that the graph was not important from an examination point of view, while the other teacher said that it was important for students to understand the concept. In the meanwhile, another teacher entered and sat on the chair at the back of the class. The teacher interrupted the class and said that the videos were not that useful because there were no question-and-answer exercises at the end. The students needed those exercises so that they could write answers in the examination. Two of the teachers who were taking the class replied that the videos helped make the students understand, while the other two teachers disagreed with the suggestion.

In two other cases of multiple teaching, another teacher was present in the class. The teacher was talking to another teacher while taking the class using DSP-TV.

4.2.9 Contextualized Learning

This part explains the DSP-TV classroom teaching practices in which the teacher links the content with local and contextual examples to explain the content. It has been observed that only in a few classes (7/53) did the teacher use contextual examples to explain, and the students understood the DSP-TV content.

In one of the observations, during a co-ed Science class, the teacher was teaching the effects of hormones on the human body. The teacher used examples of hormones and how hormones play a crucial role in changing voice, parts of the body, functions, and processes like menstruation in girls, which were part of the DSP-TV content. The students did not react when the content of menstruation was shown on the DSP-TV, but they reacted when the teacher explained.

When the teacher used the word period, there was a sudden murmur in the entire class. This indicates that all the students were interacting in a DSP-TV class, and it can be seen that everyone present in the class reacted to the word 'period'. It has been further observed that a non-verbal interaction took place among students.

In another 9th grade Science class, the teacher took a class on cells and explained the dead cells. The teacher used contextual examples to explain the content. The teacher pauses the video and gives examples of *"Balon me dandruff hote hain na, thand me chamri phat jaldi hai, ye sab dead cells hote hain./ There is dandruff in our hair, our skin gets dry, these are dead cells".* Since real examples were used, all of the students interacted with the teacher and the content. The teacher further explained.

In another class, the teacher was teaching pollution in a Science class. The teacher extensively used the water refinery plants in the district as an example in the class, leading to a more active participation and interaction with the teacher and the content. The teacher said the water refinery is used to purify the water. The purified water is supplied through pipes, protecting us from water-borne diseases. The contextual examples were found to be more interactive, as noted during the observation. The teacher asked what the effects of drinking unpurified water are. The children responded with different diseases like piliya (jaundice), loose motions, etc.

In another DSP-TV class on Science, the teacher taught about metal and non-metal. The teacher asked.

Teacher: *"Wo jo class ka darwaja hai wo kis chiz ka bana hai?/ What is the material with which the door of the classroom is made up of?"*

Students replied: *"lohe ka/ Is made of iron".*

The teacher further asked, *"usko sadne aur jang na lage uske liye kya karte hain?/What should we do to protect the iron gate from getting rust?"*

The students responded in chorus: *"rangte hain/ We paint it."*

The teacher: *"haan paint karte hain/ Yes we paint it".*

Such an example led to more active participation of the students.

In another Math class, the teacher used the DSP-TV and paused the video to provide a more relatable example. Instead of using pizza, as shown in the TicTac video, the teacher referred to roti (Indian bread). The teacher asked, *"Roti ko do bhagon me baatenge, toh do log hain, toh ek ko kitna milega?"* ("If we divide a roti into two parts and there are two people, how much will each person get?")

Students replied: *"aadha addha milega*/ Each will get half."

The teacher further asked: *aur char bhag me batengen ge aur char log hai toh kitna milega? If we divide it into four parts and there are four people, how much will they get?"*

Students replied: *"ek ko aadhe ka aadha milega./*One will get half of the half."

It was observed that the moment the teacher started using the roti example instead of pizza, the students' participation increased.

In a Science class, the teacher explained the concept of blood cells. Despite the teacher's efforts, some of the students had difficulty understanding the concept, leading to lower student participation. The teacher asked: *kisi ko piliya hua hai?/*Does anyone suffer from jaundice?"

A few students replied: *"haan hua hai/*Yes, we suffered".

*"kaise pata hai chala piliya hua hai?/*How did you know you got jaundice?"

Few students: *"Ma'am khoon ka janch hua tha usse?/*Our blood got tested?"

The teacher used students' health as an example to further explain the topic, which resulted in increased participation from the students.

The teacher drew a box to show the blood cells and gave examples of how *"Chot lagne par zakham ban jata hai, peep ban jata hai/ Our wounds get filled up with lots of puss"* and explained it through cells of the blood.

In another Math class, the teacher used examples of train tracks and asked, *"Tum logon ne train ki patri dekhi hai/Have you all seen the train track?*"

The students replied: *"haan, dekha hai/*Yes, we have seen."

Teacher: *"Kaisa rahta hai wo?/* How does it look?"

Students: *"Ek dusre ke samantar/* Parallel to each other."

The teacher asked the students what would happen if the train track was not parallel. The students responded in unison that the train would not be able to run. After that, the teacher played a DSP-TV content, and the students watched attentively. The teacher paused the video and drew parallel lines on the smart board to explain the concept further. To aid their understanding, the teacher drew another line that was not parallel. The teacher's examples of the track led to more active participation from the students.

Case Study: A Case of a Teacher Using YouTube on Her Phone While Teaching

During one of the Science classes, the teacher taught the topic of 'Time and Speed' using various teaching methods. The teacher wrote the topic on the blackboard and asked the students to define it. All students responded, and after every answer, the teacher and the students clapped and said "Good, good, very good" together. The teacher continuously asked questions for the first five minutes and led the discussion after taking answers. The teacher mostly focused on a few front rows because the students were answering from those rows.

Then, the teacher divided the class into six groups of 5-6 students. Each group got a chart paper and was asked to prepare a presentation based on their understanding. The students were instructed not to copy the exact words from the book. The teacher gave the students a mobile phone with a video on YouTube (e shiksha) to watch and prepare their presentation. The video was 27 minutes long. Meanwhile, the other groups were asked to read the books and prepare their presentations.

During the preparation, it was observed that four girls in the group watching the YouTube video were taking the lead in participating and engaging more in the process while the two other girls were left out. Once every group had completed its presentation, the two girls presented what they noted in a chart paper, while the other group members were not with them for the presentation. The teacher gave feedback on every presentation and asked if the students had any questions or doubts. However, only one group could complete the video, while the others watched for a few minutes before the teacher asked them to stop viewing and present their findings.

Case Study: The Teacher Asked To Summarize The DSP-TV Content

In a 7th grade Science class, the teacher began the lesson by playing a video and instructed the students to pay close attention as she would ask questions afterward. It has been observed that when the videos were asked to be repeated, the teacher repeated the content.

Then, the teacher moved to the back of the class, sat on the chair, and started making notes while the video continued. Some students also took notes during the class. Once the video ended, the teacher asked questions, instructing the students to raise their hands before answering. She then gave some students the chance to answer before providing further explanations. Additionally, the teacher incorporated her own insights while explaining the video content and asked a girl at the back of the class to summarize the video in her own language. The teacher asked the students not to use the words that were used in the video. The girl summarised the video very well in her own language. The teacher took the girl's summary, explained it a bit, and ended the class. She also asked if the students liked it. The students said in chorus yes.

An expert's review during classroom observation highlighted that the students were having a vicarious learning experience watching the TicTac Learn video on lighting the bulb. Vicarious learning has been documented as a very useful learning technique especially in contexts and domains where actual experience is not viable or difficult, for example, dissecting animals for experiments. Simulations are quite popular that gives a vicarious learning experience, but an active one which allows interaction with the vicarious reality. In this observation, students watching other children in the video lighting the bulb as a vicarious experience, could have had instructional value if the teacher used it or the video had prompted the teacher to replicate the experience in the classroom. On the contrary, the video prompted the teacher to ask students to replicate the lighting of the bulb at home. The home in the video did not resonate with the social conditions of the students in the government school.

4.3 Findings of Teacher Interviews and Teacher Engagement Survey

In this study, a total of 64 schools were sampled: 21 SIP schools and 43 SNP schools. Of these 64 schools, 41 have used the DSP-TV in the last 3 months (active- category 1,2 & 3) from the day of the interview, while in 23 schools, the teachers did not use the DSP-TV in the last 3 months (non-active: category 4& 5). In one SNP school no data was collected as the DSP-TV has not been used in the past six months and the teachers and school head also could not provide any data.

A total of 78 teachers (31 SIP and 47 SNP) were interviewed, of which 39 were Math teachers, 28 were Science teachers, and 11 taught both subjects (Math and Science). Of the 78 teachers, 30 teachers were female and 48 teachers were male.

In SIP schools, 28 interviews were conducted with teachers from active schools, and 3 interviews were conducted with teachers from the non-active schools. In SNP schools, 22 interviews were conducted with teachers from active schools, and 25 interviews were conducted with teachers from the non-active schools.

The table no. 4.3.2 below provides the details of the teachers interviewed in all schools (SIP and SNP):

Table 4.3.1

Gender-wise Category of Teachers Interviewed					
Gender	**Active (Category 1,2 &3)**		**Non-active (Category 4 & 5)**		**Total**
	SIP	**SNP**	**SIP**	**SNP**	
Female	11	8	1	10	30
Male	17	14	2	15	48
Total	**28**	**22**	**3**	**25**	**78**

Table 4.3.2

Subject-wise Category of Teachers Interviewed					
Subject taught	**Active (Category 1,2 &3)**		**Non-active (Category 4&5)**		**Total**
	SIP	**SNP**	**SIP**	**SNP**	
Math	13	11	1	14	39
Science	10	6	2	10	28
Math and Science	5	5	0	1	11
Total	**28**	**22**	**3**	**25**	**78**

4.3.1 Tool of Data Collection

Two semi-structured interview questionnaires and 1 Teacher Engagement Survey (TES) were designed for the SIP and SNP school teachers.

The SIP interview questionnaire comprised 32 questions about usage, training, effectiveness, challenges, community of practice, and feedback covering the larger themes: usage, access, participation, value-benefit, choice and decision making, challenge, monitoring and support, home and parental perception, suggestions/ feedback.

The SNP interview questionnaire consisted of 44 questions on DSP-TV operations, support, TicTac Learn content, effectiveness, challenges, community of practice, feedbacks covering the larger themes: usage, access, participation, value-benefit, choice and decision making, challenges, monitoring and support, home and parental perception, suggestions/ feedback.

The TES served as a standardized tool for both SIP and SNP schools. This survey, comprising 31 Likert scale items, explored themes including the effectiveness of DSP in pedagogy, the operation of DSP-TV, and the utilization of DSP-TV content. The scale ranged from *"Strongly Disagree"* to *"Strongly Agree,"* facilitating nuanced responses regarding various dimensions of DSP-TV implementation.

The semi-structured interviews were audio recorded if the teacher allowed recording. At the same time, the researcher manually entered the responses on the hardcopies of the questionnaire.

The TES was administered to teachers following the interview process. Teachers were provided with printed copies of the tool, which they subsequently completed.

4.3.2 Method of Selection of Teachers for Interviews

The participants in the interviews were Math and Science teachers from the sampled schools who are part of the Digital Shala Programme and have conducted at least three sessions using the DSP-TV within the past three months (active: category 1, 2 & 3).

For the SNP category, if the schools have discontinued using DSP-TV or have not used DSP-TV in the last three months (non-active: category 4 & 5), the questions asked were limited to the status of DSP-TV operation and teacher training conducted by Muskaan Dreams in the school. The rationale for asking questions only on operations and training was to understand the integration of the DSP-TV in the classroom transaction process. If the DSP-TV has not been used for teaching purposes in the past three months, then the other questions posed in the teacher interview would not be relevant. A few schools in SIP category also reported to not have used the DSP-TV in the past three months and were therefore categorized as categories 4 and 5.

The teachers were connected through the school head or the teacher-in-charge of the school. First, the researchers introduced themselves and explained about the study to the teacher and provided the consent form. Once the teacher had read the consent form, the researchers asked for their approval for the interview and audio recording. The signed consent form was also collected from the teacher and post teacher's approval the interviewer began the interview.

4.3.3 Method of Data Collection and Analysis

A total of 78 teachers were interviewed, out of which 51 teachers did not provide consent for the audio recording and only handwritten notes were taken for these interviews which were used for data analysis. The audio-recorded data and handwritten notes were then translated and transcribed in English. The transcriptions were run through a qualitative data analysis software called MAXQDA, a qualitative data analysis software, for coding purposes. During the coding process, relevant codes were assigned to the teacher interview transcriptions, which were then organized into themes and sub-themes.

The summary presented here is structured according to the respective themes and sub-themes.

After the interview, teachers were given the TES and guided through completing it. The TES was filled out by over 78 teachers, however only 73 teachers were considered for analysis. Teachers for whom data was missing for multiple variables were excluded from the analysis. To get a clearer understanding, certain variables were mapped against the teachers' interviews for example usage data. The information regarding geographical location of schools was taken from the school heads' interviews.

4.3.4 Analysis of Teacher Interviews

The analysis of the teacher interviews has been summarized in two sections: analysis of the interviews of Category 1, 2 & 3 schools (active schools) (SIP and SNP) and analysis of Category 4 & 5 schools (non-active schools) (SIP and SNP). Analysis of the interviews of non-active schools (SIP and SNP) is mentioned first as the interview ended in a few questions on the DSP operation and training received by teachers. Following that the analysis of the interviews of active schools (SIP and SNP) are reported.

4.3.5 Analysis of Teacher Interviews and Teacher Engagement Survey of the Non-Active Schools

A total of two SIP schools and 21 SNP schools fell under the non-active school category. Three interviews were conducted in the 2 SIP schools that were non-active and 25 teacher interviews were conducted in 21 SNP schools that were non-active. In these schools, the interview ended after the teacher was asked about the operations and training regarding DSP-TV.

4.3.5.1 Demographic Details and Teacher Details of Non-Active Schools

The following sections provide demographic details of non-active schools along with the details of teachers.

i. Demographic Location of Schools

The 2 SIP schools were in rural areas. Of the 21 SNP schools, 17 schools were in rural areas, 1 school in semi-urban areas and 3 schools were in urban areas. The 2 SIP schools were co-ed schools. Of the 22 SNP schools, 21 were co-ed schools and 1 was a girls' school.

Table 4.3.3

Division of Schools as per Geographical Location				
School category	**Rural**	**Semi Urban**	**Urban**	**Total**
SIP	2	0	0	2
SNP	17	1	3	21
Total	**19**	**1**	**3**	**23**

Table 4.3.4

Division of Schools as per School Type (Non-active)				
School category	**Girls'**	**Boys'**	**Coed**	**Total**
SIP	0	0	2	2
SNP	1	0	20	21
Total	**1**	**0**	**22**	**23**

ii. Subject Taught by the Teachers

The interviews were conducted with 15 Math teachers (1 SIP and 14 SNP) and 12 Science teachers (2 SIP and 10 SNP) and 1 teacher who teaches both subjects.

iii. Age of Teachers

Of the 28 teachers interviewed, one teacher (1 SNP) was below 30 years. 15 teachers (2 SIP and 13 SNP) were in between 31-45 years, 7 teachers (1 SIP and 6 SNP) were in between 46-55 years and 5 teachers were above 55 years. Below the table no. 4.3.5 shows data on age groups of teachers and the school categories.

Table 4.3.5

Age Group of Teachers Interviewed			
Age Groups (in years)	**SIP**	**SNP**	**Total**
Below 30	0	1	1
31-45	2	13	15
46-55	1	6	7
Above 55	0	5	5
Total	**3**	**25**	**28**

iv. Teaching Experience (in years)

Among the 28 teachers interviewed, the distribution of their teaching experience varied. Two teachers (2 SNP) had 1-5 years of experience, while another 2 teachers (1 SIP and 1 SNP) had 6-10 years of experience. 10 teachers (10 SNP) had been teaching for 11-15 years. Five teachers (1 SIP and 4 SNP) had 16-20 years of experience, and another group of five teachers (1 SIP and 4 SNP) had 21-25 years of experience. Lastly, four teachers (4 SNP) had 26-30 years of teaching experience.

Table 4.3.6

Teaching Experience of Teachers			
Teaching Experience (in years)	**SIP**	**SNP**	**Total**
1-5	0	2	2
6-10	1	1	2
11-15	0	10	10
16-20	1	4	5
21-25	1	4	5
26-30	0	4	4
Total	**3**	**25**	**28**

4.3.5.2 Usage Reported by Teachers During Teacher Interview

The teachers of the non-active schools were asked questions regarding the DSP-TV operation status in schools and training. Under the DSP-TV operation theme, teachers were also asked to state the reasons for discontinuation.

28 teachers in the 23 schools reported that the DSP-TVs had not been used in the past 3 months.

Several (13/28) teachers (3 SIP and 10 SNP) reported that the DSP-TV has not been operational for more than three months. Of these 13 teachers, 10 teachers (3 SIP and 7 SNP) reported to not have used the DSP-TV in 6-12 months. One (1/13) teacher (1 SNP) mentioned that DSP-TV was not used in the last four years. One (1/13) teacher (1 SNP) mentioned to not have used it for more than five years. A teacher (1/13) also mentioned to not have any knowledge about it when the DSP-TV use was discontinued. Several (15/28) teachers did not respond, when the DSP-TV operation was discontinued.

4.3.5.3 Technical Knowledge of Teachers to Operate DSP-TV Reported by Teacher in the Teacher Engagement Survey (TES)

Under this theme, teachers were asked to respond on their technical knowledge to operate DSP-TV. The survey questions under this theme were administered on a 5-point Likert scale as given below:

1. totally insufficient
2. insufficient
3. neutral
4. sufficient
5. totally sufficient

My present technological knowledge is sufficient to insert a pen drive in the TV: The TicTac Learn content was given to the respective schools in a pen drive so that teachers can use the content offline directly on DSP-TV. The teachers were asked to report whether their present technical knowledge is sufficient to use a pen drive.

Some (4/21) teachers (2 SIP and 2 SNP) mentioned that their knowledge was totally sufficient to use a pen drive and many (13/21) teachers (2 SIP and 11 SNP) mentioned their knowledge was sufficient. A few (3/21) teachers (3 SNP) were neutral. A few (1/21) teachers (1 SNP) indicated that their knowledge was insufficient to use a pen drive

My present technological knowledge is sufficient to navigate across contents: Some (6/21) teachers (3 SIP and 3 SNP) felt that their current technological knowledge was totally sufficient for them to navigate across different content on the DSP-TV and many (13/21) teachers (1 SIP and 12 SNP) felt their knowledge was sufficient. A few (1/21) teachers (1 SNP) were neutral on the sufficiency of their skills while a few (1/21) teachers (1 SNP) felt their current technological knowledge was insufficient to navigate across content on the DSP-TV.

My present technological knowledge is sufficient to operate the remote to pause, rewind and forward contents: Several (7/21) teachers (2 SIP and 5 SNP) felt that their current technological knowledge was totally sufficient and many (13/21) teachers (2 SIP and 11 SNP) felt it was sufficient to operate the remote of the DSP-TV to pause, rewind and forward contents. A few (1/21) teachers (1 SNP) felt that their knowledge was totally insufficient to operate the remote of the DSP-TV to pause, rewind and forward content.

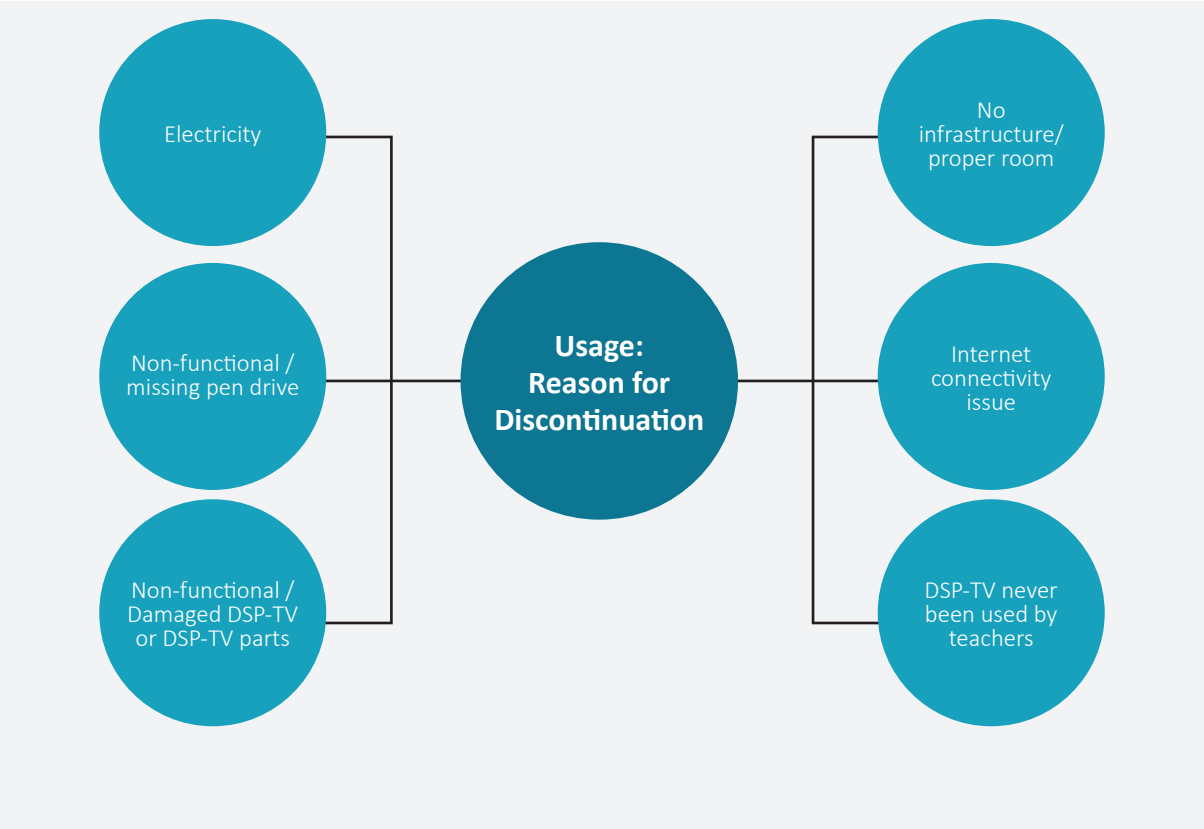
My present technological knowledge is sufficient to connect the TV using Bluetooth or Wi-Fi connection: Some (5/21) teachers (3 SIP and 2 SNP) felt that their current technological knowledge was totally sufficient and some (6/21) teachers (6 SNP) felt it was sufficient to connect the DSP-TV using Bluetooth or Wi-Fi. A few (2/21) teachers (1 SIP and 1 SNP) were neutral about their knowledge to connect the TV. Several (5/21) teachers (5 SNP) felt that their knowledge was insufficient and a few (3/21) teachers (3 SNP) felt it was totally insufficient to connect the TV using Bluetooth or Wi-Fi.

My present technological knowledge is sufficient to use other apps on the TV: A few (1/21) teachers (1 SNP) felt that their current technological knowledge was totally sufficient and several (11/21) teachers (3 SIP and 8 SNP)

felt it was sufficient to use other application on the DSP-TV. A few (4/21) teachers (1 SIP and 3 SNP) were neutral on their knowledge to use other applications. Some (4/21) teachers (4 SNP) felt their knowledge was insufficient and a few (1/21) teachers (1 SNP) felt their knowledge was totally insufficient to use other applications on the DSP-TV.

4.3.5.4 Reason for Discontinuation of DSP-TV

Figure 4.3.1: Findings from Teacher Interviews-Use of DSP-TV in Non-active Schools



Electricity seems to be the primary cause of discontinuation of DSP, especially in rural areas. Apart from electricity, loss of pen drive, lack of space are the predominant reasons for discontinuation.

For instance, a teacher from SNP school mentioned *"For the past four months there is no electricity in the school, we have given many applications to the district administration but nothing has happened."*

Another teacher from SIP school shared that *"There were two TVs in the school. One DSP-TV was damaged by a stone thrown through the skylight. Since then, the other TV is also kept locked in a trunk, because once the door lock of the room was found broken. Since then, that TV is rarely used, and even when it has been used, it's not for educational purposes."*

Another Science teacher in SIP school said that, *"There was a TV in the school that was stolen last year. There was also an iron main gate, which was stolen as well."*

i. **SIP:** A total of 3 responses were recorded from the teachers of non-active SIP schools explaining the reason for discontinuation of use of DSP-TV.

- ***DSP-TV was Damaged:*** Two (2/3) responses mentioned that the DSP-TV has been damaged. Teachers from an SIP school reported that one of their DSP-TVs was damaged as someone threw a stone

from the outside of the window and the other DSP-TV is kept in the trunk with a double lock as there was an attempt to steal the TV.

- ***DSP-TV was Stolen:*** One (1/3) response in one SIP school reported that the DSP-TV was stolen six months back.

ii. **SNP:** 32 responses were recorded from the 25 teachers of SNP schools in non-active categories that explain the reason for discontinuation of use of DSP-TV.

- ***No Electricity:*** Several responses (14/32) by teachers in the SNP schools have said that there is no regular supply of electricity in the school.

  In one of the SNP schools, the teacher shared, *"The school's electric wires were cut and taken away. It's been over a year now, and there is no electricity in the school, so how can the TV be used?" In another SNP school, a teacher shared that, "The school-head sir has taken the electricity connection from two different electric poles, yet there was no electricity."*

  A teacher who joined the school five months back said that *"I have heard that there was a case of wire theft in the school and the electricity connection stopped due to a wire issue. Now the school has a connection but the electricity supply is not regular. I have never seen the DSP functional in school."*

- ***Loss of the Pen Drive:*** A few teacher responses (4/32) from the SNP schools have mentioned that the pen drive is lost and because of that DSP-TV could not be used.

  A Science teacher has mentioned *"The pen drive hasn't been found for a long time. It seems to be misplaced. School-head sir called the Muskaan Dream people, but no one has come for many days. Without the pen drive, how will the TV work?"*

  Another teacher shared, *"we misplaced the pen drive. An ICT lab has been installed. There are 15 computers there. We have more materials than our requirements. So, we are not able to use it properly. We have a touch screen TV. We can write something on it even using a normal pen. Here we can play YouTube also. So, we have a lot of alternatives now. We have TV in many classrooms. So, we do not have to shuffle for DSP-TV."*

- ***DSP-TV Non-functional:*** Some (4/32) responses from the teachers in SNP schools have reported that there is some issue with the DSP and were not able to open it. A Math teacher who is also in charge of the IT lab in the school has said *"The wire connection is not working properly and because of that TV is not getting switched on. It's a government work and it has not been fixed and because of that the DSP is not being used."*

- ***No Infrastructure/Proper Room:*** A few responses (2/32) from teachers in SNP schools have said that there is no proper space in the school.

  "Some classes are taking place in this room. If I want to use this TV then I need to bring all students of class 10 and ask existing students of this class to go to another class. This is another major problem. We almost lost 15 minutes because of this shuffle. We have only 35 minutes in a class. So this is a problem of infrastructure. I think it will be solved within the next six months as a new building is coming. So, we do not need to shuffle. We can have a separate TV room or we may use a Tablet in class. We will have a TV in all classes. So that problem will be solved."

  Another teacher said *"earlier there were two campuses of this school and now the government has merged the school. We have a space crunch and the DSP-TV classroom has been converted into a staff room".*

- ***DSP-TV was Never Used:*** A few (2/32) responses were recorded where the teachers mentioned to have never used DSP.

  A teacher said: *"I never used the DSP-TV because there is no question-and-answer given. The content has only a definition which is not useful for the examination. The teacher also said that they are responsible for the passing out of the students in the exam. So, they had to make sure that the students got questions and answers ready."*

- ***Focus on Revision:*** One teacher responded (1/32) that they were not using it at that moment because it is the revision time for children.

  "We have almost completed our syllabus by November. This time revision is going on. We have an examination in December. So, the need for DSP-TV is not in demand. We use it mainly when students do not understand particular topics like how light rays pass through objects or for digressive systems etc. We play TV to clear their concept. Our main objective is that students should learn. We gave them a few questions and asked them to remember."

- ***Non-functional Pen Drive:*** One (1/32) response mentioned that the pen drive is not working.

- ***DSP-TV Battery is Not Working:*** One (1/32) response mentioned that the non-functional DSP battery as the reason for the DSP-TV not in use.

- ***Not Comfortable with DSP-TV:*** A (1/32) teacher said that she is not comfortable using DSP-TV.

- ***Unable to Connect Wi-Fi:*** One teacher response (1/32) talked about not being able to connect Wi-Fi.

- ***No Internet Connection:*** One teacher response (1/32) mentioned about the unavailability of the internet being the reason for not using DSP-TV.

4.3.5.5 Training of Teachers

To understand the preparedness of the teachers to take the DSP class, teachers were asked about whether they have received training or not by the Muskaan Dreams or by other government departments.

Many (17/28) teachers (3 SIP and 14 SNP) mentioned that they did not go through any teacher training regarding DSP-TV.

Only a few (2/25) teachers in SNP schools said that they have received the training. For example, a Science teacher said *"A one day training was given, it was about how to use TV in the class for teaching. Training was good and it should happen from time to time."*

A teacher said about the training *"It would have been impactful. We would have learnt and maintained it better."*

Many (9/25) teachers did not respond to this question.

The analysis indicated that the majority of the teachers had not been trained for DSP classes.

4.3.5.6 Steps to Solve the Problem Regarding the Non-Operational DSP-TV

Of the 28 teachers, some (7/25) teachers (7 SNP) talked about the steps taken by the school to solve the problem. Most teachers (21/25) did not respond to this question. Of the 7 teachers who responded, many (4/7) teachers (4 SNP) have said that they have raised the issue with the Muskaan Dreams regarding the problem. A teacher said *"we have lodged a complaint to the associates of Muskaan Dreams. They have visited once also but the TV did not work."* Another teacher said, *"Muskaan Dreams representative visited the school and we raised our concern but the problem was not solved."*

A few (2/7) teachers (2 SNP) have said that they have sent applications regarding the electricity issues to the concerned departments. One (1/7) teacher (1 SNP) said that a mechanic was called to solve the problem with DSP but the problem

was not solved. The teacher said, *"We have called mechanics from outside but they told us that we have to take the TV to Gwalior for repair. We have contacted Muskaan Dreams but they did not provide any support."*

4.3.5.7 Summary of Non-Active School Teachers' Interviews

The above analysis indicates that 28 teachers across 23 schools reported non-use of DSP-TVs in the past three months, with primary reasons being lack of electricity, device damage, and loss of pen drives.

12 teachers also indicated the TVs had been inoperative for over three months, with 10 of these not using them for 6-12 months, and some even longer, up to five years. Various issues such as stolen or damaged equipment, electricity theft, and inadequate infrastructure were cited. Notably, 14/25 SNP teachers highlighted inconsistent electricity as a major impediment.

Moreover, many teachers had not received training on using DSP-TVs, with only 2/25 SNP teachers having attended training sessions. Efforts to resolve these issues included reaching out to Muskaan Dreams and applications for electricity repairs but the challenges are persisting.

4.3.5.8 Perceptions of TicTac Learn Content Reported by Teacher in the Teacher Engagement Survey

I find DSP-TV content useful for getting students' attention: A few (3/21) teachers (3 SNP) strongly agreed the DSP-TV was useful in getting the students' attention and many (13/21) teachers (4 SIP and 9 SNP) agreed that the DSP-TV was useful in getting the students attention. A few (1/21) teachers (1 SNP) were undecided on the usefulness of DSP-TV for getting students' attention and a few (3/21) teachers (3 SNP) disagreed that the DSP-TV was useful in getting students' attention. A few (1/52) teachers (1 SNP) did not respond to this question.

I find DSP-TV content useful for informing the students of the lesson's objectives: A few (3/21) teachers (1 SIP and 2 SNP) strongly agreed and most (16/21) teachers (3 SIP and 13 SNP) agreed that the DSP-TV was useful for informing students about the lessons' objectives. A few (1/21) teachers (1 SNP) disagreed that the DSP-TV was useful for informing students about the lessons' objectives. A few (1/21) teachers (1 SNP) did not respond to this question.

I find DSP-TV content useful in stimulating student's prior learning: Some (4/21) teachers (1 SIP and 3 SNP) strongly agreed and many (14/21) teachers (3 SIP and 11 SNP) agreed that the DSP-TV was useful for stimulating students' prior learning. A few (2/21) teachers (2 SNP) disagreed that the DSP-TV was useful for stimulating students' prior learning. A few (1/21) teachers (1 SNP) did not respond to the question.

I find the DSP-TV content useful in providing students with learning guidance: Some (4/21) teachers (1 SIP and 3 SNP) strongly agreed and most (16/21) teachers (3 SIP and 13 SNP) agreed that the DSP-TV was useful for providing students with learning guidance. A few (1/21) teachers (1 SNP) did not respond to this question.

Effectiveness of DSP-TV in enhancing student learning as reported by teacher in the Teacher Engagement Survey.

I enjoy my teaching using the DSP-TV: Some (4/21) teachers (1 SIP and 3 SNP) strongly agreed and most (17/21) teachers (3 SIP and 14 SNP) agreed that they enjoyed teaching with the DSP-TV.

I would like to have every classroom equipped with a DSP-TV: Some (6/21) teachers (6 SNP) strongly agreed and several (11/21) teachers (3 SIP and 8 SNP) agreed that they would like all classrooms to be equipped with the DSP-TV. A few (3/21) teachers (1 SIP and 2 SNP) disagreed and a few (1/21) teachers (1 SNP) said that they would like all classrooms to be equipped with the DSP-TV.

I eagerly wait for the day's next DSP-TV-enabled class: Some (4/21) teachers (4 SNP) strongly agreed and several (11/21) teachers (4 SIP and 7 SNP) agreed that they eagerly waited for the next day's DSP-TV class. Some (5/21) teachers (5 SNP) disagreed and a few (1/21) teachers (1 SNP) strongly disagreed that they eagerly waited for the next day's DSP-TV class.

My interest in teaching has increased after the introduction of the DSP-TV: Some (4/21) teachers (1 SIP and 3 SNP) strongly agreed and several (12/21) teachers (3 SIP and 9 SNP) agreed that their interest in teaching has increased after the introduction of DSP-TV at their schools. A few (3/21) teachers (3 SNP) disagreed and a few (2/21) teachers (2 SNP) strongly disagreed that their interest in teaching has increased after the introduction of DSP-TV at their schools.

Teachers feel excited when students interact with the DSP-TV: A few (1/22) teachers (1 SNP) strongly agreed and several (12/21) teachers (2 SIP and 10 SNP) agreed that they felt excited with their students' interaction with the DSP-TV. Some (8/21) teachers (2 SIP and 6 SNP) disagreed that they felt excited when their students interacted with the DSP-TV.

4.3.5.9 Teachers' Agency as Reported by Teacher in the Teacher Engagement Survey

I can design and plan how to integrate DSP-TV in my teaching: A few (2/21) teachers (2 SNP) strongly agreed and several (15/21) teachers (4 SIP and 11 SNP) agreed that they are able to design and plan how to integrate DSP-TV in their teaching. Several (3/21) teachers (3 SNP) disagreed and a few (1/21) teachers (1 SNP) teachers strongly disagreed with the statement.

I can decide how to teach with the DSP-TV: Some (3/21) teachers (3 SNP) strongly agreed and many (17/21) teachers (4 SIP and 13 SNP) agreed that they were able to decide how to teach with the DSP-TV. A few (1/21) (1 SNP) disagreed with the statement.

I can decide when to use DSP-TV in my lesson: Some (4/21) (4 SNP) strongly agreed and many (17/21) (4 SIP and 13 SNP) agreed that they were able to decide when to use the DSP-TV in their lesson.

I develop my own lesson plans to teach using the DSP-TV: A few (2/21) teachers (2 SNP) strongly agreed and several (9/21) teachers (2 SIP and 7 SNP) agreed that they develop their own lesson plans to teach using the DSP-TV. A few (1/52) teachers (1 SNP) were undecided and several (9/21) teachers (2 SIP and 7 SNP) disagreed that they developed their own lesson plans to teach using the DSP-TV.

Classroom Practices as reported by teacher in the Teacher Engagement Survey

I ask more questions while teaching in a DSP-TV-enabled class: A few (1/21) teachers (1 SNP) strongly agreed and several (12/21) teachers (2 SIP and 10 SNP) agreed that they tend to ask more questions while teaching in a DSP-TV enabled class. Some (8/52) teachers (2 SIP and 6 SNP) disagreed that they tend to ask more questions while teaching in a DSP-TV enabled class.

I run the DSP-TV content forward and backwards several times while teaching: A few (2/21) (2 SNP) teachers strongly agreed and most (17/21) teachers (4 SIP and 13 SNP) agreed that they run the DSP-TV content forward and backward several times while teaching. A few (2/21) teachers (2 SNP) disagreed that they run the DSP-TV content forward and backward several times while teaching.

I collect content from other sources (like YouTube) and run it on the DSP-TV: Some (4/21) teachers (1 SIP and 3 SNP) strongly agreed and several (9/521) teachers (2 SIP and 7 SNP) agreed that they collect content from other sources like YouTube and run it on the DSP-TV. Some (8/52) teachers (1 SIP and 7 SNP) disagreed that they collect content from other sources like YouTube and run it on the DSP-TV.

I can build discussions with students in DSP-TV-enabled classrooms: A few (2/21) teachers (2 SNP) strongly agreed and most (18/21) teachers (SIP- 4, SNP- 14) agreed that they are able to build discussions with students in the DSP-TV enabled classes. A few (1/21) teachers (1 SIP and 3 SNP) disagreed that they were able to build discussions with students in the DSP-TV enabled classes.

I try different ways to make students actively participate in the DSP-TV-enabled sessions: Some (4/21) teachers (4 SNP) strongly agreed and many (15/21) teachers (4 SIP and 11 SNP) agreed that they try different ways to make students actively participate in the DSP-TV enabled sessions.

A few (1/21) teachers (1 SNP) disagreed and a few (1/21) teachers (1 SNP) strongly disagreed that they try different ways to make students actively participate in the DSP-TV enabled sessions.

4.3.5.10 Classroom Participation of Students While Using DSP-TV as Reported by Teacher in the Teacher Engagement Survey

I find it easier to gauge if the students have understood what has been taught when using DSP-TV: A few (2/21) teachers (2 SNP) strongly agreed and many (13/21) teachers (4 SIP and 9 SNP) agreed that they found it easier to gauge if the students have understood what has been taught when using the DSP-TV. Some (6/21) teachers (6 SNP) disagreed and said that they found it easier to gauge if the students have understood what has been taught when using the DSP-TV.

I take the help of students when they face problems with the DSP-TV: A few (2/21) teachers (2 SNP) strongly agreed and several (12/21) teachers (2 SIP and 10 SNP) agreed that they take help from their students when the face problems with the DSP-TV. Some (6/21) teachers (2 SIP and 4 SNP) disagreed and a few (1/21) teachers (1 SNP) strongly disagreed that they take help from their students when they face problems with the DSP-TV.

I allow students to operate the remote and TV as per their needs during sessions: A few (2/21) teachers (2 SNP) strongly agreed and many (15/21) teachers (2 SIP and 13 SNP) agreed that they allow their students to operate the remote and TV as per their needs during the session. A few (3/21) teachers (2 SIP and 1 SNP) disagreed and a few (1/21) teachers (1 SNP) strongly disagreed that they allowed their students to operate the remote and TV as per their needs during the session.

I encourage students to interact among themselves and discuss topics during DSP-TV enabled class: A few (1/21) teachers (1 SNP) strongly agreed and several (19/21) teachers (4 SIP and 15) agreed that they encouraged students to interact among themselves and discuss topics during DSP-TV class. A few (1/21) teachers (1 SNP) were undecided.

I engage more with students in DSP-TV Class: A few (2/21) teachers (2 SNP) strongly agreed and several (10/21) teachers (3 SIP and 7 SNP) agreed that they engage more with students in the DSP-TV class. While some (8/21) teachers (1 SIP and 7 SNP) disagreed and a few (1/21) teachers (1 SNP) strongly disagreed that they engage more with students in the DSP-TV class.

I am aware of their students' feelings during DSP-TV-enabled classes: A few (2/21) teachers (2 SNP) strongly agreed and most (18/21) teachers (4 SIP and 14 SNP) agreed that they were aware of their students' feelings during the DSP-TV enabled class. While a few (1/21) teachers (1 SNP) disagreed.

4.3.5.11 Support Sought by Teachers for Operating DSP-TV as Reported by Teacher in the Teacher Engagement Survey

I discuss and share my experience of DSP-TV class with my colleagues: Some (4/21) teachers (4 SNP) strongly agreed and many (16/21) teachers (4 SIP and 12 SNP) agreed that they discuss and share their experiences with other teachers. A few (1/21) teachers (1 SNP) did not answer this question.

I help my colleagues when they have problems with DSP-TV enabled learning: Some (5/21) teachers (1 SIP and 4 SNP) strongly agreed and most (16/21) teachers (3 SIP and 13 SNP) agreed that they help their colleagues when they have problems with DSP-TV enabled learning.

I seek help from my colleagues when I face a problem with DSP-TV enabled learning: Some (4/21) teachers (4 SNP) strongly agreed and most (16/21) teachers (3 SIP and 13 SNP) agreed that they seek help from their colleagues when they face problems with DSP-TV enabled lesson. A few (1/21) teachers (1 SNP) disagreed that they seek help from their colleagues when they face problems with DSP-TV enabled lessons.

I can connect with experts on software or hardware issues with the DSP-TV: A few (2/21) teachers (2 SNP) strongly agreed and several (14/21) teachers (3 SIP and 11 SNP) agreed that they connect with experts on software or hardware issues with the DSP-TV. Some (5/21) teachers (1 SIP and 4 SNP) disagreed that they connect with experts on software or hardware issues with the DSP-TV.

I attend discussions, seminars and trainings over the DSP-TV enabled pedagogy: A few (1/21) (1 SNP) teachers strongly agreed and several (9/21) teachers (2 SIP and 7 SNP) agreed that they attend discussions, seminars and training on the DSP-TV enabled pedagogy. Some (8/21) teachers (8 SNP) disagreed and a few (2/21) teachers (2 SNP) strongly disagreed that they attend discussions, seminars and training on the DSP-TV enabled pedagogy.

I can contact the program associate from Muskaan Dreams for any problems regarding DSP-TV content and technical support: Some (4/21) teachers (1 SIP and 3 SNP) strongly agreed and many (15/21) teachers (3 SIP and 12 SNP) agreed that they can connect with the program associate from Muskaan Dreams for any problems regarding the DSP-TV content and technical support. A few (2/21) teachers (2 SNP) disagreed that they can connect with the program associate from Muskaan Dreams for any problems regarding the DSP-TV content and technical support.

4.3.5.12 Effectiveness of DSP-TV in Enhancing Student Learning as Reported by Teacher in the Teacher Engagement Survey

DSP-TV has improved my classroom teaching: Some (4/21) teachers (1 SIP and 3 SNP) have strongly agreed that DSP-TV has improved their teaching and several (12/21) teachers (2 SIP and 10 SNP) have agreed that DSP-TV has improved their teaching. A few (1/21) teachers (1 SNP) were undecided on the impact of DSP-TV on their classroom teaching. A few (3/21) teachers (1 SIP and 2 SNP) disagreed that the DSP-TV had improved their teaching and a few (1/21) teachers (1 SNP) strongly disagreed that the DSP-TV had improved their teaching.

DSP-TV is helpful for teaching with more visual instruction: Some (4/21) teachers (1 SIP, 3 SNP) strongly agreed that DSP-TV is helpful for teaching due to the availability of more visual instruction and most (16/21) teachers (3 SIP and 13 SNP) agreed that DSP-TV is helpful for teaching due to the availability of more visual instruction. A few (1/21) teachers (1 SNP) strongly disagreed that DSP-TV is helpful for teaching due to the availability of more visual instruction.

I pay more attention to teaching while using DSP in teaching: A few (2/21) teachers (2 SNP) strongly agreed that they pay more attention to teaching while using the DSP-TV and most (16/21) teachers (4 SIP and 12 SNP) agreed that they pay more attention to teaching while using the DSP-TV. A few (1/21) teachers (1 SNP) disagreed and a few (1/21) teachers (1 SNP) strongly disagreed that they pay more attention to teaching while using the DSP-TV. A few (1/21) teachers (1 SNP) did not respond to this question.

4.3.6 Analysis of Teacher Interviews and Teacher Engagement Survey (TES) of the Active Schools

Of the 78 teacher interviews 50 interviews were conducted in 41 schools (19 SIP and 22 SNP) where the teachers are using the DSP-TV regularly (active Schools). The 50 teachers were asked questions about usage, training, effectiveness, challenges, community of practice, and feedback. The summary presented here is structured under the larger themes: usage, access, participation, value-benefit, choice and decision making, challenge, monitoring and support, home and parental perception and suggestions/ feedback.

4.3.6.1 Demographic Details of Schools

Of these 41 schools (19 SIP and 22 SNP), 19 schools (9 SIP and 10 SNP) are in rural areas, 6 schools (4 SIP and 2 SNP) are in semi-urban areas and 15 schools (6 SIP and 9 SNP) are in urban areas. Amongst these 41 schools, 7 are girls'

schools (6 SIP and 1 SNP), 2 are boys' schools (2 SIP) and 31 are co-ed schools (11 SIP and 20 SNP). The tables below provide the details of the schools as per demography.

Table 4.3.7

Division of Schools as per Geographical Location				
School category	**Rural**	**Semi Urban**	**Urban**	**Total**
SIP	9	4	6	19
SNP	10	2	9	21
Total	**19**	**6**	**15**	**40**

Table 4.3.8

Division of Schools as per School-type				
School category	**Rural**	**Semi Urban**	**Urban**	**Total**
SIP	2	6	11	19
SNP	0	1	20	21
Total	**2**	**7**	**31**	**40**

4.3.6.2 Details of Teachers

i. Gender of the Teacher

Of the 50 teachers (28 SIP and 22 SNP) interviewed, 32 teachers were male (17 SIP and 14 SNP) and 18 teachers (11 SIP and 8 SNP) were female.

The table 4.3.9 below gives the gender wise details of teachers interviewed in the SIP and SNP schools in the active school category.

Table 4.3.9

Gender of Teachers Interviewed			
Gender	**SIP**	**SNP**	**Total**
Male	17	14	31
Female	11	8	19
Total	**28**	**22**	**50**

ii. Age of the Teachers

Of the 50 teachers (28 SIP and 22 SNP) interviewed, one teacher (1 SNP) was below 30 years. 27 teachers (13 SIP and 14 SNP) were in between 31-45 years, 17 teachers (13 SIP and 4 SNP) were in between 46-55 years and 5 teachers (2 SIP and 3 SNP) were above 55 years of age (Table 4.3.10).

Table 4.3.10

Age Group of Teachers Interviewed			
Age Groups (in years)	**SIP**	**SNP**	**Total**
Below 30	0	1	1
31-45	13	14	27
46-55	13	4	17
Above 55	2	3	5
Total	**28**	**22**	**50**

iii. Employment Status

Of the 50 teachers (28 SIP and 22 SNP) interviewed in the active schools, 47 teachers are permanent teachers (28 SNP and 22 SNP), and 3 teachers (3 SNP) were contractual teachers in the school.

iv. Additional Duty

During the interview, teachers were also asked about the additional duties they have in school other than teaching. The question was asked to get an understanding of the duties assigned to teachers beyond teaching.

Of the 50 teachers (28 SIP and 22 SNP), 18 teachers (11 SIP and 7 SNP) responded that they do not have any additional duties apart from the subject level teaching. Six teachers (2 SIP and 4 SNP) mentioned having responsibilities beyond teaching, such as preparing students for extracurricular activities (e.g., scouting, games, cultural activities), managing class duties, handling the admission process, and assisting with election duties. Additionally, one teacher (1 SIP) reported being in charge of the KGBV Girls' hostel (Kasturba Gandhi Balika Vidyalaya). One teacher in (1 SNP) school was reported to be in charge of the information technology (IT) lab.

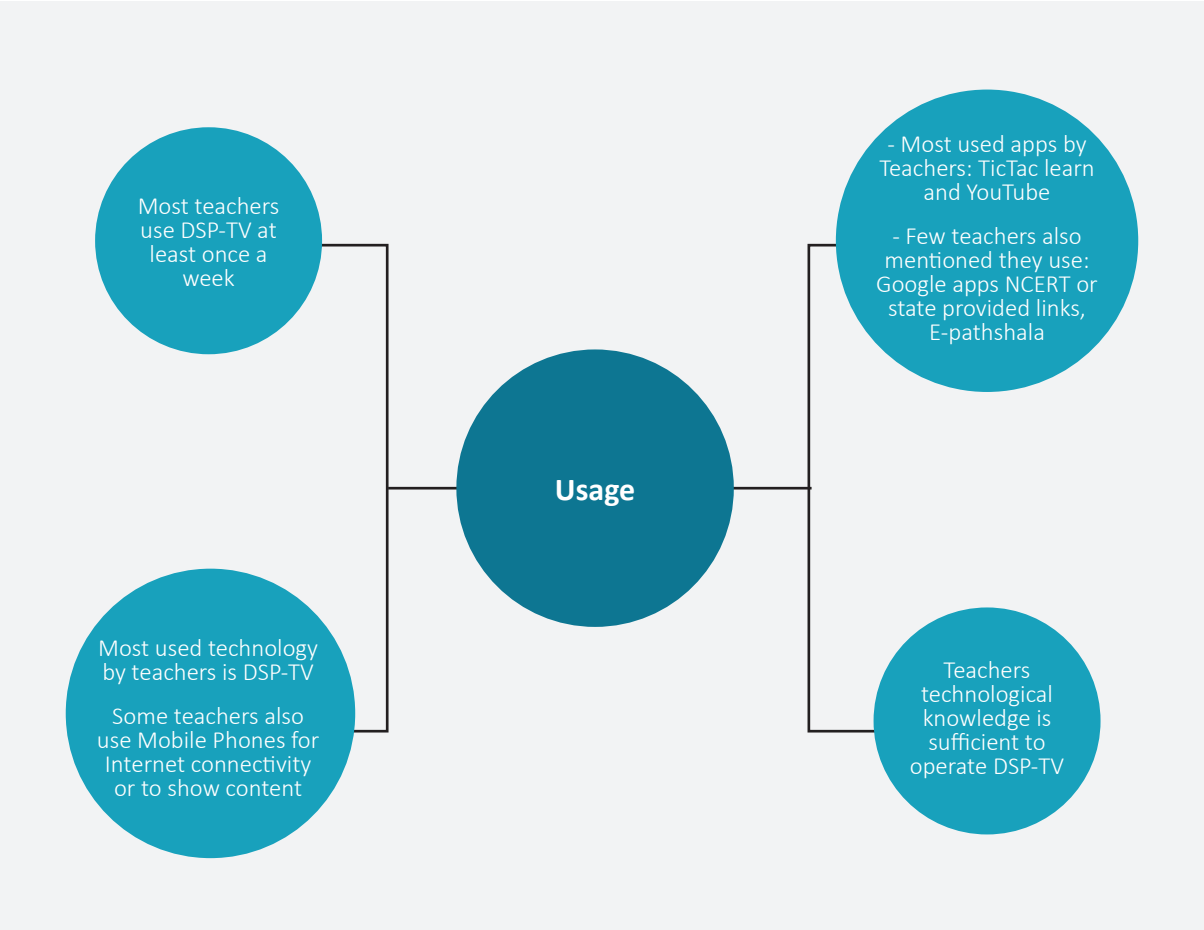
Six teachers (3 SIP and 3 SNP) reported being school heads while also teaching one subject. Three teachers (3 SIP) mentioned that they manage both subjects in addition to their roles as school heads. Four teachers (3 SIP and 1 SNP) mentioned serving as the teacher-in-charge.

Some (11/50) teachers did not respond to the question.

4.3.6.3 Usage

To understand the usage pattern teachers were asked about the use of DSP-TV, use of other apps, frequency of TicTac Learn and other apps, preference for particular topics, use of other technology in the classroom.

Figure 4.3.2: Findings from Teacher Interviews-Use of DSP-TV in Active Schools



i. Summary of Findings from Teacher Interview -Usage

Findings on the usage of DSP-TV in active schools indicated that most teachers use the device at least once a week. Teachers reported to use TicTac Learn and YouTube the most, while a few also mentioned using Google apps, NCERT or state-provided links, and E-Pathshala. Several teachers also reported to use mobile phones alongside DSP-TV for internet connectivity or to display content. Findings from the TES also indicated teachers having sufficient technological knowledge to operate the DSP-TV effectively.

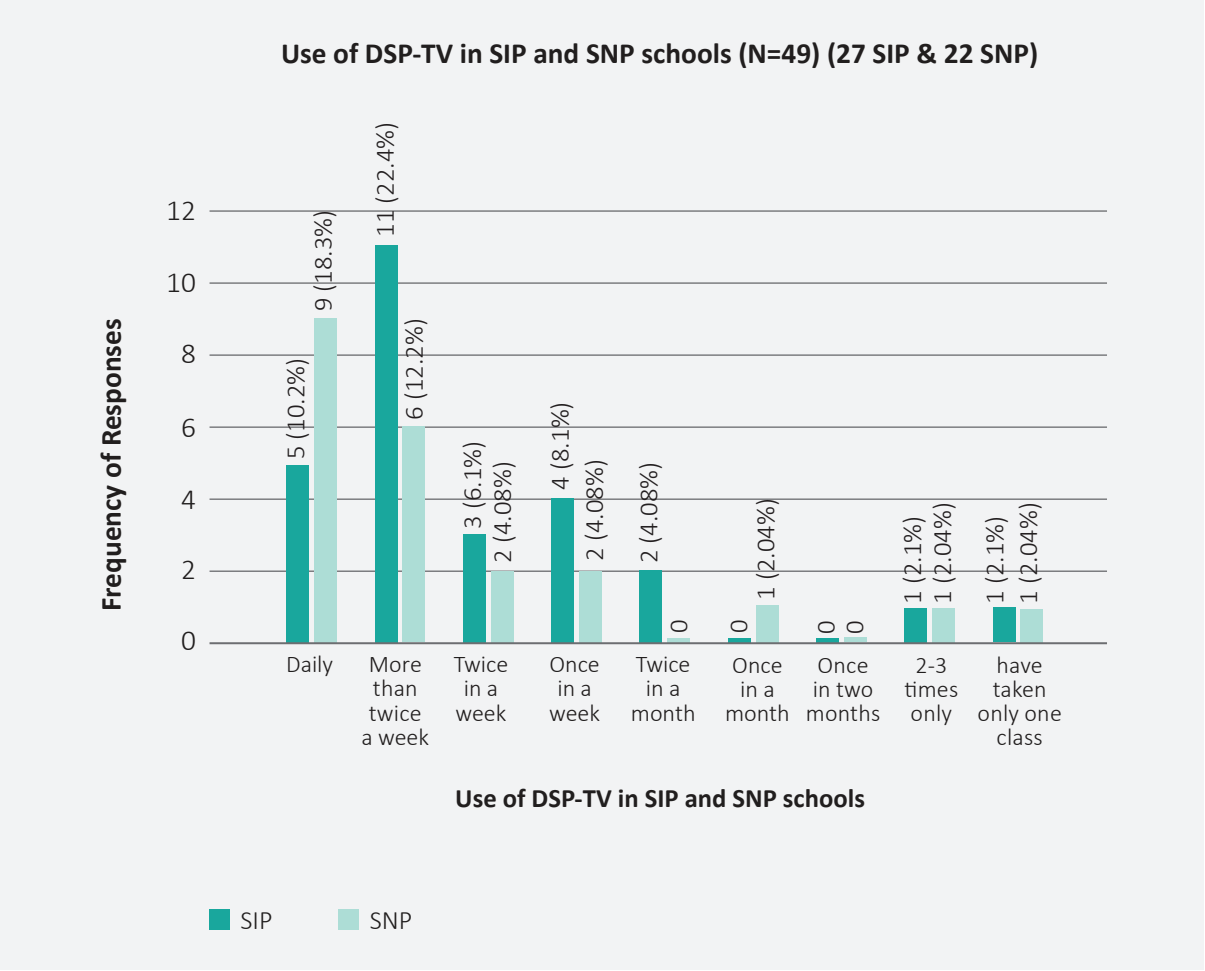
ii. Usage Reported by Teachers During Teacher Interview

- ***Use of DSP-TV in the Classroom***

  Of the 50 teachers (28 SIP and 22 SNP), most (49/50) teachers (27 SIP and 22 SNP) reported to have used the DSP-TV in the classroom, however, the frequency of usage is varying. Of the 49 teachers who responded, some (17/49) teachers (11 SIP and 6 SNP) mentioned that they use DSP-TV more than twice a week in the classroom. Some (14/49) teachers (5 SIP and 9 SNP) mentioned that they use DSP-TV daily in the classroom. A few (6/49) teachers (4 SIP and 2 SNP) mentioned that they use DSP-TV once in a week. A few (5/49) teachers (3 SIP and 2 SNP) mentioned that they use DSP-TV twice a week in the classroom, a few (2/49) teachers (2 SIP) mentioned to use DSP-TV twice a month. A few (2/49) teachers (1 SIP and 1 SNP) also mentioned to have used DSP-TV 2-3 times overall in the past three months and a few (2/49) teachers (1 SIP and 1 SNP) mentioned to use DSP-TV only once. One teacher (1 SNP) mentioned that they use DSP-TV once a month and one teacher (1 SIP) reported to not have used the DSP-TV till now.

  The usage of the DSP-TV in SIP and SNP schools are shown in the figure 4.3.3 below.

Figure 4.3.3: Findings from Teacher Interviews - Use of DSP-TV in SIP and SNP Schools

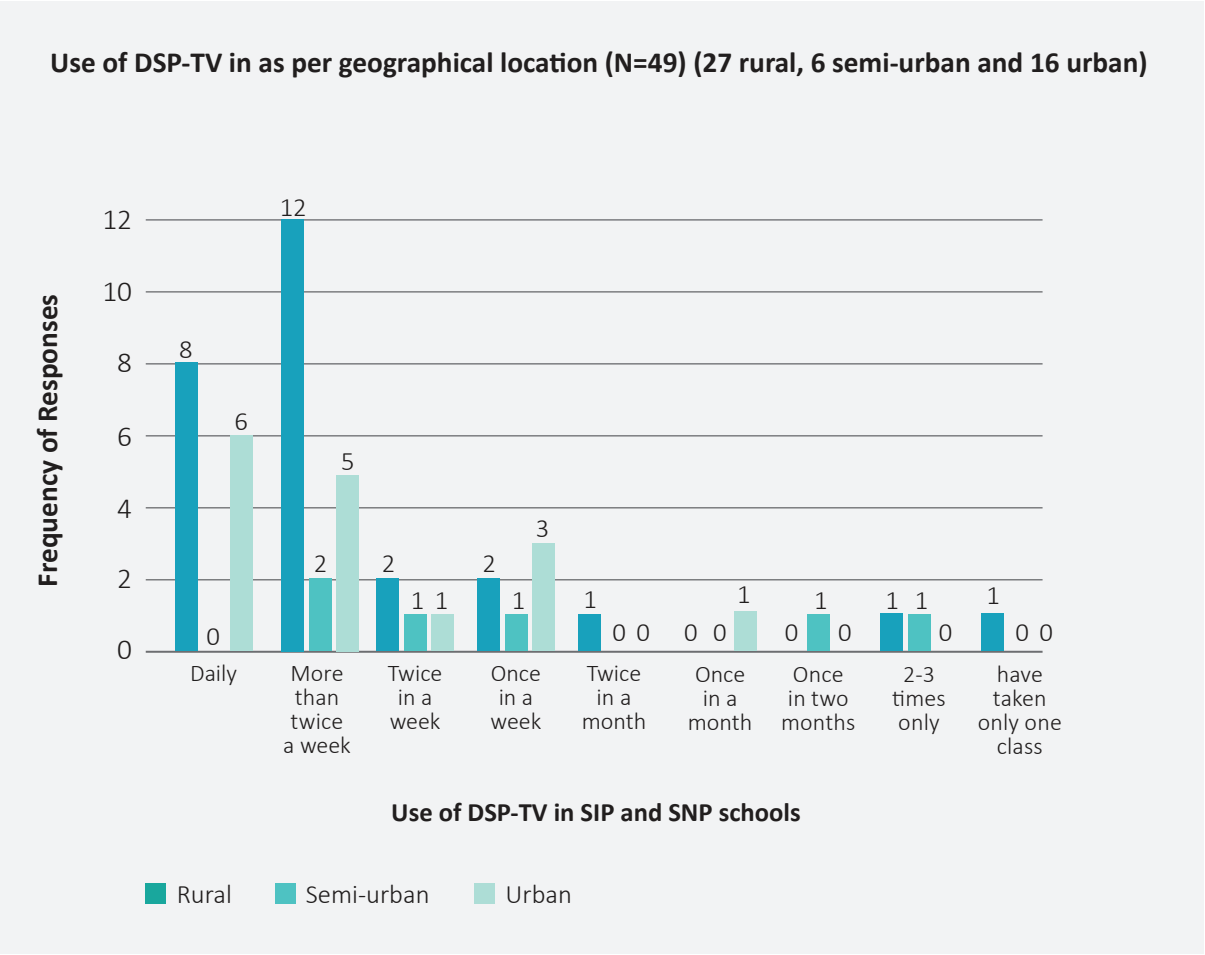


The above analysis indicates that the majority of the teachers in SIP schools reported to use the DSP-TV regularly (daily, twice in a week, once in a week). Of the 49 teachers who responded, 27 were from rural schools, 6 were from semi-urban schools and 16 teachers were from urban schools.

On further analysis, it was found that the daily usage of DSP-TV as reported by teachers was higher (14 teachers; 5 SIP and 9 SNP) in the rural schools than urban or semi-urban (8 rural and 6 urban). The weekly use of DSP-TV (more than twice a week, twice a week and once a week) was also reported higher by the teachers (28 teachers; 18 SIP and 10 SNP) from the rural schools than urban or semi-urban schools (16 rural, 3 semi-urban and 9 urban). Teachers who reported to use DSP-TV less than three times in the past three months are from rural, semi-urban and urban areas (2 rural, 1 semi-urban and 1 urban).

As shared by a teacher, *"I have used it 2-4 times till date, actually, you can say once in a month, we need to complete the syllabus within the timeline. Also, we have some other responsibilities too."*

Figure 4.3.4: Findings from Teacher Interviews - Use of DSP-TV in SIP and SNP Schools as per Geographical Location



iii. Teacher Preferences and Usage Patterns of DSP-TV Content

- ***Preference of Topics on DSP-TV:*** to understand the preference of topics on DSP-TV, the teachers were asked whether they like a particular topic for DSP-TV or whether they use it for all the topics. The question was asked to understand the teachers' preference of content in DSP-TV and reasons for liking or using any topic.

  Of the 50 teachers (28 SIP and 22 SNP), some (14/50) teachers (6 SIP and 8 SNP) reported that they prefer to use DSP-TV for specific topics. However, some (14/50) teachers (10 SIP and 4 SNP) also mentioned that they do not use DSP-TV for any specific topic or subject. One teacher (1 SIP) reported to use DSP-TV for revision. Several (21/50) teachers (11 SIP and 10 SNP) did not respond to the question.

  - **SIP:** Of the 28 teachers, some (10/28) teachers reported to not use DSP-TV for any specific topic. Some (6/28) teachers reported to use DSP-TV more for specific topics. Of these 6 teachers, 4 were Science teachers and 2 were Math teachers. One teacher (1/28) mentioned that she uses DSP-TV for revision. No response has been recorded for some (11/28) teachers.

A Science teacher in a SIP school gave an example of how she uses DSP-TV to explain topics such as 'Blood Circulation' and 'Acid-Base'. As she explained, "*It has been defined very properly through diagrams and process flow. It was clearly explained to the students how circulation takes place.*" Another male Science teacher from a SIP school mentioned that he used the TicTac Learn content to explain the 'Reproductive System.' As he shared, *"we are uncomfortable discussing it with students. The students understood and also noted it. The content was on the pendrive."*

A Math teacher in another SIP school gave an example of how he uses the videos to explain concepts such as mensuration because *"there are shapes like triangles, quadrilaterals, which are clearer and easier to learn by visuals."*

- **SNP:** Of the 22 teachers, some (8/22) teachers reported to use DSP-TV more for specific topics. Of these, 5 were Math and 3 were Science teachers. Some (4/22) teachers reported to not use DSP-TV for any specific topic. Several (10/22) teachers did not respond to the question.

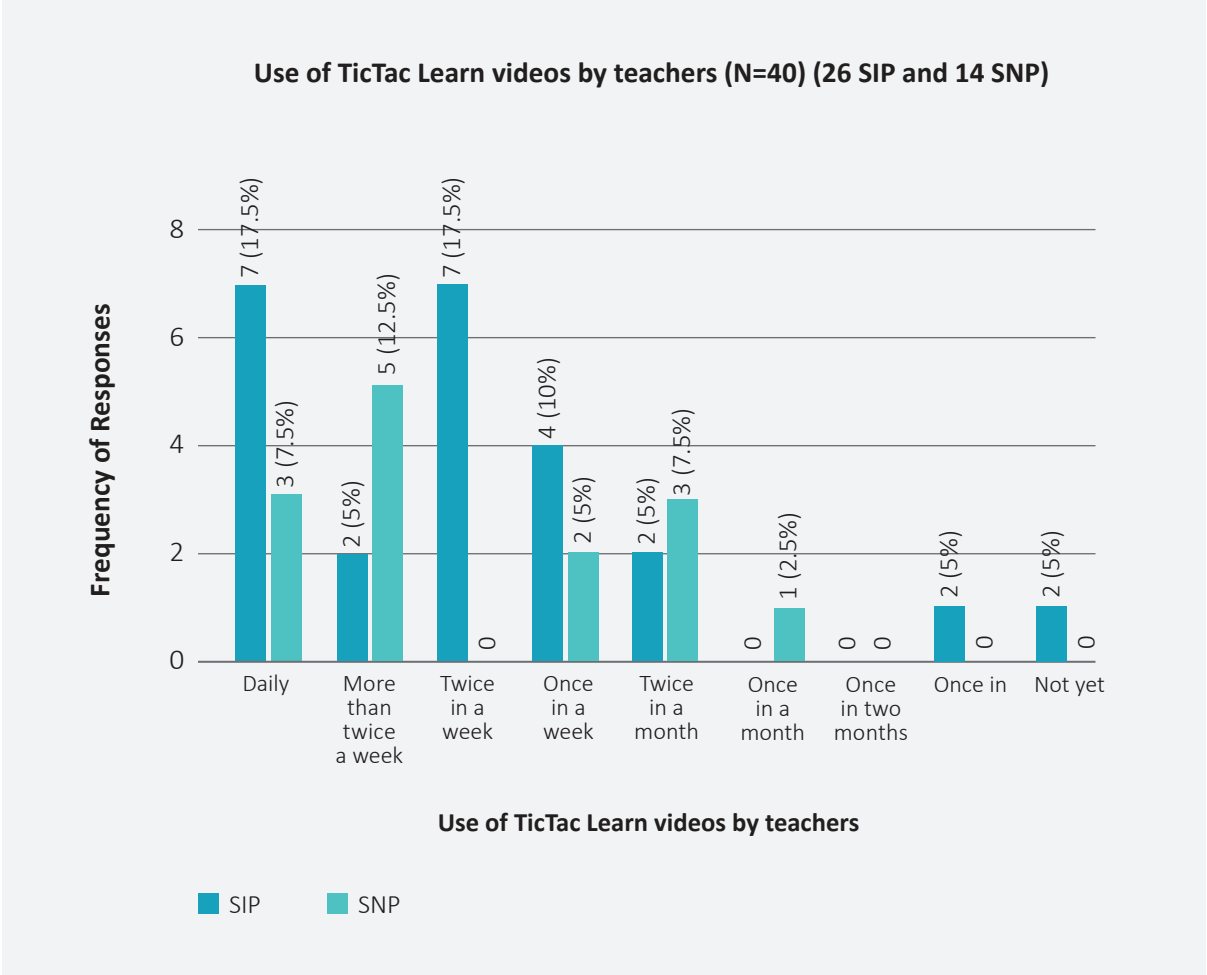
  As shared by a Science teacher, *"Like reproduction, digestive system etc which can not be explained clearly on the board in those cases we used to take the help of YouTube. Sometimes barometric pressure etc topics are also explained through TV."* Another Math teacher shared that, *"It's more useful when we need to explain 3D shapes because we can't physically demonstrate the difference between 2D and 3D. Videos make it easier for them to understand."*

- ***Preference of Types of Applications on DSP-TV:*** Teachers who reported to use DSP-TV in the classroom were also asked about the type of application they use to teach on the DSP-TV in their classroom. The questions were asked to understand the patterns of using DSP-TV in the classroom. Teachers were asked about the frequency of use of TicTac Learn content, other apps such as YouTube on DSP-TV.

  - ***Use of TicTac Learn:*** Of the 50 teachers (28 SIP and 22 SNP), most (40/50) teachers (26 SIP and 14 SNP) reported that they use TicTac Learn for teaching in a varying range of frequencies.

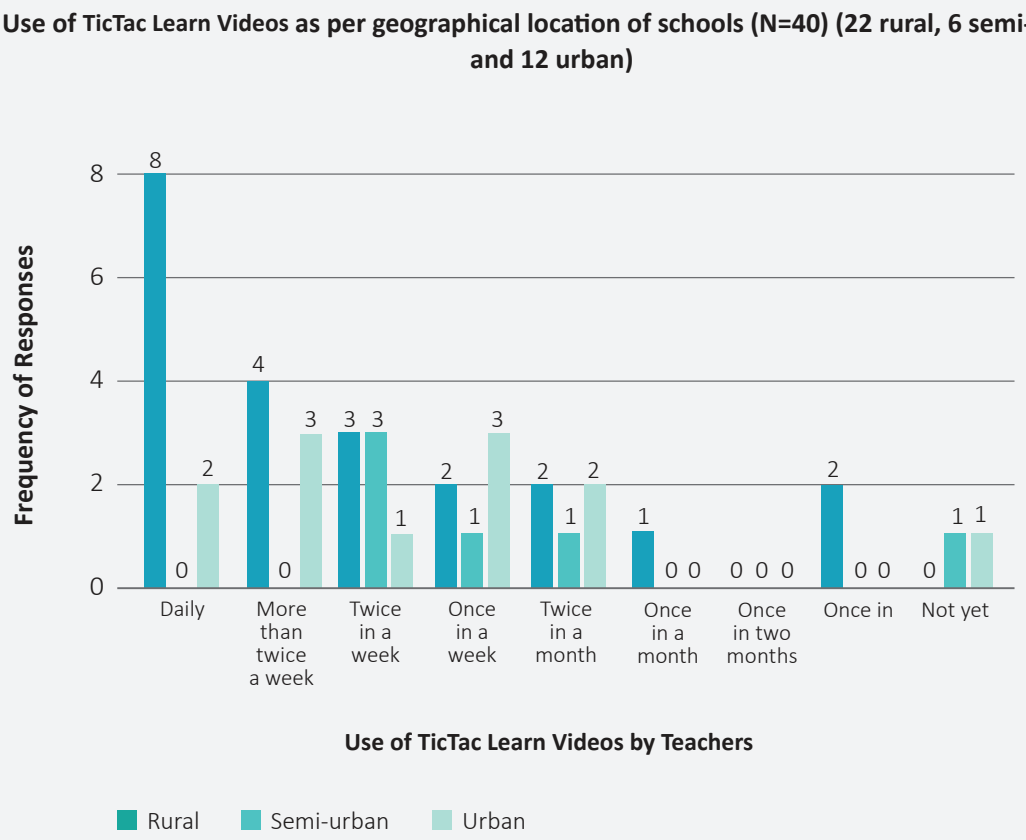
    Some (10/50) teachers (7 SIP and 3 SNP) mentioned that they use the TicTac Learn videos daily, a few (7/50) teachers (2 SIP and 5 SNP) reported to use the videos more than twice a week, a few (7/50) teachers (7 SIP) mentioned to use the videos twice a week, a few (6/50) teachers (4 SIP and 2 SNP) mentioned to use the videos once a week, a few (4/50) teachers (2 SIP and 3 SNP) mentioned to use the videos twice a month,one 1 teacher (1 SNP) mentioned to use the videos once a month, a few (2/50) teachers (2 SIP) mentioned using the TicTac Learn content only once in the past three months. A few (2/50) teachers (2 SIP) responded that they have not used the videos in the past three months. Some (10/50) teachers (2 SIP and 8 SNP) did not respond to the question.

Figure 4.3.5: Findings from Teacher Interviews - Use of TicTac Learn Videos by Teachers



On further analysis, it was found that the use of TicTac Learn videos are varying as per the geographical location of the schools of the teachers interviewed. It was observed that of the 10 teachers (7 SIP and 3 SNP) who reported the daily use of TicTac Learn videos are mostly from rural schools (8 rural and 2 urban). Of the 20 teachers (13 SIP and 7 SNP) who reported to use the TicTac Learn videos weekly (2-3 times in a week, twice in a week, once in a week) are majorly from rural and urban schools (9 rural, 4 semi-urban, 7 urban). Of the 12 teachers (4 SIP and 4 SNP) who reported to use the TicTac Learn videos monthly are majorly from rural and urban schools (5 rural, 1 semi-urban, 2 urban).

Figure 4.3.6: Findings from Teacher Interviews - Use of TicTac Learn Videos by Teachers as per Geographical Location

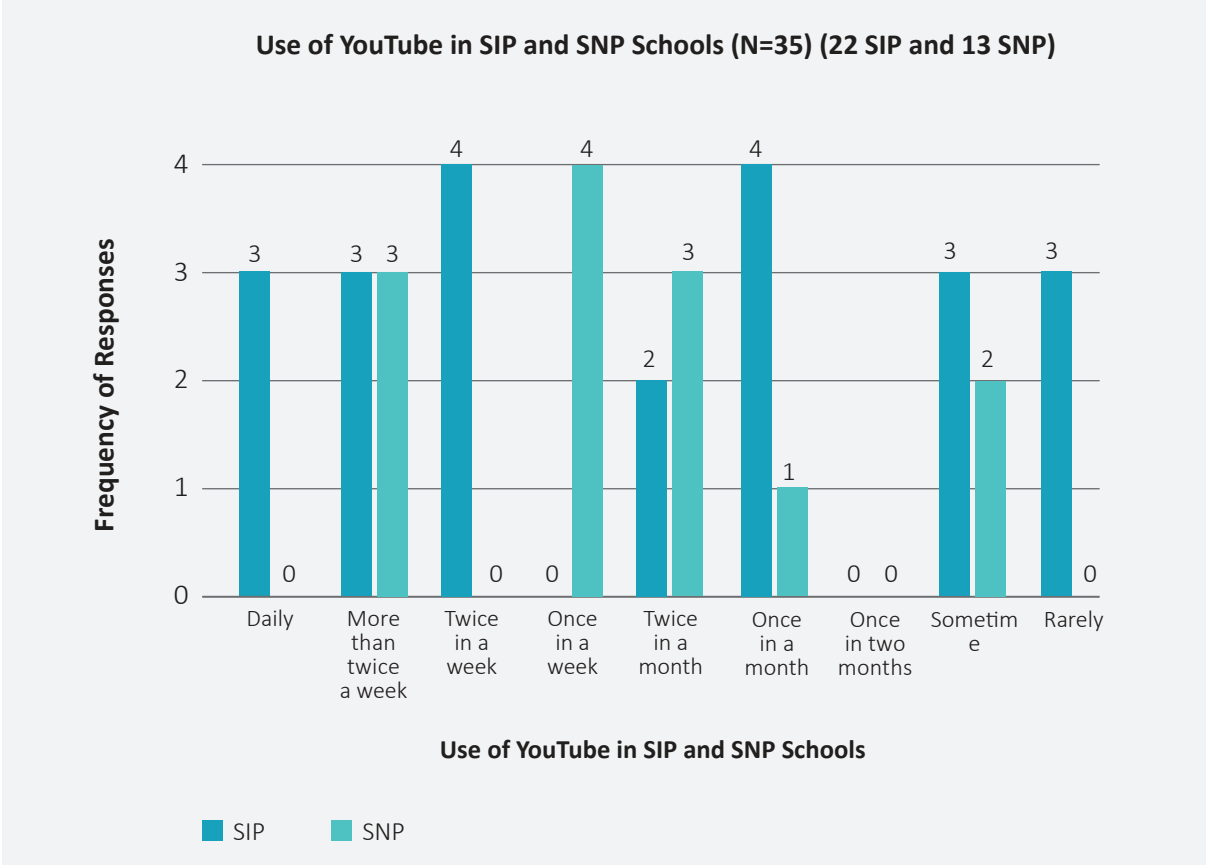


- ***Use of Apps Other than TicTac Learn***

  Of the 50 teachers (28 SIP and 22 SNP) interviewed, many (35/50) teachers (22 SIP and 13 SNP) reported to have used apps other than TicTac Learn on the DSP-TV.

  YouTube was reported to be the most played app on DSP-TV amongst other apps other than TicTac Learn by many (35/50) teachers (22 SIP and 13 SNP). Of the 35 teachers who reported to use YouTube on DSP-TV, some (6/35) teachers (3 SIP and 3 SNP) reported to use YouTube more than twice a week, a few (5/35) teachers (2 SIP and 3 SNP) mentioned to use YouTube twice in a month, a few (5/35) teachers (4 SIP and 1 SNP) reported to use YouTube once in a month, a few (5/35) teachers (3 SIP and 2 SNP) reported to use YouTube sometimes, a few (4/35) teachers (4 SIP) reported to use YouTube twice a week, a few (4/35) teachers (4 SIP) reported to use YouTube once a week, a few (3/35) teachers (3 SIP) reported to use YouTube daily, and a few (3/35) teachers (3 SIP) reported to use YouTube rarely. 2 teachers (2 SIP) also mentioned that they never used YouTube on DSP-TV.

Figure 4.3.7: Findings from Teacher Interviews - Use of Youtube by Teachers



Within these 35 teachers who use YouTube, a few (8/35) teachers also reported using other apps along with YouTube on the DSP-TV. They mentioned apps such as Google apps, NCERT or state provided links, E-pathshala besides YouTube.

As shared by a teacher, *"I mostly use YouTube. Other than that, we also use whatever links we are sent by the Department such as NTSE (National Talent Search Examination), NCERT links etc."*

A few (3/50) teachers (3 SIP) reported that they have not used any other apps on DSP-TV yet. Some (10/50) teachers did not respond to the question. A few teachers (2/50) also mentioned that they never used YouTube on DSP-TV.

- **SIP:** YouTube is the most used app as reported by most (22/28) of the teachers of SIP schools. Some (4/22) teachers mentioned that they use YouTube twice a week. Some teachers also (4/22) mentioned that they use YouTube once in a month, a few (3/22) teachers reported to use YouTube daily. A few (3/22) teachers mentioned that they use YouTube more than twice a week. A few (3/22) reported to use it sometimes, a few (3/22) teachers reported rarely and a few (2/22) teachers reported to use YouTube twice a month.

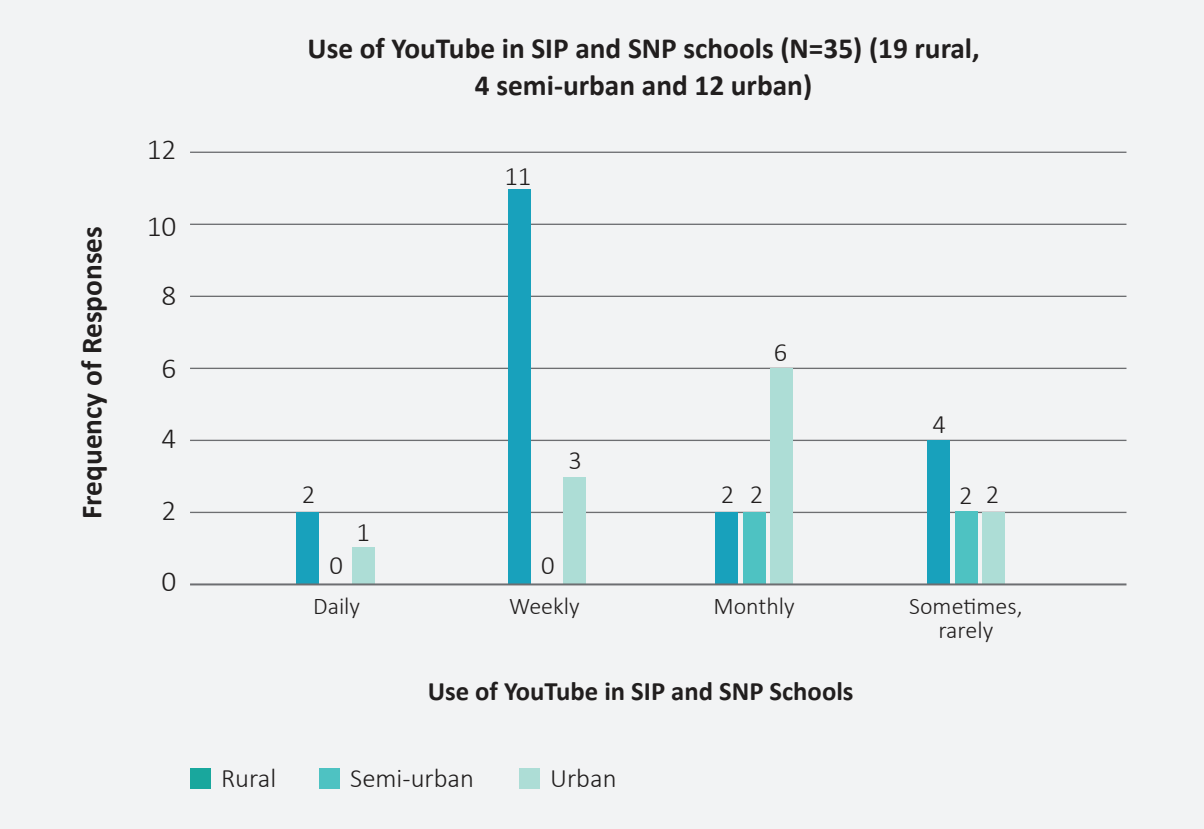
  The use of YouTube as reported by the teachers in SIP schools varied from showing curriculum related content to other programmes. A teacher mentioned that she uses YouTube in her teaching 'as needed' because *'the diagrams are clearer on YouTube than books.'* Another teacher also mentioned that they use YouTube for other subjects. As shared, *"... 'Tense' is not in the content of Muskan Dream because they are focused on Science and Math. We took the help of YouTube to teach tense. We are not restricted to their content; we use it for the betterment of the students whether in Science or English."*

- **SNP:** YouTube is the most preferred app in SNP schools as well. Of the 22 teachers, several (13/22) teachers mentioned that they used YouTube on DSP-TV. Some (5/13) teachers stated to use YouTube once a week, some (4/13) teachers reported to use YouTube more than twice a week, a few (2/13) teachers mentioned to use YouTube twice in a month and one teacher (1/13) mentioned to use YouTube once in a month. One teacher (1/13) also mentioned to use YouTube as per requirement. As explained by the teacher, *"We sometimes use it to make them understand the topics better."* As shared by a teacher, *"The use of TV now is not restricted to lessons only. For any informative discussion, we use YouTube. For the speech of the honorable Prime Minister, we use YouTube for students."*

  As shared by another teacher, *"Now that this school has become CM Rise, their frequency of visits has reduced. We also have panel boards and I also have a Clicker which we are asked to use those apps. All students have their own Clicker account as per name and roll numbers. When they click, it takes them directly to Bhopal where it shows what you have taught and how students have answered."*

The teacher interviews also indicated that the use of YouTube is varying as per the geographical location of the schools of teachers interviewed. It was observed that of the three teachers (2 SIP and 1 SNP) who reported the daily use of YouTube videos are mostly from rural schools (2 rural and 1 urban). Of the 14 teachers (7 SIP and 7 SNP) who reported to use the YouTube videos weekly (2-3 times in a week, twice in a week, once in a week) are majorly from rural and urban schools (11 rural, 3 urban). Of the 10 teachers (6 SIP and 4 SNP) who reported to use the YouTube videos monthly are majorly from rural and urban schools (2 rural, 2 semi-urban, 6 urban).

Figure 4.3.8: Findings from Teacher Interviews - Use of YouTube by Teachers as per Geographical Location



iv. Use of Other Technological Devices in the Classroom

Of the 50 teachers (28 SIP and 22 SNP), several (20/50) teachers (11 SIP and 9 SNP) reported that they used other technologies such as tablet, laptop, mobile in the classroom other than the DSP-TV. Some (19/50) teachers (13 SIP and 6 SNP) have said that they do not use any other technologies (other than DSP-TV) in the classroom. A few (11/50) teachers (4 SIP and 7 SNP) did not respond to the question.

- **SIP:** Of the 28 teachers, several (13/28) teachers mentioned that they do not use any other technologies other than DSP-TV in the classroom. Some (11/28) teachers stated that they use other technologies in the classroom.

  According to the teachers, mobile phones are the most commonly used device (6/11) among other technologies in the classroom. Teachers reported using mobile phones for assessments, such as assigning homework questions in students' WhatsApp groups or playing YouTube videos. One teacher highlighted that she uses mobile phones to provide more clarity on the topic she teaches *"...there are some diagrams which are not clearly explained in the textbook so students are not able to understand the diagrams in the books and we show them the videos on mobile."*

  Few (4/11) teachers reported that they use their personal tablet in the classroom to teach.

  One teacher (1/11) mentioned that she uses the school projector for teaching and one teacher (1/11) mentioned that he uses his laptop to share his *"... daughter's presentations and projects on laptop with students"* in the classroom. A few (4/28) teachers did not respond to the question.

- **SNP:** Some (9/22) teachers mentioned that they use other technologies such as mobile phones, projector, tablets in classrooms. Some (6/22) teachers stated that they do not use any technology other than DSP-TV. As reported by teachers, in the case of other technological devices used in the classroom, many (6/8) teachers have said that they use mobile phones in the classroom to show YouTube or other content when required. One teacher (1/8) reported using tablets, while another teacher (1/8) mentioned using a projector in the classroom. Another teacher (1/8) indicated using multiple devices, including a mobile phone, laptop, and speakers. Additionally, some teachers (8/22) did not provide a response to this question.

  The reported use of other technology devices in the classroom by 21 teachers (11 SIP and 10 SNP) were varying as per the geographical location of the school. The 12 teachers (6 SIP and 6 SNP) who mentioned using mobile phones in the classroom were mostly from rural schools (7 rural and 5 urban). Use of laptops were reported by teachers (2 SIP) from only rural schools (2 rural). The use of tablets reported by 5 teachers (4 SIP and 1 SNP) are mostly from urban schools (1 rural, 1 semi-urban and 3 urban).

  Out of the 12 teachers who indicated that they used their mobile phones in the classroom, 10 teachers (SIP and SNP) completed the Teacher Engagement Survey. In a crosstabulation examining the use of mobile devices for teaching by these 10 respondents revealed that 7 taught Mathematics, and 3 taught Science. Out of the 10 respondents, only 3 were males, and 7 were female teachers. It was also noted that these teachers were evenly spread across urban and rural schools (5 from urban schools and 5 from rural schools).

v. Technical Knowledge of Teachers to Operate DSP-TV Reported by Teacher in the Teacher Engagement Survey

The following analysis is based on the teachers' responses regarding their technical knowledge as reported in the Teacher Engagement Survey. Under this theme, teachers were asked to

respond about their technical knowledge to operate DSP-TV.

The survey questions under this theme were administered on a 5-point Likert scale as given below:

1. totally insufficient
2. insufficient
3. neutral
4. sufficient
5. totally sufficient

My present technological knowledge is sufficient to insert a pen drive in the TV: The TicTac Learn content is given to the respective schools in a pen drive so that teachers can use the content offline directly on DSP-TV. The teachers were asked to report whether their present technical knowledge is sufficient to use a pen drive.

Some (12/52) teachers (7 SIP and 5 SNP) mentioned that their knowledge was totally sufficient to use a pen drive and several (28/52) teachers (13 SIP and 15 SNP) mentioned their knowledge was sufficient. A few (1/52) teachers (1 SIP) were neutral. Some (9/52) teachers (4 SIP and 5 SNP) indicated that their knowledge was insufficient to use a pen drive and few (1/52) teachers (1 SNP) indicated that their knowledge was totally insufficient to use a pen drive. A few (1/52) teachers (1 SNP) did not respond to this question.

My present technological knowledge is sufficient to navigate across contents: Some (17/52) teachers (10 SIP and 7 SNP) felt their current technological knowledge was sufficient for them to navigate across different content on the DSP-TV and several (27/52) teachers (12 SIP and 15 SNP) felt their knowledge was sufficient. A few (1/52) teachers (1 SIP) were neutral on the sufficiency of their skills while a few (7/52) teachers (2 SIP and 5 SNP) felt their current technological knowledge was insufficient to navigate across content on the DSP-TV.

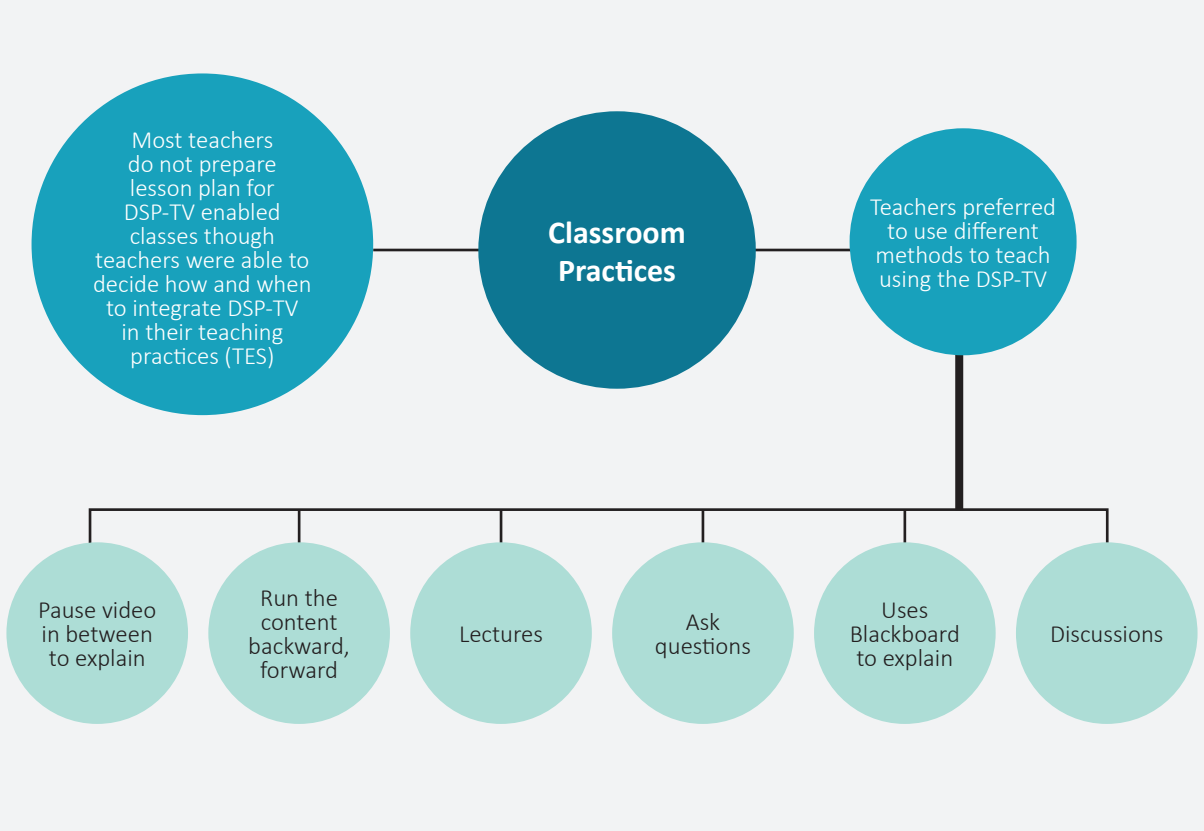
My present technological knowledge is sufficient to operate the remote to pause, rewind and forward contents: Several (25/52) teachers (14 SIP and 11 SNP) felt their current technological knowledge was totally sufficient and several (22/52) teachers (9 SIP and 13 SNP) felt it was sufficient to operate the remote of the DSP-TV to pause, rewind and forward contents. A few (1/52) teachers (1 SNP) were neutral while a few (3/52) teachers (2 SIP and 1 SNP) felt their knowledge was insufficient and a few (1/52) teachers (1 SNP) felt it was totally insufficient to operate the remote of the DSP-TV to pause, rewind and forward contents.

My present technological knowledge is sufficient to connect the TV using Bluetooth or Wi-Fi connection: Some (18/52) teachers (10 SIP and 8 SNP) felt that their current technological knowledge was totally sufficient and some (20/52) teachers (9 SIP and 11 SNP) felt it was sufficient to connect the TV using Bluetooth or Wi-Fi. A few (3/52) teachers (1 SIP and 2 SNP) were neutral about their knowledge to connect the TV. Several (9/52) teachers (4 SIP and 5 SNP) felt that their knowledge was insufficient and a few (2/52) teachers (1 SIP and 1 SNP) felt it was totally insufficient to connect the TV using Bluetooth or Wi-Fi.

My present technological knowledge is sufficient to use other apps on the TV: Some (10/52) teachers (6 SIP and 4 SNP) felt that their current technological knowledge was totally sufficient and several (21/52) teachers (7 SIP and 14 SNP) felt it was sufficient to use other application on the DSP-TV. A few (6/52) teachers (3 SIP and 3 SNP) were neutral on their knowledge to use other applications. Some (12/52) teachers (7 SIP and 5 SNP) felt their knowledge was insufficient and a few (2/52) teachers (1 SIP and 1 SNP) felt their knowledge was totally insufficient to use other applications on the DSP-TV. A few (1/52) teachers (1 SIP) did not respond to this question.

4.3.6.4 Classroom Practices

Figure 4.3.9: Findings from Teacher Interviews - Classroom Practices



i. Summary of Findings from Teacher Interview- Classroom Practices

Findings from teacher interviews regarding classroom practices indicated that teachers were employing various methods such as pausing videos for explanations, rewinding or forwarding content, delivering lectures, asking questions to engage students, using the blackboard for additional explanations, and encouraging discussions. The teachers also reported that they were not in the practice of creating lesson plans, but they knew when and where to use DSP-TV. These strategies allowed teachers to seamlessly integrate DSP-TV into their regular routines.

ii. Use of Lesson Plan as Reported by Teachers During Teacher Interview

During the interview teachers were also asked if they prepared any lesson plan specifically for the DSP-TV classes. This question was asked to understand how the teachers plan ahead to use the DSP-TV in the classroom in a structured way.

Most (46/50) teachers (24 SIP and 22 SNP) have mentioned that they have not prepared lesson plans for DSP-TV classes. A few (4/50) teachers (SIP) have said that they prepared lesson plans for DSP-TV class.

- **SIP:** Of the 28 teachers, Many (24/28) teachers reported that they do not prepare any lesson plan to teach with DSP-TV. While responding to the question regarding lesson plan four teachers also added that they prepare lesson plans specifically to teach with DSP-TV. A few (5/28) teachers mentioned that they prepare lesson plans for regular classroom teaching.

  As shared by a Science teacher, *" …we make normal lesson plans. The videos are helpful to explain a topic and make students understand. We don't make a separate lesson plan."*

One teacher who is also the school head shared, *" The teachers always make regular lesson plans. They do not have any idea of how to make lesson plans for DSP-TV enabled classrooms."*

- **SNP:** All of the (22/22) teachers have responded that they do not make lesson plans, particularly for the DSP-TV class.

iii. Teachers' Agency as Reported by Teacher in the Teacher Engagement Survey

The following analysis is based on the teachers' responses regarding the use of lesson plans in teaching using DSP-TV as reported in the Teacher Engagement Survey.

The survey questions under this theme were administered on a 5 point Likert scale as given below:

1. strongly disagree
2. disagree
3. undecided
4. agree
5. strongly agree

The teachers were asked to select their preferred responses on the scale as per their belief.

I can design and plan how to integrate DSP-TV in my teaching: Some (12/52) teachers (6 SIP and 6 SNP) strongly agreed and several (26/52) teachers (12 SIP and 14 SNP) agreed that they are able to design and plan how to integrate DSP-TV in their teaching. Several (12/52) teachers (6 SIP and 6 SNP) disagreed with the statement. A few (2/52) teachers (1 SIP and 1 SNP) did not respond to this question.

I can decide how to teach with the DSP-TV: Some (16/52) teachers (8 SIP and 8 SNP) strongly agreed and many (33/52) (16 SIP and 17 SNP) agreed that they were able to decide how to teach with the DSP-TV. A few (2/52) teachers (1 SIP and 1 SNP) disagreed with the statement. A few (1/52) teachers (1 SNP) did not respond to the question.

I can decide when to use DSP-TV in my lesson: Some (20/52) teachers (10 SIP and 10 SNP) strongly agreed and many (31/52) teachers (15 SIP and 16 SNP) agreed that they were able to decide when to use the DSP-TV in their lesson. A few (1/52) teachers (1 SNP) did not respond to the question.

I develop my own lesson plans to teach using the DSP-TV: A few (6/52) teachers (3 SIP and 3 SNP) strongly agreed and many (31/52) teachers (15 SIP and 16 SNP) agreed that they develop their own lesson plans to teach using the DSP-TV. A few (1/52) teachers (1 SNP) were undecided and some (14/52) teachers (7 SIP and 7 SNP) disagreed that they developed their own lesson plans to teach using the DSP-TV.

Though in the Teacher Engagement Survey teachers reported that they design lesson plans to teach using the DSP-TV, and are able to decide how and when to integrate DSP-TV in their teaching practices, the interview data indicates that the majority of teachers did not create any lesson plans to teach with DSP-TV.

iv. Method of Teaching Using DSP-TV

Method of Teaching as Reported by Teachers During Teacher Interview: During the interview, teachers were also asked to describe their teaching method when they are teaching a topic using DSP-TV. The question was asked to understand how they integrate DSP-TV in their classroom teaching methods. 62 responses were given by 50 teachers in the interview. Here the unit of analysis is chosen to be total responses instead of total teachers as diverse and multiple different answers were given to the same question by the teachers.

- **SIP:** The method of teaching using DSP-TV was varied as reported by the teachers and it is not confined to only lectures. A total of 34 responses were recorded from 28 teachers. Some (10/34) responses said that teachers prefer to play TicTac Learn content, pause the video in between to explain the topic or question of students and then again continue with the video.

Lecture method was also reported in some (9/34) responses. As shared by a teacher about her class using DSP-TV, *"First we try to explain the concept at our own level then we show them through the TV. If they do not understand something that we have taught them, they understand it by watching the video."*

A few (4/34) responses stated that the teacher uses collaborative exercises, a few (4/34) responses reported that the teacher uses problem-based learning and a few (3/34) responses also stated that the teacher uses project-based learning to teach with DSP-TV. As shared by a teacher, *"First lecture then project based e.g. for topics such as, fraction, ratios etc. We show visual examples to students to make projects using basic and natural material. Students ask on their own to play videos of specific topics. They also ask for a remote. 6-8 students are elders so they don't watch cartoons. I take feedback. I ask other subject teachers to teach a topic from DSP-TV from my subject to explain (in my absence). If the teacher is unable to explain then students discuss among themselves."*

In a few (2/34) responses, the teacher shared that they prefer to teach through DSP-TV, explain the topic and then give them questions to solve. While explaining the process, one teacher mentioned, *"I have taken a period. I informed them which chapter and which topic I have taken. E.g. I selected the topic of water pollution, so, after explaining it to the students, I showed the videos to the students. I showed them all the parts of the video (2,3,4 parts) and after that, I asked them what they understood and then I went ahead with questions and answers."*

One response (1/34) also reported to use the blackboard/whiteboard to explain the topic to students. As shared by the teacher, *"If students are unable to understand, I use chalk and board methods."* As explained by another teacher, *"...first, we discuss the topic and then we use TV. They watch the content. We question them in between by pausing the video. Then again, we discuss if required on black board and we give exercises as well. It helps the students to understand the topic in a better way."*

One response (1/34) was recorded where the teacher mentioned that she uses the DSP-TV to revise content, *"We use the DSP-TV for revision with the students. We don't use it in every lesson. We teach the students to make them understand the basics. Our students have a very different mindset and they are far behind in terms of learning. We teach them using the traditional method of teaching on the blackboard. We use the DSP-TV for revision. If I am not in class then it works as substitution. The students themselves use the DSP-TV. All the students in the class use the DSP-TV. The smart students use the DSP-TV to help other students."*

- **SNP:** The teachers interviewed at the SNP schools also reported using various methods in their class using DSP-TV other than lecture methods. A total of 28 responses were recorded from 22 teachers in the SNP schools.

  Some (7/28) responses stated that they use lecture methods during their teaching using DSP-TV. A few (5/28) responses were recorded where the teachers have mentioned using discussion as one of the methods to teach using DSP-TV class. As shared by a teacher, "*We do lectures using blackboards. Then connect it with DSP-TV videos."*

  In a few (4/28) responses, the teacher explained that they show the content, explain on the blackboard if required and call students to solve some problems on the board or in the notebook, *"They do make the child ask questions, so that the child can solve them on their own. I have to make them do problems on the board, and I also have to check everyone's work like it is explained on TV, but the videos keep explaining continuously. Some children are able to take notes, while others can't, so then I have to tell them."*

A few (3/28) responses also stated that they first show the video and then explain the topic from the textbook. As shared by a teacher, *"We use TV and blackboard both. First, we played on the TV. If students want some understanding in some terminology such as 'Force', we explain on blackboard. In Science, we explain definitions to students."*

A few (3/28) responses reported that they first explain the topic to students and then play the video. As shared by a teacher, *"I never used TV in the first place. First, I explained the topic to them in class. I try to connect their previous knowledge with present learning, and when I understand that their basic concept is clear then, I show them the TV. Then the use of TV is useful. It creates interest, and they understand the topic language which enhances the learning process. TV cannot be the main learning instrument but it can be an associated instrument."*

A few (2/28) responses were recorded where teachers mentioned that during the class, they like to pause the video to interact with students. A few (2/28) responses mentioned that the teacher uses the videos for revision of the topic. As shared by the teacher, *"Students do revisions by watching TV. But it is easy to teach students by using TV as we only need to pause and restart as our class needs."*

In one (1/28) of the responses, the teacher also mentioned using project-based learning in the classroom teaching. As shared, *"Sometimes we give projects to the students. Students show interest in project-making as they practically do the projects."* In one response (1/28) the teacher explained that she prefers to show the video first and then clear students' doubts regarding the topic. As shared by the teacher, *"First, we show the content, then we address their doubts. We also use the blackboard. As I mentioned before, the videos provide direct answers which the students often don't understand, so we need to explain further."*

v. Classroom Practices as Reported by Teachers in the Teacher Engagement Survey

The following analysis is based on the teachers' responses regarding the classroom practices of teachers as reported in the Teacher Engagement Survey.

The survey questions under this theme were administered on a 5 point Likert scale as given below:

1. strongly disagree
2. disagree
3. undecided
4. agree
5. strongly agree

The teachers were asked to select their preferred responses on the scale as per their belief.

I ask more questions while teaching in a DSP-TV-enabled class: A few (5/52) teachers (4 SIP and 1 SNP) teachers strongly agreed and many (32/52) teachers (13 SIP and 19 SNP) agreed that they tend to ask more questions while teaching in a DSP-TV enabled class. A few (1/52) teachers (1 SNP) were undecided while some (10/52) teachers (4 SIP and 6 SNP) disagreed that they tend to ask more questions while teaching in a DSP-TV enabled class. A few (4/52) teachers (4 SIP) did not respond to the question.

I run the DSP-TV content forward and backwards several times while teaching: Some (17/52) teachers (7 SIP and 10 SNP) strongly agreed and many (32/52) teachers (16 SIP and 16 SNP) agreed that they run the DSP-TV content forward and backward several times while teaching. A few (3/52) teachers (2 SIP and 1 SNP) disagreed that they run the DSP-TV content forward and backward several times while teaching.

I collect content from other sources (like YouTube) and run it on the DSP-TV: Some (14/52) teachers (6 SIP and 8 SNP) strongly agreed and many

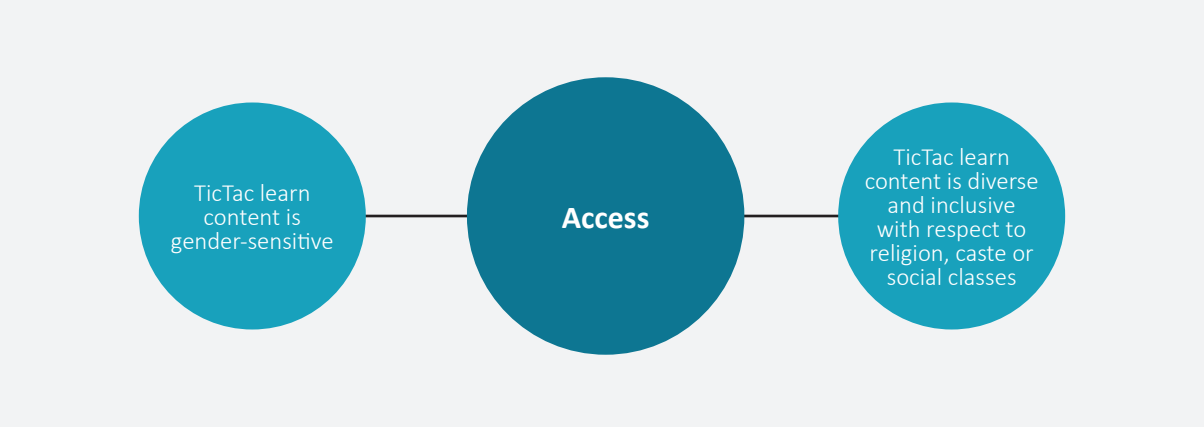
(33/52) teachers (11 SIP and 12 SNP) agreed that they collect content from other sources like YouTube and run it on the DSP-TV. Some (14/52) teachers (7 SIP and 7 SNP) disagreed that they collect content from other sources like YouTube and run it on the DSP-TV. A few (1/52) teachers (1 SIP) did not respond to the question.

I can build discussions with students in DSP-TV-enabled classrooms: Some (15/52) teachers (9 SIP and 6 SNP) strongly agreed and many (32/52) teachers (15 SIP and 17 SNP) agreed that they are able to build discussions with students in the DSP-TV enabled classes. A few (4/52) teachers (1 SIP and 3 SNP) disagreed that they were able to build discussions with students in the DSP-TV enabled classes. A few (1/52) teachers (1 SNP) did not respond.

I try different ways to make students actively participate in the DSP-TV-enabled sessions: Some (15/52) teachers (8 SIP and 7 SNP) strongly agreed and many (34/52) teachers (16 SIP and 18 SNP) agreed that they try different ways to make students actively participate in the DSP-TV enabled sessions. A few (2/52) teachers (2 SNP) disagreed that they try different ways to make students actively participate in the DSP-TV enabled sessions. A few (1/52) teachers (1 SIP) did not respond to this question.

4.3.6.5 Access

Figure 4.3.10: Findings from Teacher Interviews - Access



i. Summary of Findings from Teacher Interview-Access

The findings from the teacher interviews regarding access to DSP-TV content indicated that the TicTac Learn content used was reported to be gender-sensitive, ensuring that it considered the representation and engagement of both male and female students. Additionally, the content was also reported for being diverse and inclusive, addressing various aspects such as religion, caste, and social classes, making it relevant and accessible to students from different backgrounds.

ii. Created or Customized Content in the Subject Area to Use on the DSP-TV

Most (33/50) teachers (20 SIP and 13 SNP) have reported that they have not created any content in their subject area. A few (7/50) teachers (5 SIP and 2 SNP) have said that they have created content in their subject area to be used on DSP-TV. Some (10/50) teachers did not respond to the question.

- **SIP:** Of the 28 teachers, many (20/28) teachers reported that they have not created or customized any content. As shared by a teacher, *"I have made a PPT to explain (some topics) to*

students." Another teacher mentioned, "I have not done it in general. However, personally, I created my own videos, small ones. During the Covid period, we couldn't teach students in person, so I made short videos and shared them in the group. But it's been closed for a while now because students are back in school."

Some (5/28) teachers reported that they have created content for online teaching but not specific to TicTac Learn content. A few (3/28) teachers have not responded to the question.

- **SNP:** Of the 22 teachers, several (13/22) teachers reported that they have not created or customized any content for using on DSP-TV. As shared by a teacher, *"Yes, many times. In the chemistry lab too I use videos for the explanation."*

  However, a few (2/22) teachers reported that they have created content. Some (7/22) teachers did not respond to the question.

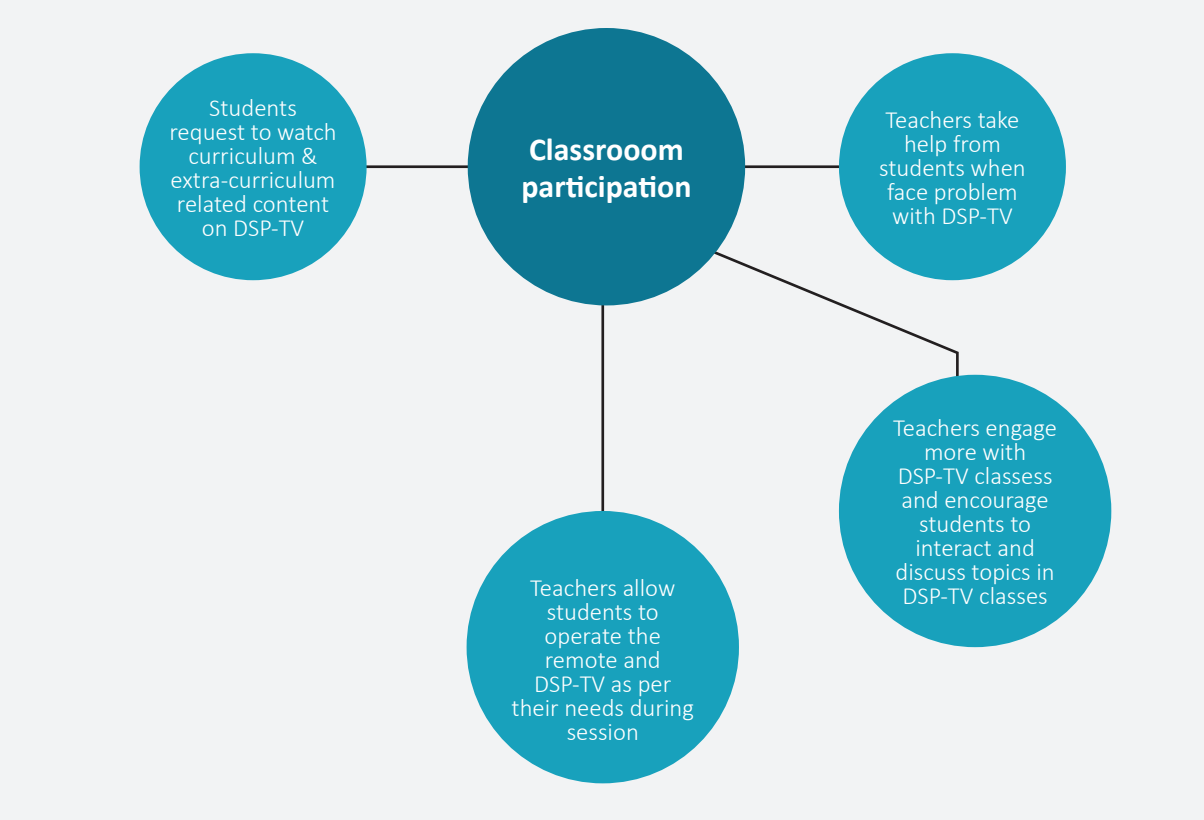
iii. Sensitivity of the DSP-TV Content

- ***Sensitivity of the TicTac Learn Video Towards Gender:*** Of the 50 teachers (28 SIP and 22 SNP) interviewed, many (32/50) teachers (19 SIP and 13 SNP) stated that TicTac Learn content is gender-sensitive. A few (4/50) teachers (2 SIP and 2 SNP) reported not having observed the content in this respect, while some (14/50) teachers (7 SIP and 7 SNP) did not respond to the question.

- ***Sensitivity of the TicTac Learn Videos Towards Religion, Caste or Social Classes:*** Of the 50 teachers (28 SIP and 22 SNP) interviewed, several (29/50) teachers (19 SIP and 10 SNP) stated that the TicTac Learn content is diverse and inclusive with respect to religion, caste, or social classes. A few (4/50) teachers (2 SIP and 2 SNP) reported not having observed the content in this regard, while some (17/50) teachers (7 SIP and 10 SNP) did not respond to the question.

4.3.6.6 Classroom Participation

Figure 4.3.11: Findings from Teacher Interviews - Classroom Participation



i. Summary of Findings from Teacher Interview- Classroom Participation

The findings from teacher interviews about classroom participation highlighted several key observations. Students frequently asked to use DSP-TV in class to view both curriculum-related and extracurricular content. Teachers allowed students to handle the remote and operate DSP-TV according to their needs during lessons. Furthermore, teachers became more involved in DSP-TV sessions, promoting student interaction and discussions on the presented topics. When teachers faced challenges with DSP-TV, they sought help from students, encouraging a collaborative approach in managing the technology within the classroom.

ii. Classroom Participation of Students in the DSP-TV Class as Reported by Teachers During Teacher Interview

Teachers were asked a series of questions regarding their observations on gender-wise student engagement with DSP-TV learning, student eagerness for DSP classes, and the types of content students prefer to watch on DSP-TV. These questions aimed to explore how DSP-TV influences classroom participation and student engagement across different demographics and interests.

- **Students' Eagerness for DSP-TV Classes**

Many (37/50) teachers (24 SIP and 13 SNP) have said that the students request for the DSP class. A few (4/50) teachers (4 SNP) have indicated that students do not request DSP classes. Some (9/50) teachers (4 SIP and 5 SNP) have not responded to the question.

- **SIP:** Of the 28 SIP school teachers, most (24/28) teachers reported that the students request teachers to teach with DSP-TV. As shared by a teacher, *"Everytime. Now the smart TV class engagement becomes a part of their routine.They need smart class room at least once a day. They request to see movies."* As shared by another teacher, *"They demand every day to have class on TV. They love to learn on TV. But as a government school, we have some set procedures/activities. So we can not take classes on TV every day."* A few (4/28) have not responded to this question.
- **SNP:** Of the 22 teachers, several (13/22) teachers reported that the students request teachers to teach with DSP-TV. Some (4/22) teachers mentioned that the students do not request the use of DSP-TV. One of the teachers said that *"No they never do. I always initiate. They like it when the person in front is interacting with them. In the videos, the answer is provided in the video once the timer goes off after the question is asked, so they don't enjoy that."* Some (5/22) teachers have not responded to this question.

The 37 teachers (24 SIP and 13 SNP) who mentioned that students request teachers to teach using DSP-TV, most teachers are from schools situated in rural areas (22 rural, 5 semi-urban and 10 urban). Teachers (4 SNP) who reported that students do not request to teach with DSP-TV are from schools situated in urban areas.

- **Gender-wise Student Engagement with DSP-TV**

Of the 50 interviews, 38 teachers (17 SIP and 21 SNP) were from co-ed schools, 8 teachers were from girls' school (7 SIP and 1 SNP) and 4 teachers (4 SIP) were from boys' school.

Among the 38 teachers from co-ed schools, several (20/38) teachers (7 SIP and 13 SNP) have said that there is no difference in engagement with DSP-TV learning based on gender among students. A few (4/38) teachers (2 SIP and 2 SNP) have said that girls engage more than boys. A few (2/38) teachers (2 SIP) have said that boys are more engaged than girls. Some (12/38) teachers did not respond to the question.

- **SIP:** Out of the 28 SIP school teachers interviewed, 17 teachers are from co-ed schools, 7 teachers are from girls' school and 4 teachers are from boys' school. Several (7/17) teachers mentioned that they found no difference in engagement with DSP-TV learning based on gender among students.

A few (2/17) teachers mentioned that girls engage more than boys in DSP classrooms. As shared by a teacher, *"Girls are very much interested in the class. Boys are more likely to keep having fun in class."* A few (2/17) teachers mentioned that the boys are more interested in the DSP-TV classes. Cases where boys were found more interested in the class, the teachers also mentioned that the girls are observed to be less interested because the ratio of boys are more in the class.
As shared by a teacher, *"In terms of navigating the DSP-TV, boys usually are active. It's not that the girls do not know how to do it, but boys do it more."* Some (6/17) teachers have not responded to this question.

- **SNP:** Out of 22 interviews, 21 teachers are from co-ed schools and one teacher is from a girls' school.

- Of these 21 teachers, many (*13/21)* teachers found no difference in engagement with DSP-TV learning based on gender among students. A few (2/21) teachers have said that girls engage more than boys and that is why their engagement is more in the DSP-TV classrooms. Some (6/21) teachers did not respond to the question.

- **Students' Preference of Content for DSP-TV**

Several (29/50) teachers (20 SIP and 9 SNP) reported that students request for curriculum related video content on DSP-TV. Some (10/50) teachers (4 SIP and 6 SNP) reported that students request to watch content related to extracurricular activities. A few (6/50) teachers (3 SIP and 3 SNP) mentioned that the students request to watch content related co-curricular activities. A few (5/50) teachers (1 SIP and 4 SNP) did not respond to the question.

- **SIP:** Many (20/28) teachers mentioned that students request to watch curriculum related videos. A teacher shared that "*for particular topics students request us to teach using TV like tissue cells."* A few (3/28) teachers stated that students request for other co-curricular videos on DSP-TV. As shared by a teacher, *"We watch many things on DSP-TV. We show 'Man ki Baat' and also demonstrate safety activities for students. For instance, we teach them how to protect themselves if they're alone and lost, and how to find their way. Sometimes we also talk about self-protection. Students are also taught about traffic rules through videos.The activities that come to us on paper, we show those on videos as well."* A few (4/28) teachers stated that students request for other extra-curricular videos on DSP-TV. One teacher (1/28) did not respond.

- **SNP:** Several (9/22) teachers mentioned that the students requested curricular contents. For example, a teacher mentioned that the students request to teach using DSP-TV in certain topics such as tissue cells. Some (6/22) teachers also mentioned that the students request for extracurricular topics such as music, dance etc. As shared by a teacher, *"If they have to practice cultural songs, they show it to them for practice."* A few (3/22) teachers also reported that students ask for co-curricular topics. Some (4/22) teachers did not respond to the question.

- **Address the Diverse Learning Needs of Students Using DSP-TV**

Teachers were also asked how DSP-TV helps cater to the different learning needs of students. This question aimed to understand the diverse ways teachers use DSP-TV for student learning. Of the 50 teachers (28 SIP and 22 SNP), several (29/50) teachers (17 SIP and 12 SNP) explained how they use DSP-TV to cater to the different needs of students. Several (21/50) teachers (11 SIP and 10 SNP) did not respond to the question.

- **SIP:** Of the 28 teachers, many (17/28) teachers reported various ways in which they use the DSP-TV to cater to the diverse learning needs of students. There was no response from some (11/28) teachers.

  Of the 17 teachers who responded also explained further about how DSP-TV caters to the diverse learning needs of students. Some (6/17) teachers mentioned that when they

play the content of the videos, they pause in between and ask them questions to clear their doubts. As shared by a teacher, *"We are not totally depending on this. First we teach them in the classroom then we show them the content through the DSP-TV. The content videos are good that the students are getting it easily by seeing the videos. Another thing is the content videos are short which keeps the students engaged. If some children do not understand something in between then we pause the video and show it again and explain it."*

Some (3/17) teachers mentioned that they follow the pace of the students so that they understand better. As shared by a teacher, *"Students who are weak in the class, we separately focus on them and also we slow down our lecture."* Some (3/17) teachers reported that they try to provide individual attention to the students by clearing their doubts, guiding them personally.

A few (2/17) teachers also mentioned that they use blackboard to explain the topic further if students are unable to understand the explanation on DSP-TV. As shared by the teacher, *"We use blackboard for explaining to those who could not understand on TV."* A few (2/17) teachers explained how DSP-TV engages students to focus. As shared, *"TV helps because the students are more interested in watching the videos. If you ask them a story, they will immediately tell you, but if you teach the lesson in the class, they don't pay attention to it and start talking amongst themselves."*

One teacher (1/17) shared how TicTac Learn videos cater to the needs of the weaker students, *"The students who are very good can grasp the concept even without using Muskaan Dreams. But in the government schools, the average students are higher than good students, so it is easier for them to grasp the concept through the videos."* Some (11/28) teachers did not respond to this question.

- **SNP:** Of the 22 teachers, several (12/22) teachers reported various ways in which they use the DSP-TV to cater to the diverse learning needs of students. There was no response from several (11/22) teachers.

  Of the 12 teachers who responded also explained further about how DSP-TV caters to the diverse learning needs of students. Some (4/12) teachers mentioned that they spend extra time for students. As shared by a teacher, *"We take separate part-time classes and make them understand the topic in a better manner so that they can understand the topic."*

  Some (3/12) teachers mentioned that they repeat and explain the topics and ask questions to make students understand better. As shared by the teacher, *"I always repeat and re-explain the contents along with that I ask questions to the students too."* Some teachers (3/12) mentioned that they explain concepts to students in their native language to enhance understanding. One teacher (1/12) highlighted the use of video playback, stating that they rewind videos and re-explain the content for clarity.

  As shared by a teacher, a Math and Science teacher said *"Both types of students are there. It is not restricted to digital or conventional. So, we need to take care of both types of students. Even those students who are not able to write or learn properly they understand through Digital TV. This is a very good advantage of using TV. Sometimes students in classes 6-7 from other schools cannot write their own names. We cannot deny their admission. We need to take their admission and then teach them how to write. TV is very good for slow learner students."*

  One teacher (1/12) mentioned adjusting the pace of teaching by slowing down to better suit the students' learning needs, *"We go slow with the class so that they can learn."* Several (10/22) teachers did not respond to the question.

iii. Classroom Participation of Students in the DSP-TV Class as Reported by Teachers in the Teacher Engagement Survey

The following analysis is based on the teachers' responses regarding the effectiveness of DSP-TV as reported in the Teacher Engagement Survey.

The survey questions under this theme were administered on a 5-point Likert scale as given below:

1. strongly disagree
2. disagree
3. undecided
4. agree
5. strongly agree

The teachers were asked to select their preferred responses on the scale as per their belief.

I find it easier to gauge if the students have understood what has been taught when using DSP-TV: Some (8/52) teachers (4 SIP and 4 SNP) teachers strongly agreed and several (21/52) teachers (7 SIP and 14 SNP) agreed that they found it easier to gauge if the students have understood what has been taught when using the DSP-TV. A few (2/52) teachers (2 SNP) were undecided while several (18/52) teachers (11 SIP and 7 SNP) disagreed and a few (1/52) teachers strongly disagreed that they found it easier to gauge if the students have understood what has been taught when using the DSP-TV. A few (2/52) teachers (2 SIP) did not respond to this question.

I take the help of students when I face problems with the DSP-TV: Some (9/52) teachers (3 SIP and 6 SNP) strongly agreed and several (30/52) teachers (14 SIP and 16 SNP) agreed that they take help from their students when the face problems with the DSP-TV. Some (10/52) teachers (6 SIP and 4 SNP) disagreed and a few (1/52) teachers (1 SNP) strongly disagreed that they take help from their students when they face problems with the DSP-TV.

I allow students to operate the remote and TV as per their needs during sessions: A few (7/52) (3 SIP and 4 SNP) teachers strongly agreed and many (35/52) teachers (16 SIP and 19 SNP) agreed that they allow their students to operate the remote and TV as per their needs during the session. Some (10/52) teachers (6 SIP and 4 SNP) disagreed that they allowed their students to operate the remote and TV as per their needs during the session.

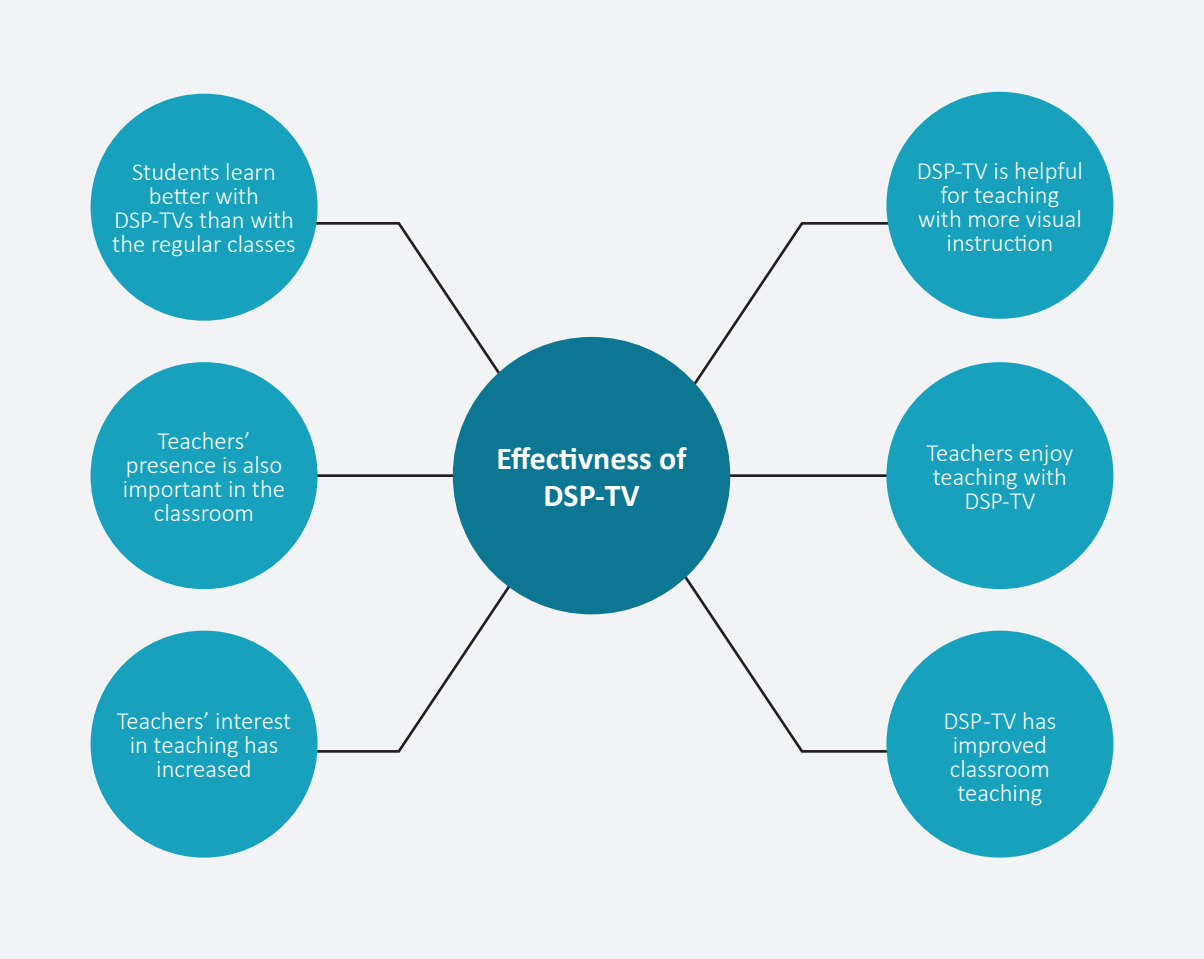
I encourage students to interact among themselves and discuss topics during DSP-TV-enabled class: Some (17/52) teachers (7 SIP and 10 SNP) strongly agreed and several (27/52) teachers (14 SIP and 13 SNP) agreed that they encouraged students to interact among themselves and discuss topics during DSP-TV class. A few (2/52) teachers (2 SNP) were undecided while a few (6/52) teachers (4 SIP and 2 SNP) disagreed that they encouraged students to interact among themselves and discuss topics during DSP-TV class.

I engage more with students in DSP-TV Class: Some (8/52) teachers (3 SIP and 5 SNP) strongly agreed and several (27/52) teachers (10 SIP and 17 SNP) agreed that they engage more with students in the DSP-TV class. While some (14/52) teachers (11 SIP and 3 SNP) disagreed and a few (2/52) teachers (1 SIP and 1 SNP) strongly disagreed that they engage more with students in the DSP TV class. A few (1/52) teachers (1 SNP) did not respond to the question.

I am aware of their students' feelings during DSP-TV enabled classes: Some (12/52) teachers (6 SIP and 6 SNP) teachers strongly agreed and many (36/52) teachers (19 SIP and 17 SNP) agreed that they were aware of their students' feelings during the DSP-TV enabled class. While a few (3/52) teachers (3 SNP) disagreed.

4.3.6.7 Value Benefit

Figure 4.3.12: Findings from Teacher Interviews - Value-Benefit



i. Summary of Findings from Teacher Interview -Value Benefit

The findings from teacher interviews on the effectiveness of DSP-TV indicated that teachers observed students learning more effectively with DSP-TV compared to traditional classes. DSP-TV was particularly beneficial for incorporating visual instruction, thereby enhancing the teaching process. Teachers reported enjoying teaching with DSP-TV and noted an improvement in classroom instruction with its integration. Additionally, they mentioned that their interest in teaching had grown as a result of using DSP-TV. While DSP-TV was reported to be effective in classroom teaching, teachers emphasized the importance of their presence in guiding the learning process effectively.

ii. Effectiveness of DSP-TV as Reported by Teachers during Teacher Interview

Teachers were asked to share their perceptions and beliefs regarding the overall integration of DSP-TV in classroom settings. These questions aimed to understand how DSP-TV benefits teaching practices, including its effectiveness in enhancing student learning, observed changes in student achievement, engagement, and attendance, and teachers' perceptions of DSP-TV videos.

- **Effectiveness of DSP-TV in Enhancing Student Learning**

Several (23/50) teachers (11 SIP and 12 SNP) have stated that their students learn better with DSP-TV. Some (12/50) teachers (11 SIP and 1 SNP) have expressed that the presence of teachers is

important for students. A few (2/50) teachers (2 SNP) have mentioned that the students do not learn better in DSP-TV class than in regular class. One teacher (1/50) stated that students learn in both classes and it is not possible to identify which one is more effective. Some (12/50) teachers (6 SIP and 6 SNP) did not respond to the question.

- **SIP:** Of the 28 teachers, some (11/28) teachers reported that students learn better with DSP-TVs than with the regular classes. As shared by a teacher, *"When we teach them using blackboard, we just write the points and students copy it which might not clear the students' ideas. When we use TV they visualize it with full concentration, at the same time they listen to the topics and write the information. Students understand and remember better than blackboard. They feel the topic is interesting on TV rather than blackboard."*

  Another teacher shared that students learn better with DSP-TV because there are multiple examples in the content which explains the topic in better ways. As shared by the teacher, *"It creates better learning. Sometimes we can explain some topics by using some materials. But the materials may not be with us all the time. Through the presentation students learn faster."*

  Some (11/28) teachers reported that presence of the teacher is important with the DSP-TV and playing the DSP-TV content solely may not be effective. As shared by a teacher, *"There is certainly an audio-visual impact. It should happen from time to time. I think it's a recreation for the brain and students get freedom from boring lectures. But, when teachers explain it to them, students understand better. If we think that we should just run the video and leave, then it won't happen. Until you explain the video, students won't understand the content. Then, they just listen to it lazily. So, I think, it's important that teachers explain the content to students."*

  Another teacher shared the view that, in their opinion, students do not learn better with DSP-TV though it helps in understanding the content. There was no response from a few (6/28) teachers for this question.

  Further analysis indicates that teachers from rural schools reported DSP-TV to be effective in enhancing students' learning.

- **SNP:** Several (12/22) teachers have said that the students learn better in DSP classes. The teacher cited various explanations such as clear understanding, visual images with examples, and use of easy language that engages students and increases the interest of the students in the class. A teacher explained, *"As I said, it is easy to understand for students. It is interactive. Contents are also at the students' understanding level. It does not start at a very high level. It's like TV is talking with students. It is so user-friendly. They feel that they are watching a story or movie."*

  As shared by a Science teacher, *"Some of the benefits are like it increases the interest as well as the confidence between the teachers. In blackboard teaching some of the backbencher students don't get to understand but in DSP-TV enabled teaching they are also understanding the topic. Students are understanding in a much better way because of the images and they are seeing the practical videos."*

  A Math teacher said, *"It creates better learning. Sometimes we can explain some topics by using some materials. But all the time, materials are not with us. But in TV presentations with materials are there. Through that presentation, students learn faster."*

  The other teacher mentioned, *"It creates interest among students in learning as it is explained through videos and they can visualize it which helps them to remember. We play videos on certain topics followed by lectures to explain the topic in depth. Sometimes we use blackboard to write notes."*

A few (2/22) teachers have reported that the students do not learn better in DSP class than in regular class as not all students are able to grasp the content and thus few are left out. Another teacher posed a question saying *"Can a student ask a question on TV? Can a student clear doubts on TV? No, and for that reason regular class is better."*

One (1/22) teacher has mentioned that the students learn in both classes and it is not possible to identify whether the students learn in DSP-TV class than in regular class. The teacher has not responded to the question of the reason behind this response.

One (1/22) teacher reported that it depends upon the teacher's ability to facilitate the DSP class. The teacher further said, "No, that's not true. It depends on the teacher's teaching skills. Sometimes teachers make easy topics difficult to understand for students and sometimes teachers make tough topics easy to understand for students. Nowadays most of the students are tech-friendly and spend a lot of time with mobile phones. So colorful graphical animated contents on TV attract them more to study. It gives them a familiar background.

We cannot simply start class by starting TV. We need to make them understand the traditional teaching process then we take the help of the TV for further explanations, and examples. We took two classes on a topic after that we took the students to the smart class and there, we discussed the topic s*howing the videos."* Some (6/22) teachers did not respond to the question.

iii. Effectiveness of DSP-TV in Enhancing Student Learning as Reported by Teachers in the Teacher Engagement Survey

The following analysis is based on the teachers' responses regarding the effectiveness of DSP-TV as reported in the Teacher Engagement Survey.

The survey questions under this theme were administered on a 5 point Likert scale as given below:

1. strongly disagree
2. disagree
3. undecided
4. agree
5. strongly agree

The teachers were asked to select their preferred responses on the scale as per their belief.

DSP-TV has improved classroom teaching: Some (10/52) teachers (7 SIP and 3 SNP) have strongly agreed that DSP-TV has improved their teaching and many (37/52) teachers (15 SIP and 22 SNP) have agreed that DSP-TV has improved their teaching. A few (3/52) teachers (1 SIP and 2 SNP) were undecided on the impact of DSP-TV on their classroom teaching. A few (2/52) teachers (2 SIP) strongly disagreed that the DSP-TV had improved their teaching.

DSP-TV is helpful for teaching with more visual instruction: Some (15/52) (8 SIP and 7 SNP) teachers strongly agreed that DSP-TV is helpful for teaching due to the availability of more visual instruction and many (35/52) (16 SIP and 19 SNP) teachers agreed that DSP-TV is helpful for teaching due to the availability of more visual instruction. A few (1/52) (1 SNP) disagreed and a few (1/52) (1 SIP) strongly disagreed that DSP-TV is helpful for teaching due to the availability of more visual instruction.

I pay more attention to teaching while using DSP in teaching: Some (13/52) (6 SIP and 7 SNP) teachers strongly agreed that they pay more attention to teaching while using the DSP-TV and many (33/52) (15 SIP and 18 SNP) teachers agreed that they pay more attention to teaching while using the DSP-TV. A few (2/52) (1 SIP) teachers were undecided on whether they paid more attention to teaching while using the DSP-TV. A few (2/52) (1 SIP and 1 SNP) teachers disagree and a few (2/52) (2 SIP) strongly disagree that they pay more attention to teaching while using the DSP-TV.

I enjoy teaching using the DSP-TV: Some (16/52) (5 SIP and 11 SNP) teachers strongly agreed

and many (33/52) teachers (20 SIP and 13 SNP) agreed that they enjoyed teaching with the DSP-TV. A few (3/52) teachers (3 SNP) disagreed that they enjoyed teaching with the DSP-TV. A few (1/52) teachers (1 SIP) did not respond to the question.

I would like to have all classrooms equipped with DSP-TV: Several (26/52) teachers (13 SIP and 13 SNP) strongly agreed and several (21/52) teachers (12 SIP and 9 SNP) agreed that they would like all classrooms to be equipped with the DSP-TV. A few (5/52) teachers (5 SNP) disagreed that they would like all classrooms to be equipped with the DSP-TV.

I eagerly wait for the next DSP-enabled class: Some (14/52) (7 SIP and 7 SNP) teachers strongly agreed and several (30/52) (16 SIP and 14 SNP) agreed that they eagerly waited for the next day's DSP-TV class. A few (6/52) (2 SIP and 4 SNP) teachers disagreed and a few (1/52) (1 SNP) strongly disagreed that they eagerly waited for the next day's DSP-TV class. A few (2/52) (1 SIP and 1 SNP) teachers did not respond to this question.

My interest in teaching has increased after the introduction of DSP-TV: Some (14/52) teachers (7 SIP and 7 SNP) strongly agreed and several (25/52) teachers (10 SIP and 15 SNP) agreed that their interest in teaching has increased after the introduction of DSP-TV at their schools. While some (11/52) teachers (7 SIP and 4 SNP) disagreed and a few (2/52) teachers (1 SIP and 1 SNP) strongly disagreed that their interest in teaching has increased after the introduction of DSP-TV at their schools.

I feel excited when students interact with the DSP-TV: A few (5/52) (4 SIP and 1 SNP) teachers strongly agreed and many (32/52) (13 SIP and 19 SNP) teachers agreed that they felt excited when their students interacted with the DSP-TV. Some (10/52) (4 SIP and 6 SNP) teachers disagreed that they felt excited when their students interacted with the DSP-TV. A few (5/52) (5 SIP) did not respond to the question.

Findings from both TES and interviews indicate that teachers find DSP-TV useful because it has more visual instructions. However, though a lot of teachers mentioned in the TES for the requirement for DSP-TV in every classroom, the interviews did not indicate the same. Only a few teachers suggested the requirement for DSP-TV in every classroom.

iv. Changes Observed in Students' Learning Achievement, Engagement and Attendance

Of the 50 teachers (28 SIP and 22 SNP), several (29/50) teachers (17 SIP and 12 SNP) stated that they have observed positive changes in students after the integration of DSP-TV in classroom teaching. A few (6/50) teachers (2 SIP and 4 SNP) mentioned that they have not observed any changes in students. One teacher (1 SIP) stated that it is too early to observe changes because the DSP-TV was installed recently. Some (14/50) teachers (8 SIP and 6 SNP) did not respond to the question.

- **SIP:** Of the 28 teachers, many (17/28) teachers mentioned that they have observed positive changes in students after the integration of DSP-TV in teaching. A few (2/28) teachers mentioned that they have not observed any changes in students. A teacher (1/28) reported that it is too early to observe changes as the school had DSP-TV installed eight months back. Some (8/28) teachers did not respond to the question.

  Of those 17 teachers, who stated to have observed changes in students, several (9/17) teachers reported that there is an increased interest in students after the teacher started teaching with DSP-TV. As shared by a teacher, *"Students changed a lot. They remember it quickly. They learn the topic in a better way. They can answer properly."* Another teacher shared that *"the students have started asking questions after the DSP-TV was introduced."*

  Some (3/17) teachers reported that they have observed improvement in students' grades and some (3/17) teachers also mentioned that the students' attendance is more when they teach using DSP-TV.

One teacher (1/17) mentioned a positive change after integrating DSP-TV in teaching for students who are already 'good' at studies. They said *"We observed changes in some students. Students who are good in studies improve after they see the videos. But those who don't know how to read, they just look at the video and leave it. They are not able to absorb more than that."*

One teacher (1/17) mentioned curiosity as a positive change in students after integrating DSP-TV in teaching. They said *"The student's curiosity has increased when they are watching it compared to when they were not."*

- **SNP:** Several (12/22) teachers have said that they have observed positive changes in students' engagement, attendance and learning achievement level. Some (4/22) teachers have said that they have not observed any changes in student achievement after the use of DSP-TV in classrooms. Some (6/22) teachers did not respond to the question.

  Some (3/12) teachers only stated to have observed changes but, most (9/12) of the teachers who reported to have observed changes in students explained the changes observed. Several (6/12) teachers mentioned that there is an increased interest in students after the teacher started teaching with DSP-TV. As shared by a teacher, *"Students changed a lot. They remember it quickly. They learn the topic in a better way. They can answer properly."* Another teacher shared that *"the students have started asking questions after the DSP-TV was introduced."*

  One teacher (1/12) reported that they have observed improvement in students' grades and one (1/12) teacher also mentioned that the student enrollment has increased. One (1/12) teacher mentioned that changes have been observed and *"Students are learning the usages of advanced technology."*

v. Teacher Perception on DSP-TV Videos

Of the 50 teachers (28 SIP and 22 SNP), several (25/50) teachers (13 SIP and 12 SNP) have reported that the content was not sufficient to teach. Some (13/50) teachers (10 SIP, and 3 SNP) have said that the content was sufficient to teach. Some (12/50) teachers (5 SIP and 7 SNP) did not respond to the question.

A teacher who teaches Math and Science in SNP school explained, *"At the time of teaching, we have to think of the related videos so the rhythm of teaching is affected. As we have to use both traditional and TV it takes some additional time (switch on – off karna parte hai). So we need to put in extra effort. But it attracts students and helps them to learn faster. 3D videos are attractive. Diagrams help in the teaching-learning process, but the teaching plan gets disturbed (barbar mute karne se). We have to follow the book and there are exercises so I use it after I explain the topic. It is good for revision work. The contents of the videos are not based on the school syllabus sequence keeping in mind the learning outcome."*

- **SIP:** Of the 28 SIP school teachers, several (13/28) teachers mentioned that it is not sufficient to teach a lesson or topic using only Science or Math content on DSP-TV. As shared by a teacher, *"I find some topics are not there. I took help from YouTube. Like the process of 'Salt Preparation'. It was not clear in the content. So I took help from YouTube."* Another teacher shared that, *"It is sufficient for a good student. But for the students who are a little weak, it is difficult to understand it properly. For example, the TV is showing the symbol of square (x^2) but students do not know that they have to multiply it twice, So we have to teach them this. The contents are very fast."*

  Some (10/28) teachers reported that the content was sufficient to teach a lesson or topic.

  A teacher mentioned that she finds it sufficient as *"... the biology portions can easily be explained with the TV. In biology, the explanations are more effective and the videos fulfill them in an effective way. TicTac Learn videos are very beneficial for geometry. The videos are easily understandable to students".* Another teacher mentioned that he feels it is sufficient because *"... curriculum is reduced hence this is enough. That is why I did not*

switch to YouTube. I use my own examples on board by pausing the video."

A few (2/13) teachers mentioned that language as one of the reasons why they feel the content is not sufficient. One of them also suggested that the content should be bilingual for diagrams. One teacher also mentioned that he found the content insufficient as it does not have questions and answers (assessment).

A few (5/28) teachers did not respond to this question.

- **SNP:** Several (12/22) teachers in SNP have reported that the content is not sufficient to teach the lesson. As shared by a teacher, *"The contents need to be upgraded as per the syllabus. Teachers should be involved during the preparation of content."*

  A few (3/22) teachers in SNP schools stated that the content was sufficient to teach. The reason was that the simple language has been used and aligns with the syllabus. It reduces the efforts of the teachers and helps the teacher to make the students understand. A teacher who teaches both Science and Math shared, *"Yes, I feel it is sufficient. But teachers should be there to explain it."* Some (7/22) teachers did not respond to the question.

vi. Teacher Perception on Tic tac Learn Videos as Reported by Teacher in the Teacher Engagement Survey

The following analysis is based on the teachers' responses regarding the teachers' perception on TicTac learn videos as reported in the TES.

The survey questions under this theme were administered on a 5 point Likert scale as given below:

1. strongly disagree
2. disagree
3. undecided
4. agree
5. strongly agree

The teachers were asked to select their preferred responses on the scale as per their belief.

I find DSP-TV content useful for getting students' attention: Some (10/52) teachers (7 SIP and 3 SNP) strongly agreed that the DSP-TV was useful in getting the students attention and several (34/52) teachers (15 SIP and 19 SNP) agreed the DSP-TV was useful in getting the students attention. A few (1/52) teachers (1 SNP) were undecided on the usefulness of DSP-TV for getting students attention and a few (6/52) teachers (2 SIP and 4 SNP) disagreed that the DSP-TV was useful in getting students attention. A few (1/52) teachers (1 SIP) did not respond to this question.

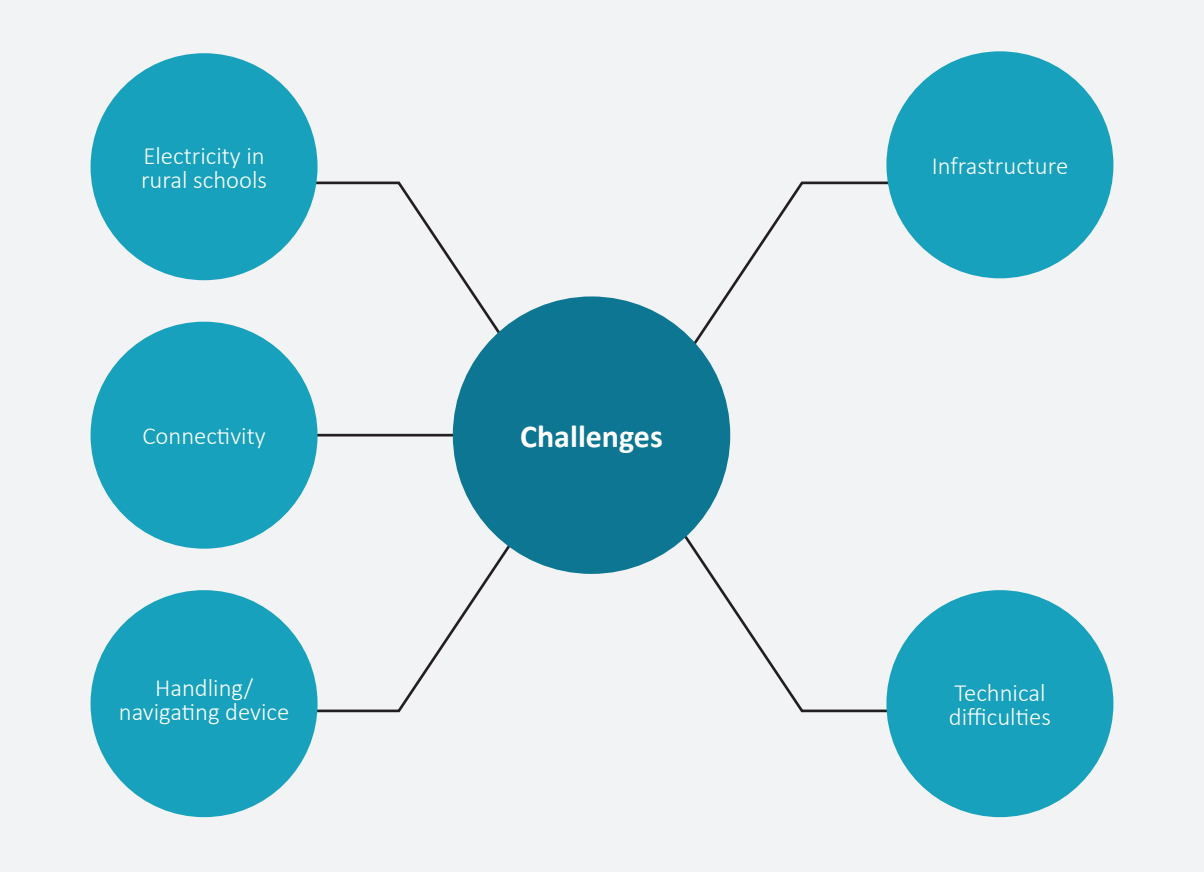
I find DSP-TV content useful for informing the students of the lesson objectives: Some (16/52) teachers (7 SIP and 9 SNP) strongly agreed and several (30/52) teachers (16 SIP and 14 SNP) agreed that the DSP-TV was useful for informing students about the lessons' objectives. A few (5/52) teachers (2 SIP and 3 SNP) disagreed and a few (1/52) teachers (1 SNP) strongly disagreed that the DSP-TV was useful for informing students about the lessons' objectives. A few (1/52) teachers (1 SIP) did not respond to this question.

I find DSP-TV content useful in stimulating student's prior learning: Some (13/52) teachers (7 SIP and 6 SNP) strongly agreed and many (31/52) teachers (13 SIP and 18 SNP) agreed that the DSP-TV was useful for stimulating students' prior learning. Some (8/52) teachers (5 SIP and 3 SNP) disagreed that the DSP-TV was useful for stimulating students' prior learning.

I find DSP-TV content useful in the students with learning guidance: Some (10/52) teachers (5 SIP and 5 SNP) strongly agreed and many (37/52) teachers (18 SIP and 19 SNP) agreed that the DSP-TV was useful for providing students with learning guidance. A few (4/52) teachers (2 SIP and 2 SNP) disagreed and a few (1/52) teachers (1 SNP) strongly disagreed that the DSP-TV was useful for providing students with learning guidance.

4.3.6.8 Challenges

Figure 4.3.13: Findings from Teacher Interviews - Challenges



i. Summary of Findings from Teacher Interview-Challenges

The findings from teacher interviews highlighted several challenges faced by teachers. These included issues with electricity, particularly in rural schools, which impacted their ability to use the DSP-TV regularly. Teachers also reported difficulties in handling and navigating DSP-TV. Additionally, infrastructure challenges, such as inadequate resources, were also reported, alongside a range of technical difficulties that hindered the use of DSP-TV in classroom teaching.

ii. Challenges as Reported by Teachers During Teacher Interview

To understand the challenges of integrating DSP-TV in teaching, teachers were asked to describe the difficulties they encounter when implementing DSP-TV learning in their classrooms. Of the 50 teachers (28 SIP and 22 SNP), several (20/50) teachers (11 SIP and 9 SNP) reported that they faced challenges while using DSP-TV in the classroom. Some (18/50) teachers (10 SIP and 8 SNP) reported to not have faced any challenges regarding the DSP-TV. Some (12/50) teachers (7 SIP and 5 SNP) did not respond to the question.

- **SIP:** Of the 28 SIP school teachers, some (11/28) teachers reported to have faced various challenges regarding the DSP-TV. Some (10/28) teachers reported that they have not faced any challenges regarding DSP-TV. There were no responses recorded for some (7/28) teachers.

  Of the 11 teachers who reported to have faced challenges, 20 responses were recorded where the teachers reported various challenges faced. Following are the challenges reported by the teachers.

Electricity: Of the 20 responses, some (6/20) responses from the teachers of rural and semi-urban schools mentioned electricity being one of the challenges.

Connectivity: Of the 20 responses, some (4/20) responses mentioned connectivity issues (internet connection) as one of the challenges.

As shared by a teacher, *"sometimes we face network issues. In this case we use a hotspot."* There were no significant differences found between the responses of rural, semi-urban and urban schools.

Handling/Navigating Device: A few (2/20) responses stated that the teachers faced difficulty in navigating and downloading the videos. As shared by one teacher, *"we faced difficulty downloading the videos as well. But after some time, I got used to it."*

Other than that, the responses recorded also reported about technical issues they face (2/20), infrastructure (1/20), security (1/20), language of the content (1/20), lose or malfunction of pendrive (2/20) and other (1/20) official engagement such as BLO duty.

- **SNP:** Of the 22 SNP teachers, several (9/22) teachers reported to have faced various challenges regarding the DSP-TV. Some (8/22) teachers reported that they have not faced any challenges regarding DSP-TV. There were no responses recorded for some (5/22) teachers.

  Of the 9 teachers who reported to have faced challenges, 22 responses were recorded where the teachers reported various challenges faced. Following are the challenges reported by the teachers:

  Electricity: Of the 22 responses, some (7/22) responses from the teachers of rural and semi-urban schools mentioned electricity being one of the challenges. As shared by a teacher, *"electricity is also not available at all times. It's available for a very short time in our village so we manage to take 1-2 periods only."*

  Infrastructure: Some (6/22) teachers also reported about infrastructure as one of the challenges. As shared by a teacher, *"There should be another separate classroom for the DSP-TV along with the internet facility."*

  Handling/Navigating Device: Some (4/22) responses stated that the teacher faced difficulty in navigating and downloading the videos. As shared by one teacher, *"we faced difficulty downloading the videos as well. But after some time, I got used to it."*

  Technical Difficulties: Some (4/22) responses also mentioned about facing various technical difficulties such as difficulty in opening the content, non functioning remote, connecting mobile devices to TV. As shared by a teacher, *"The remote is not working properly. The voice command is not working so we have to type it for YouTube or any other app whenever we need to use the TV. We talked about this with the Muskaan Dreams but they didn't do anything about it. The remote was damaged again because of the students and we had to purchase a new one."*

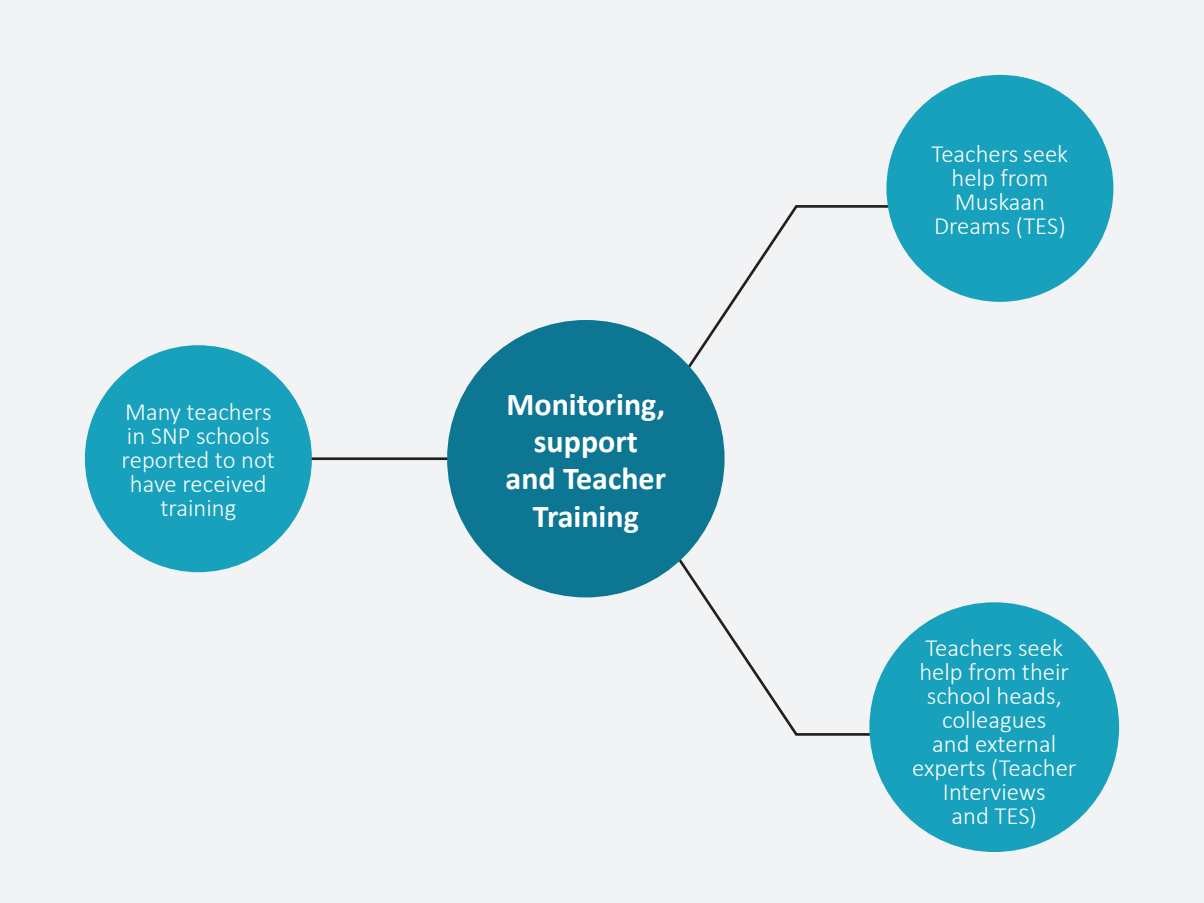
  Connectivity: Of the 23 responses, one teacher (1/22) response mentioned connectivity issues (internet connection) as one of the challenges.

  Of the 42 responses (20 SIP and 22 SNP), received from teachers, challenges regarding electricity were majorly stated by teachers from rural schools (10 rural, 2 semi-urban, 1 urban). Infrastructural issues were also majorly mentioned by teachers from the rural schools (6 rural, 1 urban) and technical issues were also raised by teachers from rural and urban schools (4 rural 2 urban). Teachers who faced challenges regarding handling devices were from rural and urban schools (3 urban and 3 rural). Two teachers from semi-urban schools mentioned challenges regarding BLO duty (Block Level Officer for the Election) and language of the content. Two teachers from the rural schools also mentioned that they faced challenges regarding pendrive. One teacher from the rural schools also mentioned

security issues. Internet connectivity issues were also raised by teachers from the rural, semi-urban and urban schools (2 rural, W1 semi-urban and 2 urban).

4.3.6.9 Monitoring, Support and Teacher Training

Figure 4.3.14: Findings from Teacher Interviews - Monitoring, Support and Teacher Training



i. Summary of Findings from Teacher Interview-Monitoring, Support and Teacher Training

The findings from teacher interviews revealed that many teachers in SNP schools indicated they had not received formal training about how to integrate DSP-TV in classroom teaching. Teachers mentioned that they sought assistance from Muskaan Dreams (TES) for support. Additionally, they also relied on assistance from their school heads, peers, and external experts to help them with technical difficulties.

ii. Monitoring, Support and Teacher Training by Teachers During Teacher Interview

The teachers were asked about the questions on training given by Muskaan Dreams and any other training for digital classrooms in order to understand their preparedness of DSP-TV classrooms. The teachers were also asked if the training received is sufficient or not, to understand their needs of capacity building for DSP-TV classes.

- **Teacher Training on DSP-TV Usage by Muskaan Dreams**

Many (30/50) teachers (12 SIP and 18 SNP) have said that they have not received the training. Some (19/50) teachers (15 SIP and 4 SNP) have said that they have received training by Muskaan Dreams. One teacher (1 SIP) did not respond to the question.

- **SIP:** Of the 28 SIP school teachers, several (15/28) teachers reported that they received training by Muskaan Dreams. Of the 15 teachers, some (14/15) teachers mentioned that they received training once. Of the 15 teachers who received the training, some (8/15) mentioned that the training was sufficient for them. A few (2/15) teachers also mentioned that the training was not sufficient and they would like to have more training. A (1/15) teacher mentioned that he does not remember much about the training. Some (4/15) teachers have not responded to whether they felt that the training was sufficient or not.

  As shared by a teacher, *"...Yes, we have no issues. It all depends on the teacher. If he wants we can utilize TV in a better way for students. The contents are already there. The teacher should mix their expertise to use the content for the betterment of the students."*

  Several (12/28) teachers have said that they did not receive any training. One (1/28) teacher has not responded to this question.

- **SNP:** Of the 22 teachers, most (18/22) have reported that they did not receive any training from the Muskaan Dreams. Of the 18 teachers who mentioned to not have received any training, some (3/18) said to have received a demo from Muskaan Dreams on how to use the device. Some (3/18) teachers were newly joined and several (11/18) mentioned to not have undergone any kind of training or orientation related to DSP-TV. One teacher (1/18) mentioned that even if training was provided, he *"was not available at that time."*

  A few (4/22) teachers mentioned that they have receive d the training. All teachers have said that they have received one day of training once. Those who received training said that the training was good. One of the teachers who received training said that the training was sufficient to understand how to use DSP-TV. The other teacher said that it was not sufficient. As shared by a teacher, *"Many of us did not know how to use a pen drive. They taught us. They taught us how to use content in Pen drive, how to plan lessons and had also discussed how to combine TV content learning with traditional ways of learning. They also discussed how to integrate TV learning into the timetable."*

  All (4/22) teachers who received training mentioned that the training was sufficient. As shared by a teacher, *"We underwent training. First, they trained us how to use it and then they asked us to gradually teach the students as well. Then we trained the students. Now the students can operate the TV. If I or any other teacher such as Math or Science teachers are not there in the class or are absent…. then students can operate the TV to do their work."*

- **Teachers' Participation in Any Other Technology Related Training**

Several (21/50) teachers (11 SIP and 10 SNP) have said that they have not received any other training for using technology in their classrooms. A few (5/50) teachers (1 SIP and 4 SNP) have said they have received some form of training given by the state education department. As shared by a teacher, *"yes, I received training. The training was conducted for MSC (Computer science)."* Another teacher shared, *"I received training on how to use smart classes and operate their content from my previous employment."* Several (24/50) teachers (18 SIP and 8 SNP) did not respond to the question.

- **SIP:** Some (11/28) teachers reported that they have not received any other training (by the Government. etc) on the use of technology in teaching. Many (17/28) teachers in SIP schools did not respond to the question.

- **SNP:** Several teachers (10/22) said that they have not received any other training while some (4/22) reported to have received

training from the education department. Some (8/22) teachers did not respond to the question.

- **Reach for Technical Support**
  During the interview, teachers were also asked about whom they should approach if they require technical assistance regarding the DSP-TV. The question was asked to understand how teachers mitigate the technological challenges.

  Some (18/50) teachers (14 SIP and 4 SNP) mentioned that they approach the school heads, colleagues, computer teacher, technical experts whenever they face technical difficulties. A few (3/50) teachers mentioned Muskaan Dreams.

  Several (28/50) teachers (10 SIP and 18 SNP) did not respond to the question.

- **SIP:** Of the 28 SIP school teachers, several (14/28) teachers reported that they approach the school heads, colleagues, computer teacher or technical experts whenever they face difficulties regarding the DSP-TV. Some (2/16) teachers mentioned that they approach their school operator. A few (2/28) teachers mentioned that they approach Muskaan Dreams whenever they face technical difficulties regarding the DSP-TV.

  Some (10/28) teachers did not respond to the question.

- **SNP:** Several (3/22) teachers have said that they approach the school heads or their colleagues. One teacher (1/22) reported to approach Muskaan Dreams. Most (18/22) teachers did not respond to the question.

- **Support Provided as Reported by Teacher in the Teacher Engagement Survey**

The following analysis is based on the teachers' responses regarding the support and training provided to teachers by school, colleagues or Muskaan Dreams.

The survey questions under this theme were administered on a 5-point Likert scale as given below:

1. strongly disagree
2. disagree
3. undecided
4. agree
5. strongly agree

The teachers were asked to select their preferred responses on the scale as per their belief.

I discuss and share their experience of DSP-TV class with my colleagues: Some (14/52) teachers (8 SIP and 6 SNP) strongly agreed and most (35/52) teachers (17 SIP and 18 SNP) agreed that they discuss and share their experiences with other teachers. A few (2/52) teachers (2 SNP) disagreed and a few (1/52) teachers (1 SNP) strongly disagreed that they discuss and share their experiences with other teachers.

I help my colleagues when they have problems with DSP-TV-enabled learning: Some (16/52) teachers (8 SIP and 8 SNP) strongly agreed and many (31/52) teachers (14 SIP and 17 SNP) agreed that they help their colleagues when they have problems with DSP-TV enabled learning. A few (5/52) teachers (3 SIP and 2 SNP) disagreed that they help their colleagues when they have problems with DSP-TV enabled learning.

I seek help from my colleagues when I face a problem with DSP-TV-enabled learning: Some (15/52) teachers (8 SIP and 7 SNP) strongly agreed and many (36/52) teachers (17 SIP and 19 SNP) agreed that they seek help from their colleagues when they face problems with DSP-TV enabled lesson. A few (1/52) teachers (1 SNP) disagreed that they seek help from their colleagues when they face problems with DSP-TV enabled lessons.

I can connect with experts on software or hardware issues with the DSP-TV: A few (6/52) teachers (2 SIP and 4 SNP) strongly agreed and many (34/52) teachers agreed that they connect with experts on software or hardware issues with the DSP-TV. Some (11/52) teachers (7 SIP and 4 SNP) disagreed that they connect with experts on software or hardware issues with the DSP-TV.

A few (1/52) teachers (1 SIP) teachers did not respond to this question.

I attend discussions, seminars and trainings over the DSP-TV-enabled pedagogy: Some (10/52) teachers (4 SIP and 6 SNP) strongly agreed and several (24/52) teachers (13 SIP and 11 SNP) agreed that they attend discussions, seminars and training on the DSP-TV enabled pedagogy. Some (15/52) teachers (6 SIP and 9 SNP) disagreed and a few (1/52) teachers (1 SIP and 4 SNP) strongly disagreed that they attend discussions, seminars and training on the DSP-TV enabled pedagogy. A few (2/52) teachers (1 SIP and 1 SNP) did not respond to this question.

I can contact the program associate from Muskaan Dreams for any problems regarding DSP-TV content and technical support: Some (11/52) teachers (5 SIP and 6 SNP) strongly agreed and many (34/52) teachers (16 SIP and 18 SNP) agreed that they can connect with the program associate from Muskaan Dreams for any problems regarding the DSP-TV content and technical support. A few (7/52) teachers (4 SIP and 3 SNP) disagreed that they can connect with the program associate from Muskaan Dreams for any problems regarding the DSP-TV content and technical support.

The TES indicates that the majority of the teachers agreed to the fact that they seek help from their school heads, colleagues, experts and program associates from Muskaan Dreams. However, in teacher interviews, only some teachers reported to seek help from their school heads, colleagues, experts and a few teachers reported to seek help from the associates of Muskaan Dreams.

The TES also indicates that many teachers attended discussions, seminars and trainings over the DSP-TV-enabled pedagogy, however, only some teachers in teacher interviews reported to have attended training or demo sessions on DSP-TV related pedagogy by Muskaan Dreams or any other technology related trainings organized by the State Education Department.

- **Community of Practice (CoP)-Use of Muskaan Dream's CoP Group**

The teachers were asked about whether they are part of the WhatsApp group created by Muskan Dreams and other groups in order to understand being part of a larger community of practices of teachers. They were also asked whether they reach for support- post their challenges, photos and videos in the DSP-TV classroom, in the groups.

Of the 50 teachers, many (29/50) teachers (18 SIP and 11 SNP) reported that they are part of the Muskaan Dream's WhatsApp group. Some (10/50) teachers (4 SIP and 6 SNP) reported that they are not part of the WhatsApp group. Some (11/50) teachers (6 SIP and 5 SNP) did not respond to the question.

- **SIP:** Of the 28 teachers, many (18/28) teachers stated to be part of the Muskaan Dream's WhatsApp group. A few (4/28) teachers reported that they are not part of the WhatsApp group. A few (6/28) teachers did not respond to the question.

  Types of posts by teachers: Types of posts by teachers: Of the 18 teachers who were mentioned to be part of the Muskaan Dream's Whatsapp group, many teachers (11/18) reported to post images and videos. A few (2/18) teachers mentioned about the post-technical difficulties in the groups as well. As shared by a teacher, *"It's not like that we post photos or videos of all classes but in the past week we have extensively used TV and we have posted in the group as well." As shared by another teacher, "We post rarely. If any special program is there then we post it to the group."* Some (5/18) teachers did not share about the posts they share on Whatsapp.

- **SNP:** Of the 22 teachers, several (11/22) teachers have reported that they are members of the WhatsApp group created by Muskaan Dreams. Some (6/22) teachers have mentioned that they are not part of any

WhatsApp group created by Muskaan Dreams. Some (5/22) teachers have not responded to this question.

Types of posts by teachers: Of the 11 teachers who reported to be part of the Muskaan Dream's Whatsapp group, many (7/11) teachers mentioned that they post images and videos of classroom activities using DSP-TV in the group. As shared by a teacher, *"Yes, sometimes we share photos or if any kind of videos they share then we react with a thumbs up."* Some (4/11) teachers did not explain the kind of posts they share on Whatsapp.

- **Member of Any Other Digital Messaging Group Related to Teaching**

The teachers were also asked about their involvement in other Communities of Practice (CoP) at school, district or state level. This question aimed to understand their patterns of activity within CoP groups.

Several (20/50) teachers (8 SIP and 12 SNP) mentioned that they are part of one or more than one WhatsApp group related to teaching. These groups are school specific, subject specific, or district level WhatsApp groups. Some (11/50) teachers (8 SIP and 3 SNP) responded that they are not part of any other WhatsApp group. Several (19/50) teachers (12 SIP and 7 SNP) did not respond to the question.

- **SIP:** Of the 28 teachers, several (8/28) teachers mentioned that they are part of other WhatsApp groups. Some (8/28) teachers responded that they are not part of any other WhatsApp groups. Several (12/50) teachers did not respond to the question.

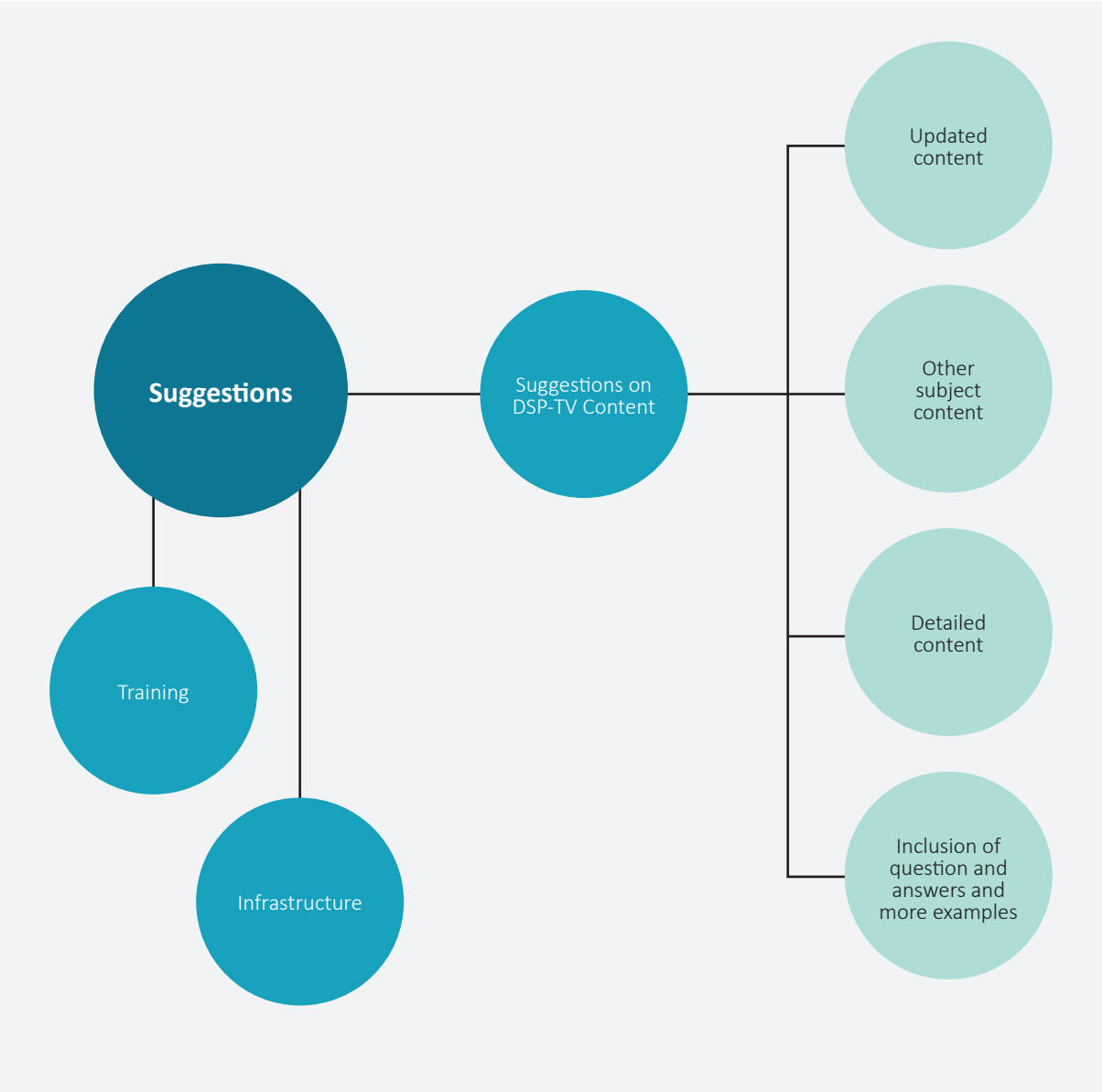
  Of the 8 teachers, few (4/8) teachers reported that they are part of the school WhatsApp groups, some (6/8) teachers mentioned that they are part of the subject level or cluster level groups.

- **SNP:** Of the 22 teachers, several (12/22) teachers mentioned that they are members of other groups such as school-level groups or district level groups (central, cluster level groups and subject groups at district level). A few (3/22) teachers mentioned that they are not part of any other groups.

  Some (7/22) teachers did not respond to the question.

4.3.6.10 Suggestions

Figure 4.3.15: Findings from Teacher Interviews - Suggestions



i. Summary of Findings from Teacher Interviews - Suggestions

Teachers had various suggestions regarding the DSP-TV. Teachers emphasized the need for more training related to the use of DSP-TV and better infrastructure. Regarding DSP TV content, teachers suggested including updated content, including content from all subjects in the curriculum, and providing more detailed material that includes all the topics and more detailed explanation. They also recommended adding questions and answers, and more examples to enhance the content's effectiveness.

ii. Suggestions Reported by Teachers During Teacher Interviews

The teachers were asked to give their suggestions and feedback on DSP-TV, DSP training, content and other technical support. This section presents the various responses, feedback and suggestions given by the teachers.

A total of 126 responses were recorded from the 50 teachers. The suggestions are summarized below separately for SIP and SNP schools.

SIP: In SIP schools, 66 responses from 28 teachers recorded feedback regarding the use of DSP-TV.

Suggestions on DSP-TV Content

- ***Updated Content:*** A few (11/66) responses stated that the TicTac Learn content is updated as per the syllabus, however, a few (11/66) other responses also stated that that the content needs to be updated. A teacher who teaches both Math and Science, mentioned that the Math content should be updated.

  A teacher who has neurological difficulties in his hand found the DSP-TV to be very useful in his teaching. He mentioned that he would have self initiated to get the DSP-TV if it has not been provided by the government. As per him, the content needs to be more detailed as the present content provides basic information and the content should be updated as per the latest syllabus. As shared by another Math teacher, *"I want small important points to be specially defined. For example, when teaching quadratic or linear equations to students, there should be key points for them to remember long-term. I believe each chapter should have a summary."* Another teacher suggested that the content *"...should be explained in a little more detail, and it should be divided into smaller parts. The content should be presented point by point, with few points in one part and few points in another part. Each point should be explained thoroughly."*

- ***Other Subject Content:*** A few (6/66) responses stated the requirement to add other subject's content. As shared by one teacher, *"Hindi as a subject should be included in it. Grammar should also be there. If there is no teacher available, students can learn by watching videos. Hindi, English, Sanskrit, and all other subjects should be included." Another teacher shared that, "It should include other subjects too, not only focused on Math and Science. Because in government schools there is always a shortage of teachers so everytime Math and Science teachers might not be available they might have some kind of meetings or training. So at that time other subject teachers can use the TV."*

- ***Detailed Content:*** A few (5/66) responses suggested that it would be helpful if TicTac Learn videos can have more detailed content. A Math teacher shared that *"the content videos are basically showing the direct answer. Like insert the formula and show the answer directly. It is not showing the process of solving the problem."* Another Science teacher shared that, *"The content should be explained in a little more detail, and it should be divided into smaller parts. The content should be presented point by point, with 2-3 points in one part and 2-3 points in another part. Each point should be explained thoroughly."*

- ***More Question and Answers:*** A few (5/66) responses suggested that it would be better if the TicTac Learn content can add more questions and answers. A Math teacher shared that, *"In Math, questions are only through the examples. If I get questions, audio and video of typical questions then it will be good. Because, the available videos on YouTube are not so good."*

  Another Science teacher shared that, "*We have to think from the perspective of the exam. Our target is how much they know and the exam. So, it is better that at the end of each content, there should be questions and answers from the examination point of view."*

- ***More Examples:*** In a few responses, (2/66) Math teachers suggested adding more examples in the videos. As shared by a Math teacher, *"More number of examples are required. We need objective type questions (fill in the blanks, one word), which indicates how students have learned. In the 75 marks exams 32 marks are objective type questions. It helps in instant practice. Currently we do it by ourselves and we spend double the time. Students will pass the exams if objective type questions are clear."*

- ***Adjusting Speed of Videos:*** One response from a Science teacher (1/66) reports that the speed of the video is very fast. As shared, *"The speed of the video is very fast. But we managed to play."*
- ***Language in the Video:*** a few (2/66) teachers suggested changes in language. A Math teacher also suggested changes in the language of the Math videos. A Science teacher shared that *"... the content should be in both languages, at least with diagrams and labeling."*
- ***Aligning to Syllabus:*** a few (2/66) teachers suggested that the content should be matched with the syllabus.
- ***Level of Difficulty:*** one response (1/66) suggested that the content should be in a way that caters to all levels of students. As shared by the teacher, *"The content should be made available for all levels of students. Sometimes, if the content is too easy for the students, they might not be interested in it."*
- ***Review of Content:*** In one of the responses (1/66) suggestion was given to review the Math content. As shared by the teacher, "content should be upgraded timely with syllabus and requirements. For Science, it is best but the Math contents should be reviewed."
- ***More Content:*** In one (1/66) teacher also requested for more content. Other suggestions related to the use of DSP-TV in the classroom.
- ***Teacher Training:*** Some (10/66) responses stated requirements for training. A teacher shared, *"A training session should be conducted because the teachers are not aware of how to include DSP-TV in the lesson plan so it might be that the training session will help us to enable the DSP-TV in our daily lesson plan."*
- ***Infrastructure:*** A few (4/66) responses were recorded where the teacher's suggested improvement about the infrastructure.
- ***Inverters:*** A few (3/66) responses were recorded where the teacher mentioned the requirement of inverters. In one of the responses the teacher mentioned the requirement for infrastructure such as security, furniture, bigger space.
- ***Pen Drive:*** One response (1/66) was recorded where the teacher requested for pendrive.

SNP: In SNP schools, 60 responses from 22 teachers recorded feedback regarding the use of DSP-TV.

Suggestions on DSP-TV Content

- ***Updated Content:*** Of the 56 responses, some (16/60) responses were recorded where teachers suggested to provide updated content as per syllabus. As shared by a teacher, *"Need to upgrade the syllabus. It is not updated. NCERT removed a further few topics last year. But still, it is in the content. Many times, we forget if that part is in the syllabus or not. After playing the content we come to remember that the topic is not in the syllabus. This is problematic. Extra knowledge is good but we do not have time for that. We abide by school policy and need to complete the syllabus. We have only 40 minutes in class. Next, some teachers are waiting for the next class. So I need to complete the lesson within 40 minutes."*
- ***Other Subject Content:*** Some (9/60) responses mentioned the requirement to add other subject's content. A teacher said, *"It would be good if other subjects are included in the content. Then students will show more interest in studying those subjects too."* The request for other subjects' content was raised by both rural and urban teachers almost equally.

- ***Level of Difficulty***: A few (3/60) teachers also suggested simplifying the content so that students can understand easily.
- ***Detailed Content:*** A few (2/60) responses were recorded where the teachers requested for more detailed content. A Math teacher shared that, *"There is no problem with smart TV. It's running well. But it does not cover our content. We also have some other pressure in mind. Sometimes the school head calls us to see the book or someone may come to check. All of them asked us questions from the angle of Digital class. Digital classes are for students to get clarity and additional help on the topics. It will help students to learn faster and in an easy way. But here we are under pressure to complete the course, so we sometimes lose our focus. It's our operational challenge. But the TV content is good."*
- ***More Examples:*** A few (2/60) responses were recorded where teachers suggested adding more examples in the videos.
- ***Adding More Graphics and Animation:*** In a few (2/60) of the responses, teachers also suggested adding more graphics, animation and diagrams.
- ***More Content:*** In a few responses (2/60), teachers requested for more content. A teacher mentioned, "*They can provide more content and more graphic related videos and also they can use AI explanation."*
- ***More Question and Answers:*** In one (1/60) of the responses the teacher suggested to add assessment in the content. As shared, *"The content does not have any assessment. There is not much scope for interaction, though the videos explain the content well. So there is no scope to understand if the child has understood the content or not. They created the content keeping in mind a level, so students who are below that level will not understand anything. E.g. if a child does not know what is 3-dimension, they will copy the content but would not understand. So, they have created the content keeping in mind the students who are in the medium level."*

Other suggestions related to the use of DSP-TV in classroom

- ***Training:*** Some (9/60) responses stated requirements for training. The training was requested from teachers of both rural and urban schools. As shared by a teacher, *"They should organize subject training. I personally feel the contents are unorganized and some are missing according to the lesson. We talked about this to Muskaan Dreams but they did not take any steps."*
- ***Infrastructure:*** A few (4/66) responses were recorded where the teacher's suggested improvement about the infrastructure.
- ***Requirement for More TV:*** A few (4/60) responses also mentioned the requirement for more TVs.
- ***Requirement for Inverters:*** Three (3/60) responses were recorded where the teacher mentioned the requirement of inverters. Of these three responses, two were from rural schools and one was from urban schools.
- ***Requirement for Smartboards:*** A few (2/60) responses also mentioned the requirement for smartboards.
- ***Replacement of TV Related Equipment:*** one (1/60) response also mentioned the requirement for replacing the remote of the TV which was damaged.

4.3.7 Statistical Analysis of Teacher Engagement Survey

To understand the relationship between the variables of the TES and the demographic and frequency of usage reported in the interviews further analysis was run on the data from the TES using SPSS (a quantitative data analysis software). Certain variables like geographical location of the school, frequency of usage and status of use (SIP active, SIP non-active,

SNP active, SNP non-active) were taken from the CRO data, School Head interviews and teacher interview data. As the backend usage data was limited, the DSP-TV usage data was taken from the teacher interviews and mapped against the data from the teacher engagement survey, in SPSS. The usage data from the teacher interview highlighted the frequency of use of the DSP-TV by teachers and the data was reported in 8 categories i.e. did not use at all, did not use in the past 3 months, used once in two months, used once in a month, used twice in a month, used once a week, used 2-3 times a week, used more than 2-3-times a week and used daily. These categories were further grouped into 4 main categories i.e. not used, used monthly, used weekly and used daily.

Data of only 73 teachers was used for this analysis as the teacher engagement survey was completed only by 73 teachers as opposed to the 78 teachers who underwent the interviews.

The findings reported in this section cover responses of teachers from both active and non-active schools.

4.3.7.1 Correlations

An exploratory correlation analysis was run to understand the relationship between the different variables of the TES. The following variables showed a strong correlation with the demographic details of the teachers.

i. Age

The age of teachers who took the TES varied from 26 years to above 56 years. The following variables showed a significant negative correlation with the teacher's age, indicating that younger teachers strongly agreed with the statements mentioned below.

Table 4.3.11

Variables Showing Correlation with Age of Teachers		
Variable	**Pearson's Correlation (r)**	**(p)**
My present technological knowledge is sufficient to insert a pen drive in TV	-0.0293	0.014
My present technological knowledge is sufficient to navigate across contents	-0.290	0.014
My present technological knowledge is sufficient to connect the TV using Bluetooth or Wi-Fi connection	-0.335	0.004
My present technological knowledge is sufficient for using other apps on the TV.	-0.284	0.017
I develop my own lesson plans to teach in the Smart TV-enabled classes.	-0.288	-0.288
I encourage students to interact among themselves and discuss a topic in my DSP-TV-enabled classes.	-0.254	0.033

ii. Teaching Experience

The following variables showed a significant negative correlation with a teacher's experience of teaching, indicating that new teachers (with less teaching experience) strongly agreed with the statements mentioned below.

The age of a teacher and their teaching experience also showed a strong positive correlation *(r =.656, p = .000)*, indicating that as a teacher's age increased so did their teaching experience.

Table 4.3.12

Variables Showing Correlations with Experience of Teachers		
Variable	**Pearson's Correlation (r)**	**(p)**
My present technological knowledge is sufficient to insert a pen drive in TV	-0.347	0.003
My present technological knowledge is sufficient to connect the TV using Bluetooth or Wi-Fi connection	-0.245	0.041
My present technological knowledge is sufficient for using other apps on the TV.	-0.276	0.022
It is easier for me to gauge if the students have understood what I am teaching when I use DSP than when I do not use DSP.	-0.260	0.032
I run the DSP-TV content backwards and forward several times while teaching until students understand.	-0.284	0.017
I collect good content using other apps (like YouTube, outside TicTac Learn) and run it on the DSP-TV.	-0.248	0.040
I develop my own lesson plans to teach in the Smart TV-enabled classes.	-0.295	0.013
I collect good content using other apps (like YouTube, outside TicTac Learn) and run it on the DSP-TV.	-0.248	0.040
I encourage students to interact among themselves and discuss on a topic in my DSP-TV-enabled classes.	-0.317	0.008
I tend to engage with students more in DSP-TV class than the regular class.	-0.330	0.006

4.3.7.2 Statistically Significant Differences Between Groups

The variables under teacher's demographic details that comprised two or more independent categories were analyzed to check for a statistically significant difference in performance between the different groups on the statements of the TES.

A Mann Whitney U (two independent groups)/ Kruskal-wallis (more than two independent groups) test was used for this analysis.

i. Subject Taught

A marginal significant difference was found between the responses of teachers who taught Math and those who taught Science (U = 443.500, p = .057) on the statement 'I enjoy my teaching using the DSP-TV' with more Science teachers (Mean rank = 38.71, Median 4.00) agreeing strongly with this statement than Math teachers (Mean rank = 31.37, Median = 4.00).

ii. Gender

A significant difference (U = 435.000, p = .019) was found between the responses of female (Mean rank = 30.04, Median = 4.00) and male teachers (Mean rank = 39.88, Median = 4.00) on the statement 'I find DSP-TV content useful for getting student' attention', indicating more male teachers strongly agreed with this statement.

A marginally significant difference (U = 495.500, p = .095) was found between the frequency of usage as reported by female (Mean rank = 41.91, Median = 3.00) and male teachers (Mean

rank = 33.76, Median = 33.76) indicating female teachers reported using the DSP-TV more frequently than their male colleagues.

A marginally significant difference (U = 520.000, p = .097) was found between the responses of female (Mean rank = 32.93, Median = 4.00) and male teachers (Mean rank = 39.68, Median = 4.00) on the statement 'DSP-TV is helpful for teaching with more visual instructions', indicating that more male teachers strongly agree with this statement.

A marginally significant difference (U = 479.500, p = .062) was found between the responses of female (Mean rank = 42.47, Median = 4.00) and male teachers (Mean rank = 33.40, Median = 4.00) on the statement 'My present technological knowledge is sufficient for connecting the TV using Bluetooth or Wi-Fi connection' indicating more female teachers strongly agree with this statement.

A marginally significant difference (U = 498.00, p = .090) was found between the responses of female (Mean rank = 32.17, Median = 4.00) and male teachers (Mean rank = 39.42, Median = 4.00) on the statement 'I find DSP-TV content useful for informing student of the lessons teaching objectives', indicating that more male teachers strongly agreed with this statement.

iii. Employment Status

A marginally significant difference (U = 44.500, p = .062) was found between the responses of permanently employed teachers (Mean rank = 36.34, Median = 4.00) and temporarily employed teachers (Mean rank = 16.83, Median = 3.00) on the statement 'I take help of my students whenever I face problems with the DSP-TV operation', indicating that more permanently employed teachers strongly agreed with this statement.

A marginally significant difference (U = 50.500, p = .065) was found between the responses of permanently employed teachers (Mean rank = 36.25, Median = 4.00) and temporarily employed teachers (Mean rank = 18.83, Median = 4.00) on the statement 'I seek help from my colleagues when I face a problem with the DSP-TV', indicating more permanently employed teachers strongly agreed with this statement.

iv. Teaching Level

A significant difference (H = 6.437, p = .040) was found between the teachers teaching elementary classes (Mean rank = 37.75, Median = 4.50), secondary classes (Mean rank = 37.78, Median = 4.00) and higher secondary classes (Mean rank = 24.07, Median = 4.00) on the statement 'My present technological knowledge is sufficient in operating the remote to pause, rewind and forward contents', indicating that more elementary teachers strongly agreed with this statement followed by secondary teachers and then higher secondary teachers.

A significant difference (H = 7.556, p = .023) was found between the teachers teaching elementary classes (Mean rank = 58.000, Median = 5.00), secondary classes (Mean rank = 36.91, Median = 4.00) and higher secondary classes (Mean rank = 24.50, Median = 4.00) on the statement 'My present technological knowledge is sufficient in connecting the TV using Bluetooth or Wi-Fi connection', indicating that more elementary teachers strongly agreed with this statement followed by secondary teachers and then higher secondary teachers.

A marginally significant difference (H = 4.894, p = .087) was found between the teachers teaching elementary classes (Mean rank = 52.25, Median = 4.50), secondary classes (Mean rank = 36.02, Median = 4.00) and higher secondary classes (Mean rank = 25.96, Median = 3.00) on the statement 'My present technological knowledge is sufficient in using other apps on the TV' indicating that more elementary teachers strongly agreed with this statement followed by secondary teachers and then higher secondary teachers.

A marginally significant difference (H = 5.399, p = .067) was found between the teachers teaching elementary classes (Mean rank = 31.50, Median = 4.00), secondary classes (Mean rank = 37.52, Median = 4.00) and higher secondary classes (Mean rank = 26.32, Median = 4.00) on the statement 'I contact program associates (from Muskaan Dreams) for any problem regarding TV

content and technical support' indicating that more secondary teachers strongly agreed with this statement followed by elementary teachers and then higher secondary teachers.

v. Geographical Location of School

A significant difference was found between teachers from rural, semi-urban and urban schools (H = 8.249, p = .016) in their responses to the statement 'My present technological knowledge is sufficient to insert a pendrive in the TV' with more rural teachers strongly agreeing with the statement (Mean rank = 39.05, Median = 4.00) followed by teachers from urban schools (Mean rank = 37.70, Median = 4.00) and teachers from semi-urban schools (Mean rank = 18.63, Median = 3.00).

A marginally significant difference was found between teachers from rural, semi-urban and urban schools (H = 4.786, p = .091) in their responses to the statement 'I can decide how to teach with the DSP-TV', with more urban teachers (Mean rank = 42.30, Median = 4.00) strongly agreeing with this statement followed by teachers from rural schools (Mean rank = 36.41, Median = 4.00) and semi-urban schools (Mean rank = 26.19, Median = 4.00).

vi. Additional Duties of Teacher

A significant difference was found between teachers who had other duties in addition to teaching (H = 9.602, p = .022) in their responses to the statement 'DSP-TV is helpful for teaching with more visual instructions'. Teachers who also held the position of principal of their school (Mean rank = 42.80, Median = 5.00) strongly agreed with this statement followed by teachers who had no other responsibilities apart from teaching (Mean rank = 28.96, Median = 4.00) and teachers who were also the teacher-in-charge of their schools (Mean rank = 27.20, Median = 4.00). Teachers who had other responsibilities like being in charge of sports events, or school cultural programs (Mean rank 22.00, Median = 4.00) did not agree as strongly with this statement.

A significant difference was found between teachers who had other duties in addition to teaching (H = 11.422, p = .010) in their responses to the statement 'My present technological knowledge is sufficient for operating the remote to pause, rewind and forward contents'. Teachers who also held the position of teacher-in-charge (Mean rank = 41.55, Median = 5.00) of their schools strongly agreed with this statement followed by teachers who had no other duties apart from teaching (Mean rank = 26.62, Median = 4.00) and teachers who were also the school principals (Mean rank = 24.40, Median = 4.00). Teachers who had other responsibilities like being in charge of sports events, or school cultural programs (Mean rank = 22.47, Median = 4.00) did not agree as strongly with this statement.

A significant difference was found between teachers who had other duties in addition to teaching (H = 8.249, p = .019) in their responses to the statement 'I find DSP-TV content useful in providing students with learning guidance'. Teachers who also held the position of principal of their school (Mean rank = 38.70, Median = 5.00) strongly agreed with this statement followed by teachers who held the position of Teacher-in-charge (Mean rank = 32.17, Median = 4.00) and teachers who had no other responsibilities in addition to teaching (Mean rank = 27.98, Median = 4.00). Teachers who had other responsibilities like being in charge of sports events, or school cultural programs (Mean rank = 20.17, Median = 4.00) did not agree as strongly with this statement.

A marginally significant difference was found between teachers who had other duties in addition to teaching (H = 6.477, p = .091) in their responses to the statement 'I tend to engage with students more in DSP-TV class than in the regular class'. Teachers who also held the position of principal of their school (Mean rank = 33.90, Median = 4.00) strongly agreed with this statement followed by teachers who held no other responsibilities in addition to teaching (Mean rank = 32.36, Median = 4.00) and teachers who were also the teacher-in-charge of their schools (Mean rank = 28.30, Median = 2.00). Teachers who had other responsibilities like being in charge of sports events, or school cultural programs (Mean rank = 24.77, Median = 2.00) did not agree as strongly with this statement.

4.3.7.3 Linear Regression Model

A linear regression analysis was explored to create a model to understand the relationship between the input variables on teachers' competency of using the DSP-TV from the TES with the output variable usage of DSP-TV as reported by teachers during the interview.

For this analysis the data from teachers who reported that they had not used the DSP-TV in the last 3 months (21 teachers) and those who did not respond to the question on frequency of usage (7 teachers) was excluded, hence data from only 45 teachers was used for linear regression analysis.

Based on the initial explorations of correlations between the different variables of the TES, variables related to the teachers' self-reported competence in using the DSP-TV were used as input variables to run a linear regression analysis. These variables are listed below.

My present technological knowledge is sufficient to insert a pen drive in the TV.

My present technological knowledge is sufficient to navigate across contents.

My present technological knowledge is sufficient to operate the remote to pause, rewind, and forward contents.

My present technological knowledge is sufficient to connect the TV using Bluetooth or Wi-fi connection.

My present technological knowledge is sufficient to use other apps on the TV.

The model summary revealed that the teacher's competence of using the DSP-TV as reported by them in the survey, significantly explained the variance in the frequency of usage reported by them, ($F(5, 37) = 2.950$, $p = .024$). The model accounted for a moderate amount of variance, $R^2 = .285$, adjusted $R^2 = .188$, and the standard error of the estimate was .576.

However, only the variable, 'My present technological knowledge is sufficient to navigate across contents' was found to be significantly predicting the frequency of teachers' usage of DSP-TV ($b = .289$, $p = .007$).

Regression model analysis on other variables other than technological competence was not found to be significant.

4.4. Findings from Teacher Interviews

In this study, a total of 64 schools were sampled, 21 were SIP, and 43 were SNP schools. Out of these 64 schools, 54 schools (17 SIP and 37 SNP) had school-heads who were accessible and agreed to the one-on-one interview. Among the school-heads who responded, 36 were from higher/secondary schools, 18 were from middle schools, 35 schools in the rural locality, and 19 schools in the urban locality.

4.4.1. Tool for Data Collection

A Semi-structured interview schedule was designed which consisted of 17 questions, which were categorized under the themes of *Implementation, Technical Specifications, Benefits, Usage by Subject and Evaluation.* The semi-structured interviews were audio-recorded if the school head allowed recording, and at the same time, the responses were manually entered into the paper form of the questionnaire by the researcher.

4.4.2. Method of Data Collection and Analysis

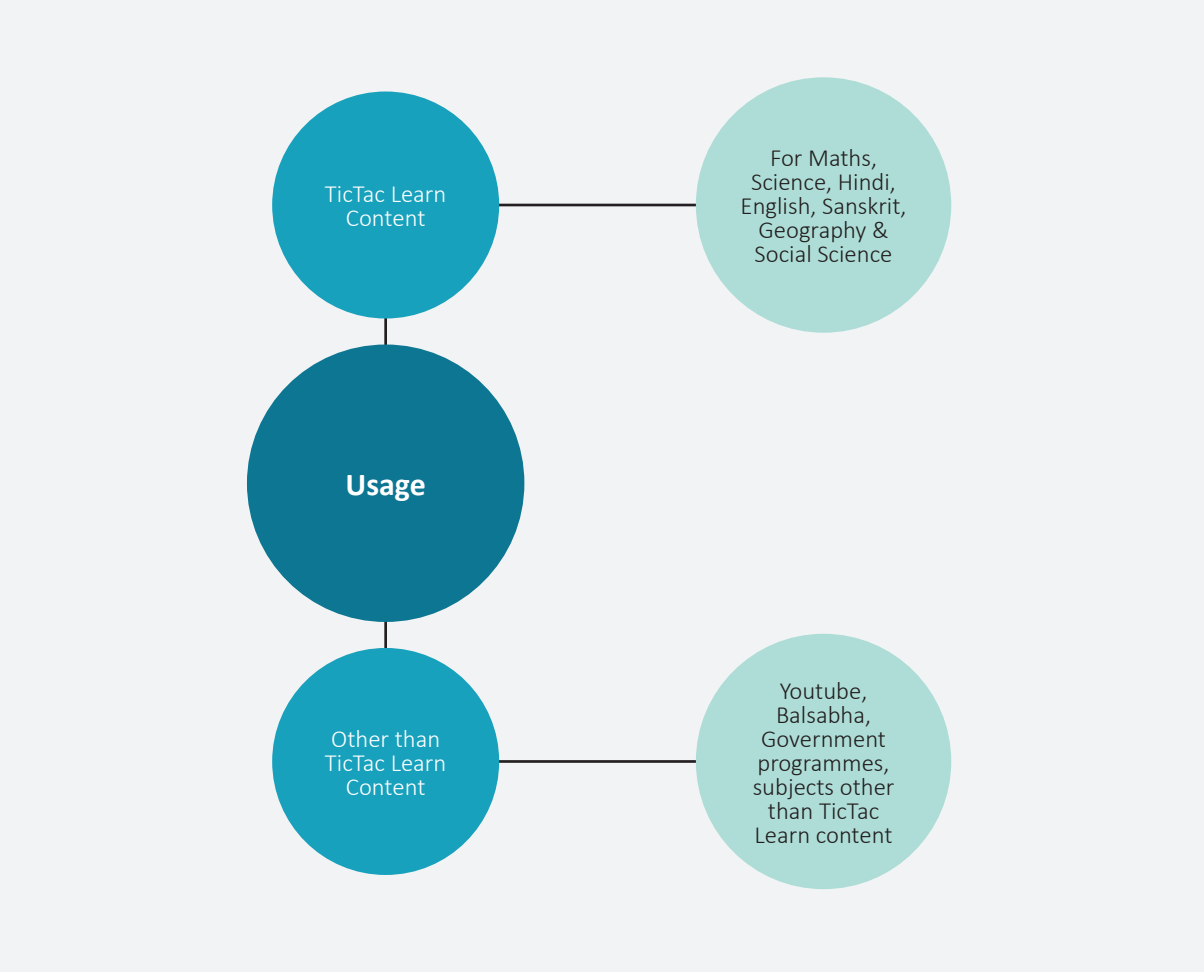
A total of 54 school-heads were interviewed, of which 29 school-heads allowed the audio recording, and the remaining interviews were documented through only handwritten notes which were used for data analysis. The audio-recorded data were translated and transcribed in English, these transcriptions were run through a qualitative data analysis software called MAXQDA, for coding purposes. During the coding process, relevant codes were assigned to the school-head interview transcriptions, which were then organized into themes and sub-themes.

The summary presented here is structured according to the respective themes and sub-themes.

4.4.3. Usage of DSP-TV

The school-heads reported usage of only the DSP-TV when they were talking about the Digital Shala Programme.

Figure 4.4.1: Findings of School Head Interview: Usage



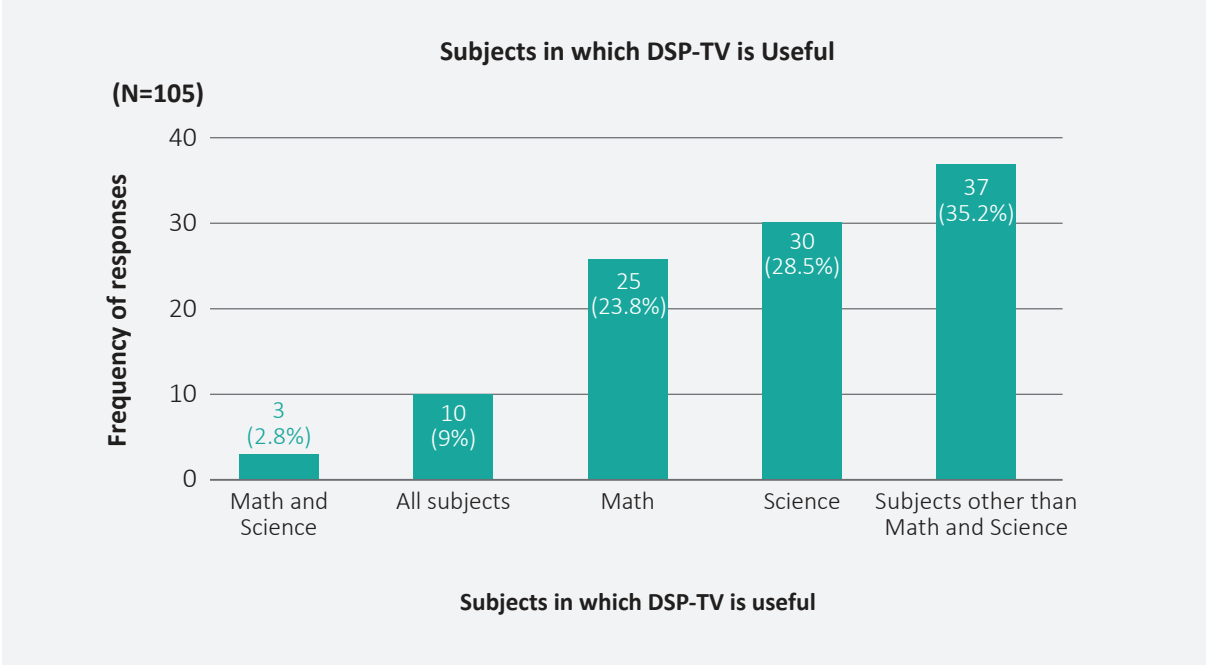
i. Summary of Findings -Usage

Findings from interviews with school heads indicate that,in both SIP and SNP schools DSP-TV was used to play TicTac Learn videos of Mathematics and Science. Other than TicTac Learn content, DSP-TVs were used for Youtube, Balsabha, Government programmes, subjects other than TicTac Learn content.

ii. Subjects for Which DSP-TV is Useful

In both SIP and SNP schools, 46 school heads gave multiple responses (105 responses) about the subjects for which DSP-TV is useful. Some responses (30/105) indicated that the DSP-TV was useful for Science, similarly, some responses (25/105) indicated that the DSP-TV was useful for Math. Some responses (37/105) stated that the DSP-TV was useful for subjects other than Math and Science. Subjects include Hindi, English, Sanskrit, Geography and Social Sciences. A few responses (10/105) stated that the DSP-TV was useful for all subjects that can be accessed on the DSP-TV from platforms other than TicTac Learn content (Fig. 4.4.2). Three responses out of the 105 mentioned that the DSP-TV was not useful for subjects other than Math and Science. Eight school-heads out of 54, did not respond to the subjects for which DSP-TV was helpful.

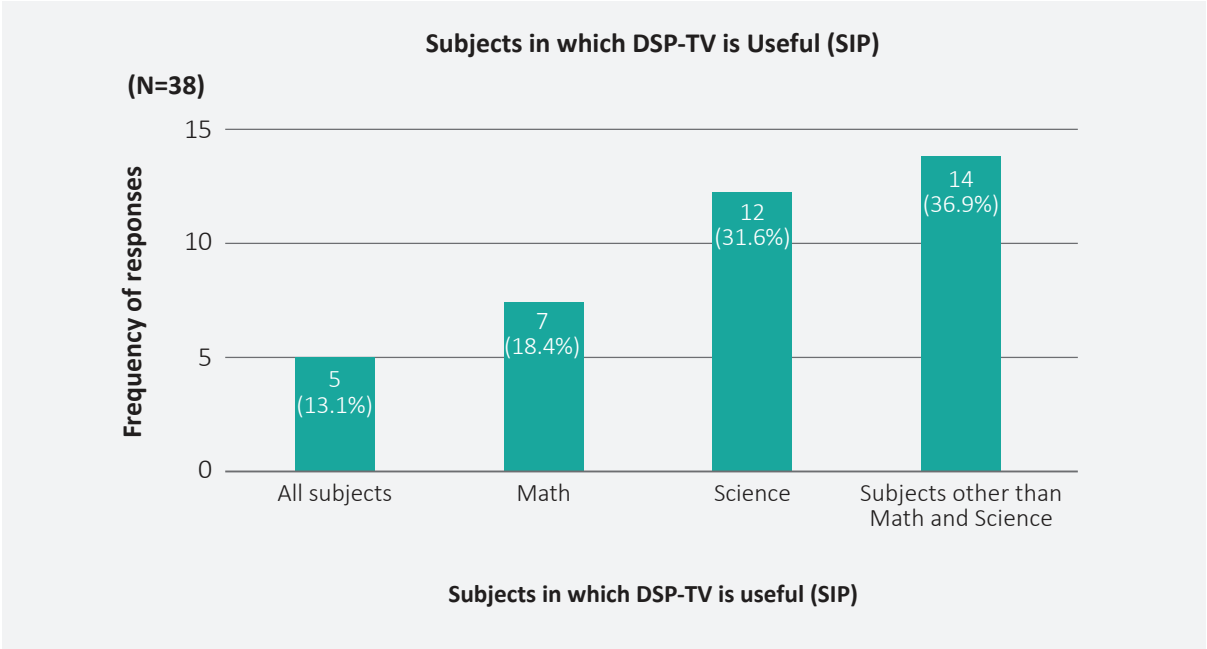
Figure 4.4.2: Findings of School Head Interview: Subjects in which DSP-TV is Useful



- **SIP:** Out of 105 responses, 38 were from SIP school-heads. Within these 38 responses, 20 responses were from Category 1 schools, 17 were from Category 2 schools, and one was from Category 5 schools.

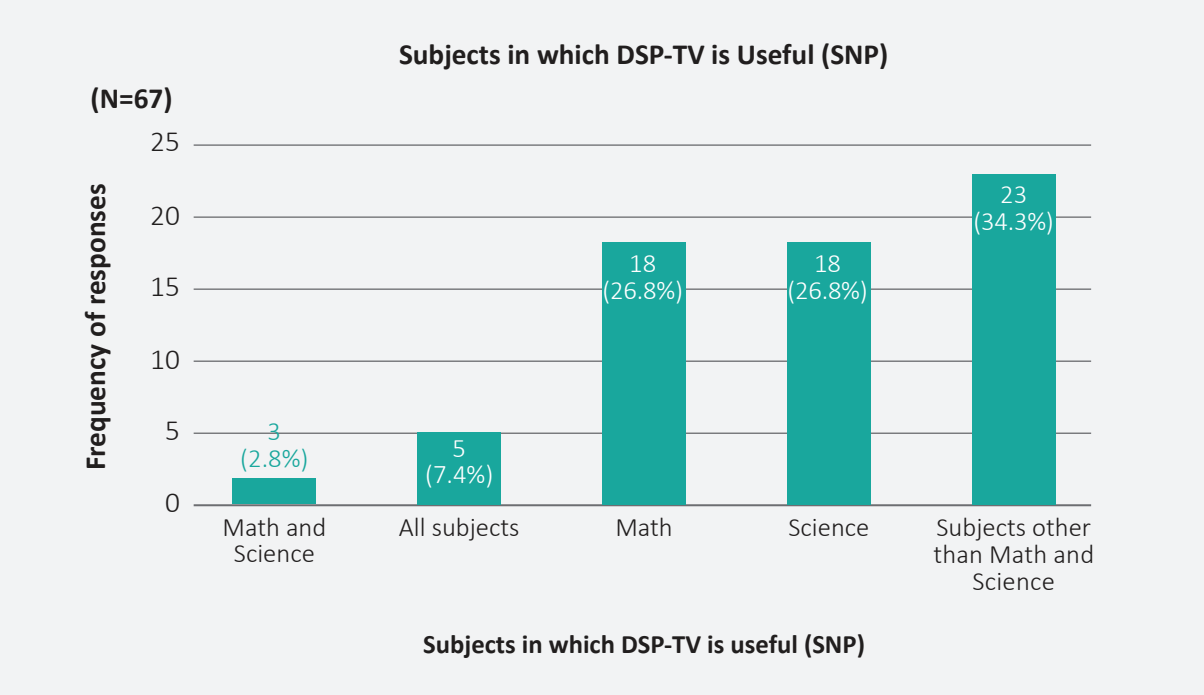
  Some responses (12/38) indicated that the DSP-TV was useful for Science, and some responses (7/38) indicated DSP-TV usage for Math (Fig. 4.4.3). Some responses (14/38) stated that the DSP-TV was useful for subjects other than Math and Science. A few responses (5/38) indicated that the DSP-TV was useful for all subjects that can be accessed on the DSP-TV from platforms other than TicTac Learn content.

Figure 4.4.3: Findings of School Head Interview: Subjects in which DSP-TV is Useful - SIP



- **SNP:** Out of the 105 responses, 67 were from SNP school heads. Within these 67 responses, 13 responses were from Category 1 schools, 21 were from Category 2 schools, 7 were from Category 3 schools, one was from Category 4 schools and 25 were from Category 5 schools (Fig. 4.4.4).

Figure 4.4.4: Findings of School Head Interview: Subjects in which DSP-TV is Useful - SNP



Some responses (18/67) indicated that the DSP-TV was useful for Science, similarly some responses (18/67) indicated that the DSP-TV is useful for Math. Some responses (23/67) stated that the DSP-TV was useful for subjects other than Math and Science. A few responses (5/67) stated that the DSP-TV was useful for all subjects that can be accessed on the DSP-TV from platforms other than TicTac Learn content.

Three responses out of the 67 mentioned that the DSP-TV was not useful for subjects other than Math and Science.

iii. Usage of DSP-TV Apart From Subjects (TicTac Learn Content)

In both SIP and SNP schools, 45 responses from 30 school-heads indicated the DSP-TV was used beyond TicTac Learn content. Many responses (27/45) indicated that YouTube was used. A school-head said that, *"We use it for YouTube. We search for a topic and we get good results."* Another school-head mentioned that, "English teachers use YouTube through personal mobile Wifi (hotspot)." Some responses (11/45) indicated that multiple applications were used on DSP-TV to play motivational songs, and government-issued video-based lectures and discussions. Some responses (7/45) stated that they play Bal Sabha, which is an extracurricular activity during which the teachers show students inspirational videos on DSP-TV. 24 school heads did not respond to the DSP-TV usage apart from TicTac Learn content (Fig. 4.4.5).

- **SIP:** Out of 45 responses, 24 were from SIP school heads. Within these 24 responses, 13 responses were from Category 1 schools, 10 were from Category 2 schools, and one response was from Category 5 schools. Several responses (14/24) indicated that YouTube is used on the DSP-TV, apart from TicTac Learn content. Some responses (6/24) indicated that other programmes are played on the DSP-TV,

apart from the TicTac Learn content. Some responses (4/24) stated that they play the Bal Sabha programme on the DSP-TV. (Fig. 4.4.6)

Figure 4.4.5: Findings of School Head Interview: Usage of DSP-TV apart from Subjects (TicTac Learn Content)

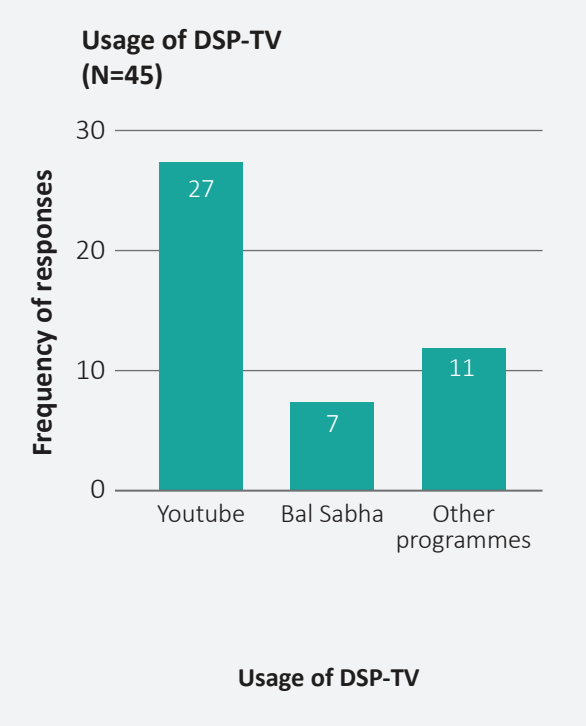
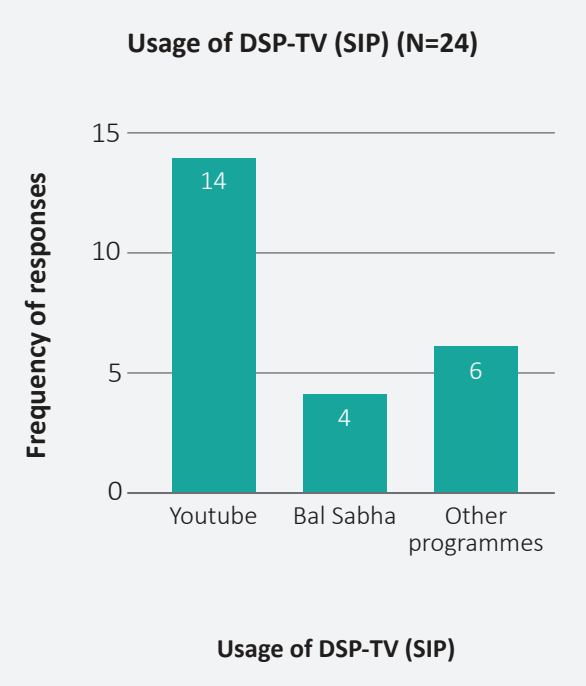
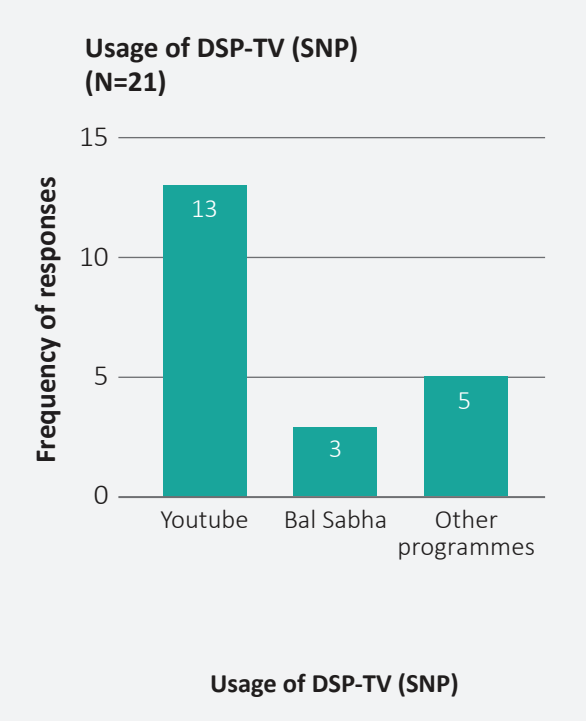


Figure 4.4.6: Findings of School Head Interview: Usage of DSP-TV apart from Subjects (TicTac Learn Content) - SIP



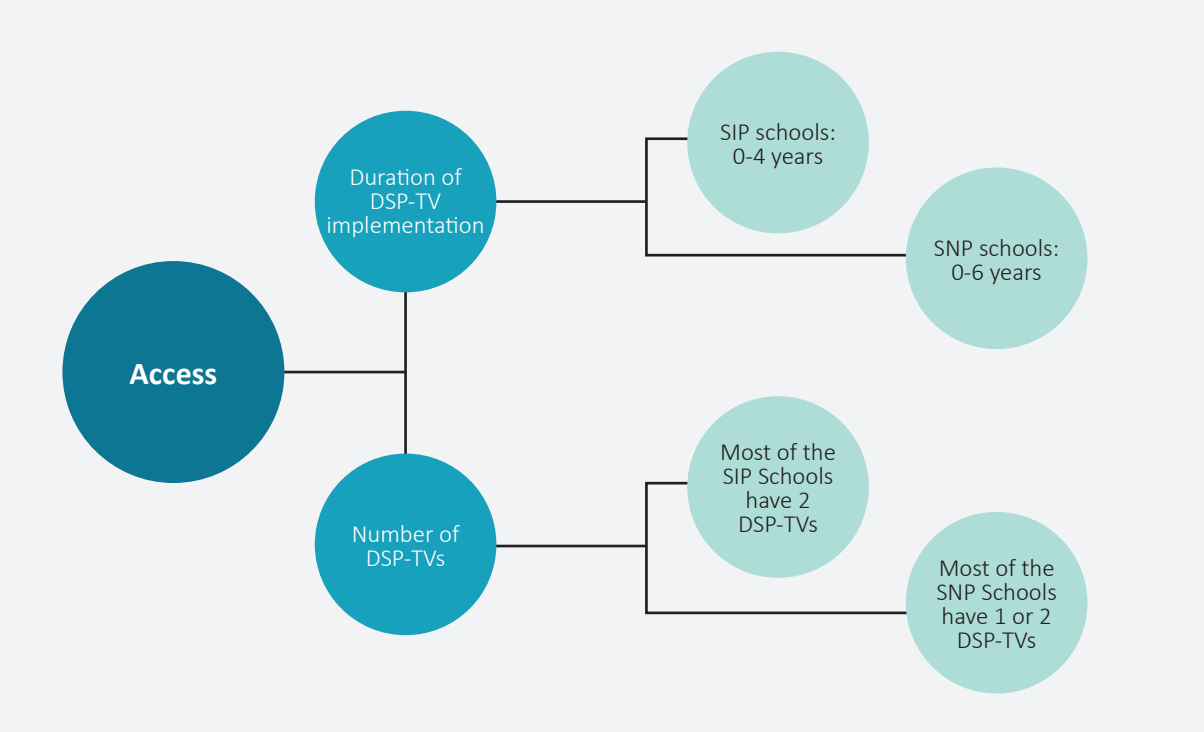
- **SNP:** Out of 45 responses, 21 were from SNP school heads. Within these 21 responses, five responses were from Category 1 schools, eight were from Category 2 schools, one response was from Category 3 schools, one was from Category 4 schools and six were from Category 5 schools. Many responses (13/21) indicated that YouTube is used on the DSP-TV, apart from TicTac Learn content. Some responses (5/21) indicated that other programmes are played on the DSP-TV, apart from the TicTac Learn content. A few responses (3/21) stated that they play the Bal Sabha programme on the DSP-TV.

Figure 4.4.7: Findings of School Head Interview: Usage of DSP-TV apart from Subjects (TicTac Learn Content) - SNP



4.4.4. Access to DSP-TV

Figure 4.4.8: Findings of School-Head Interview: Summary of Findings- Access to DSP-TV



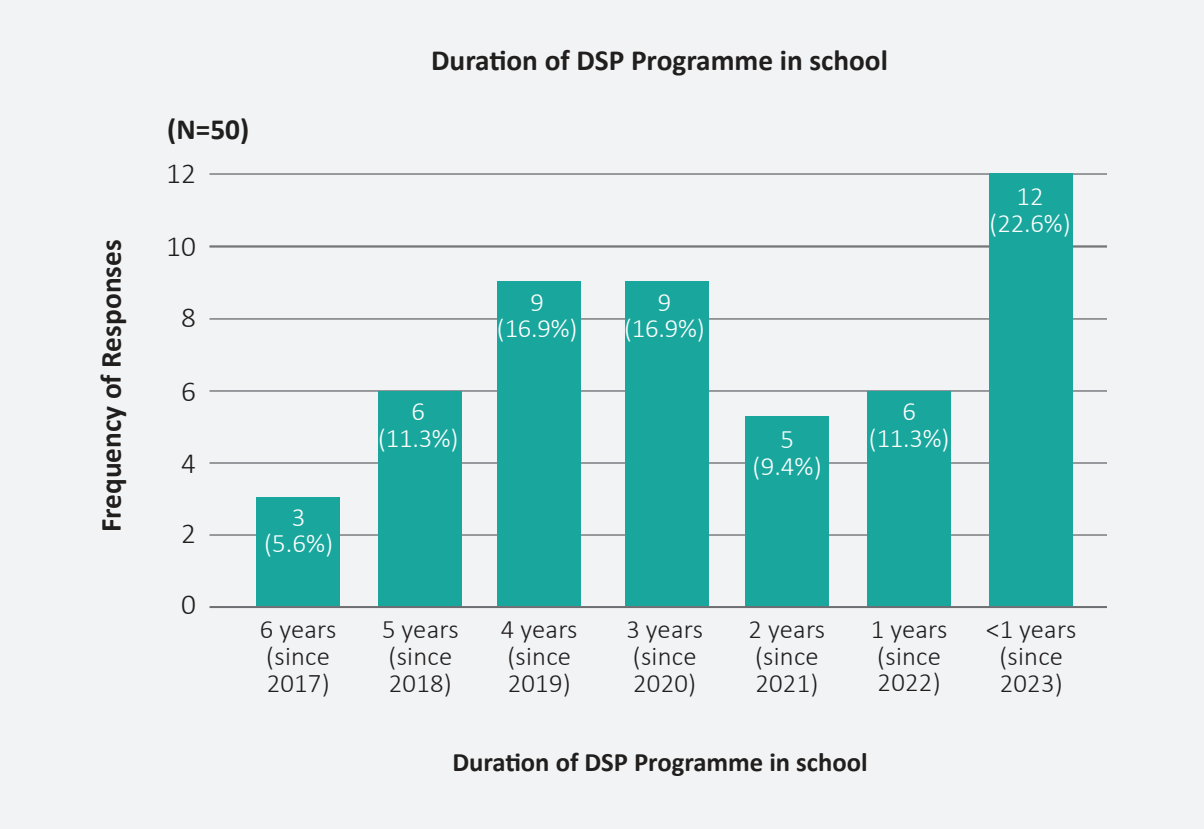
i. Summary of Findings:Access to DSP-TV

Findings from interviews with school heads indicate that DSP-TVs had been implemented in 0-4 years across SIP schools , whereas in 0-6 years across SNP schools. Most of the responses from SIP school heads indicated that there are two DSP-TVs installed in their school. Responses from SNP school heads indicated that several schools have one DSP-TV installed in their school and several others have two DSP-TVs.

ii. Duration of DSP-TV Implementation

In both SIP and SNP schools, 53 responses from 52 school heads indicated the duration of DSP-TV implementation. Some responses indicated that the DSP-TV had been implemented for less than a year (12/53), for the last 3 years (9/53), and for the last 4 years (9/53). A few responses showed that the DSP-TV had been implemented for the last 5 years (6/53) and for the last 6 years (3/53). A few responses indicated that the DSP-TV had been implemented for the last 1 year (6/53) and for the last 2 years (5/53). A few school heads (3/53) who responded were unsure of the duration of DSP-TV implementation. Two school heads did not give any response about the duration of DSP-TV implementation.

Figure 4.4.9: Findings of School Head Interview: Duration of DSP-TV Implementation



SIP: Out of the 53 responses, 17 responses were from SIP school heads. Within these 17 responses, 10 responses were from Category 1 schools, six were from Category 2 schools, and one response was from Category 5 schools. Many responses (11/17) indicated that the implementation of the DSP-TV has been going on for less than a year (Fig. 4.4.10). A few responses indicated that the implementation of the DSP-TV has been going on for the last 4 years (2/17) and for the last 1 year (2/17). One response (1/17) indicated that the implementation of the DSP-TV has been going on for the last 3 years and one response reported the duration being the last 2 years (1/17). None of the responses from the 16 SIP school heads indicated that the implementation of the DSP-TV had been going on for the last 6 years and for the last 5 years.

Figure 4.4.10: Findings of School Head Interview: Duration of DSP-TV Implementation - SIP

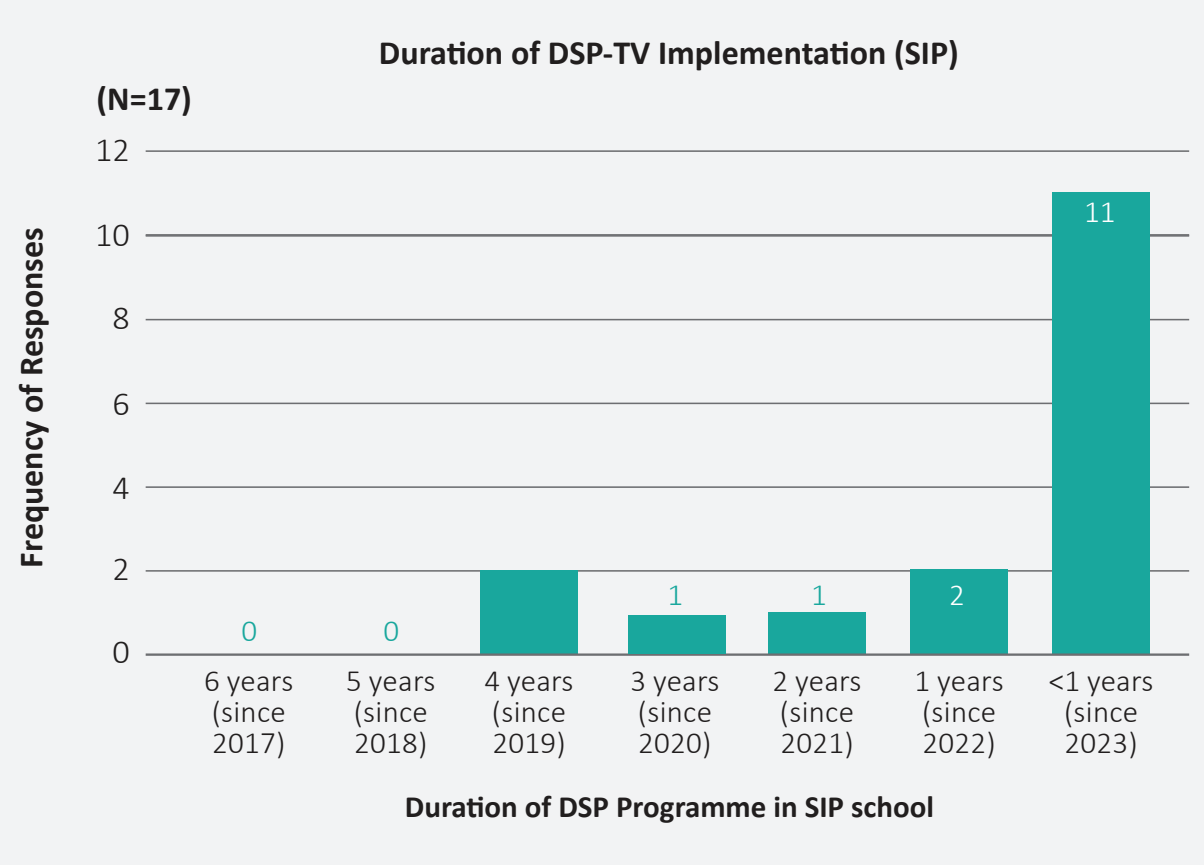
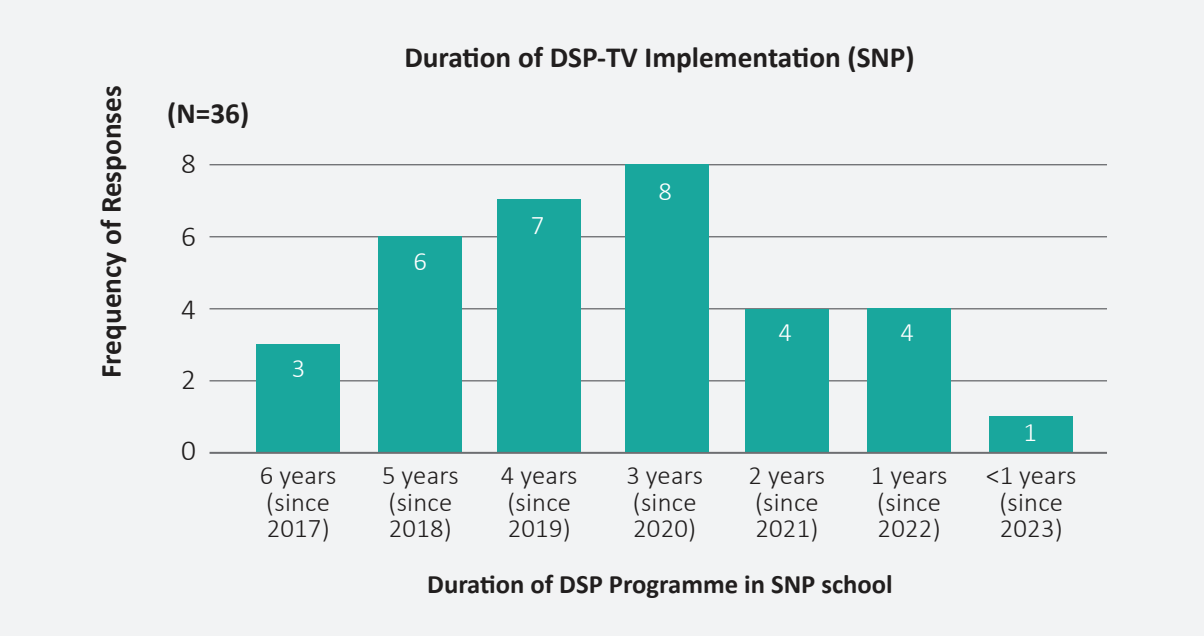


Figure 4.4.11: Findings of School Head Interview: Duration of DSP-TV Implementation - SNP



- **SNP:** Out of the 53 responses, 36 responses were from SNP school heads.

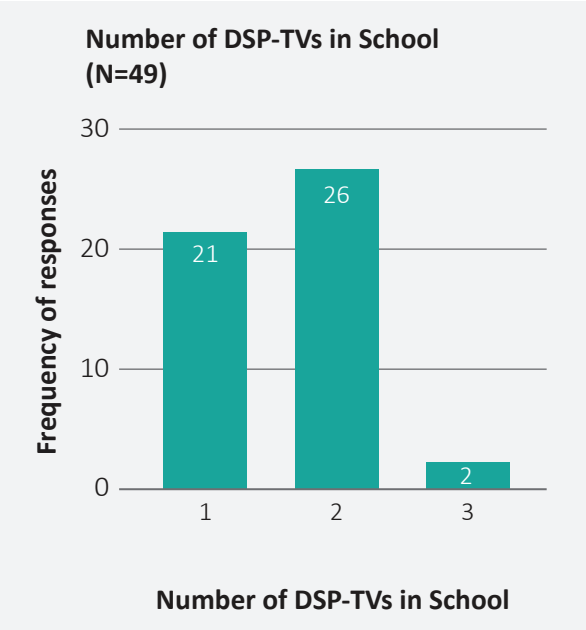
  Within these 36 responses, six responses were from Category 1 schools, 11 were from Category 2 schools, three responses were from Category 3 schools, one was from Category 4 schools and 15 were from Category 5

schools. Some responses indicated that the implementation of the DSP-TV has been going on for the last 3 years (8/36), for the last 4 years (7/36), and for the last 5 years (6/36). A few responses (4/36) indicated that the implementation of the DSP-TV has been going on for the last 2 years, for the last 1 year (4/36), and the last 6 years (3/36), in their respective schools (Fig. 4.4.11). One response (1/36) indicated that the implementation of the DSP-TV has been going on for less than a year. Three school heads were unsure of the duration of DSP-TV implementation.

iii. Number of DSP-TVs Per School

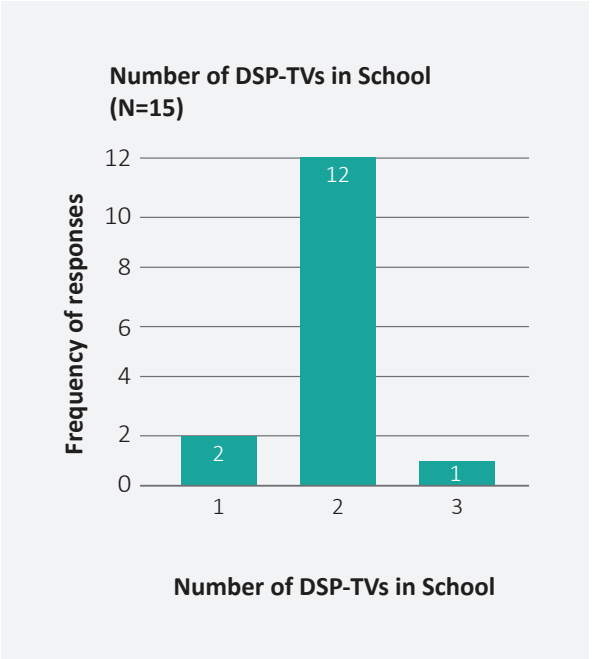
In both SIP and SNP schools, 49 responses from 49 school heads indicated the number of DSP-TVs installed in the schools. Several responses (26/49) mentioned that there were two DSP-TVs installed in their school. Similarly, several more responses (21/49) mentioned that there was one DSP-TV installed in their school. A few responses (2/49) indicated that there are three DSP-TVs installed in their school. Five school heads did not give any response about the number of DSP-TVs installed in their schools.

Figure 4.4.12: Findings of School Head Interview: Number of DSP-TVs per School



- **SIP:** Out of the 49 responses, 15 responses were from SIP school heads. Within these 15 responses, nine responses were from Category 1 schools, five were from Category 2 schools, and one response was from Category 5 schools. Most responses (12/15) mentioned that there are 2 DSP-TVs installed in their school. Two responses (2/15) indicated that there is 1 DSP-TV installed in their school. One response (1/15) indicated that there are 3 DSP-TVs installed in their school.

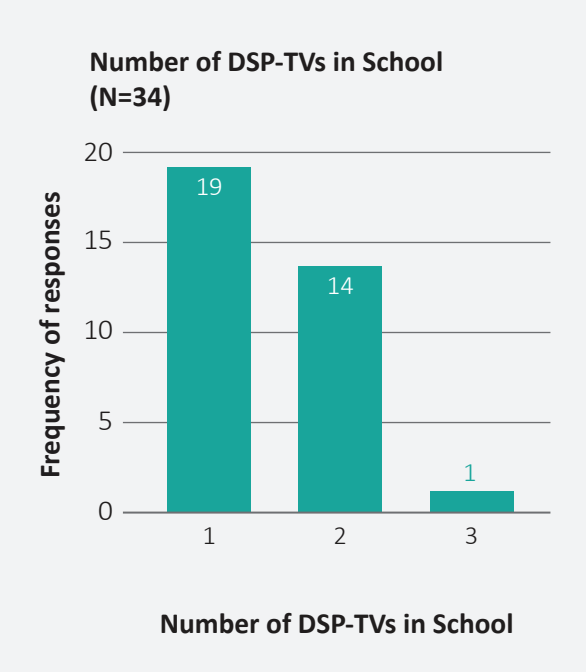
Figure 4.4.13: Findings of School Head Interview: Number of DSP-TVs per School - SIP



- **SNP:** Out of the 49 responses, 34 responses were from SNP school heads. Within these 34 responses, five responses were from Category 1 schools, 10 were from Category 2 schools, three responses were from Category 3 schools, one was from Category 4 schools and 15 were from Category 5 schools.

  Several responses (19/34) indicated that there is one DSP-TV installed in their school. Similarly, several more responses (14/34) mentioned that there are two DSP-TVs installed in their school. One response (1/34) indicated that there are three DSP-TVs installed in their school (Fig. 4.4.14).

Figure 4.4.14: Findings of School Head Interview: Number of DSP-TVs per School - SNP

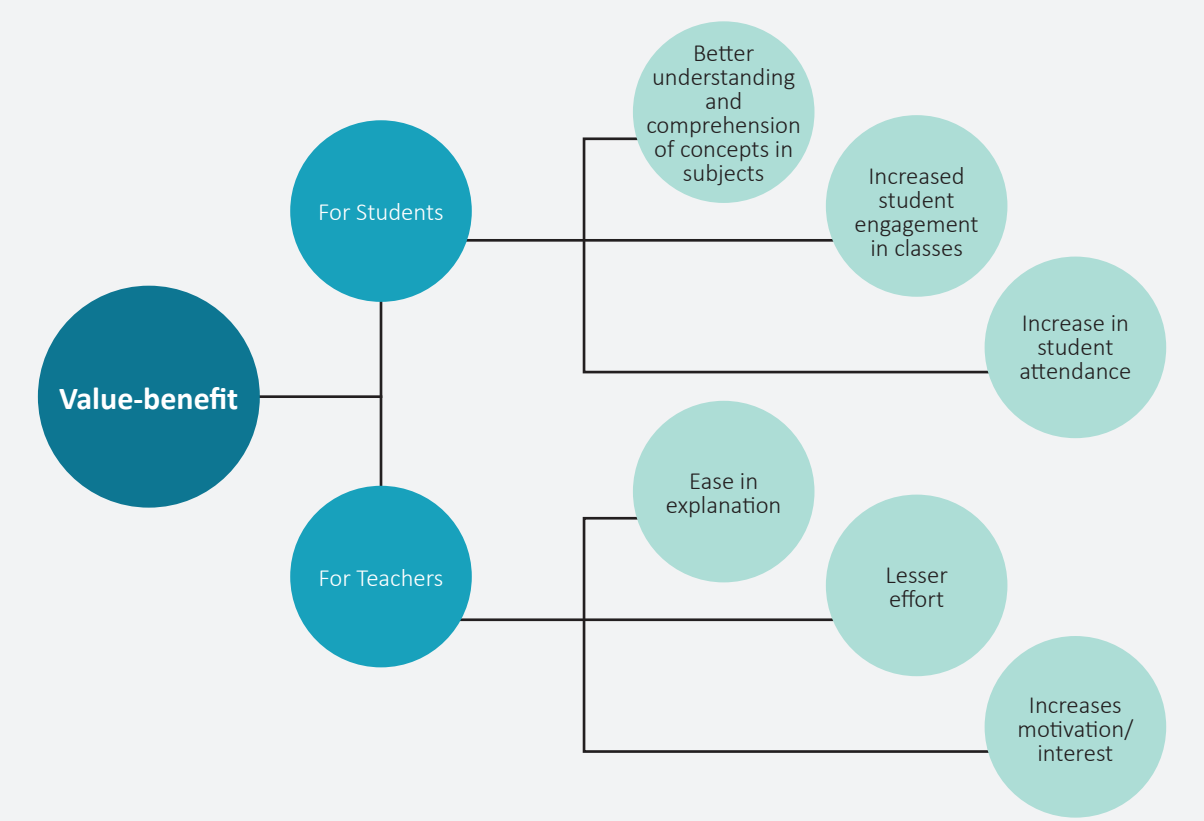


4.4.5. Value-Benefit

i. Summary of Findings-Value Benefit

Findings from interviews with school heads indicate that the programme improved students' understanding and comprehension of subjects, as well as student engagement and attendance. The school heads also mentioned that the programme increased teachers' interest and motivation, and helped teachers in providing easier explanations and reducing effort. Moreover, the various decisions for DSP-TV installation such as position (for the TV), security, grades and use was either taken by the school administration or taken by Muskan Dreams Foundation.

Figure 4.4.15: Findings of School-Head Interview: Value-Benefit



Findings from School-Heads Interview: Value-benefit

ii. Benefits of the DSP-TV Programme

In both SIP and SNP schools, 136 responses from 53 school heads reported the benefits of the DSP-TV (the school heads' perception of the DSP Programme).

Some responses (46/136) indicated that implementation of the DSP-TV has led to a better understanding and comprehension of subject concepts in students. One of the school heads stated *"Children who cannot write grasp concepts and learn through visuals and audio in DSP-TV."*

Some responses (35/136) indicated that the implementation of the DSP-TV programme has led to increased student engagement in classes. A school head said, *"Students ask questions. Earlier they didn't ask."*

Some responses (20/136) mentioned that the implementation of the DSP-TV program has led to an increase in student attendance. A school head said, *"The student attendance is more when we teach them through the TV."*

A few responses (13/136) indicated that the students are happy with the implementation of the DSP-TV program. A school head stated, *"Some students who do not have TV or mobile phones in their home are getting excited about the TV."*

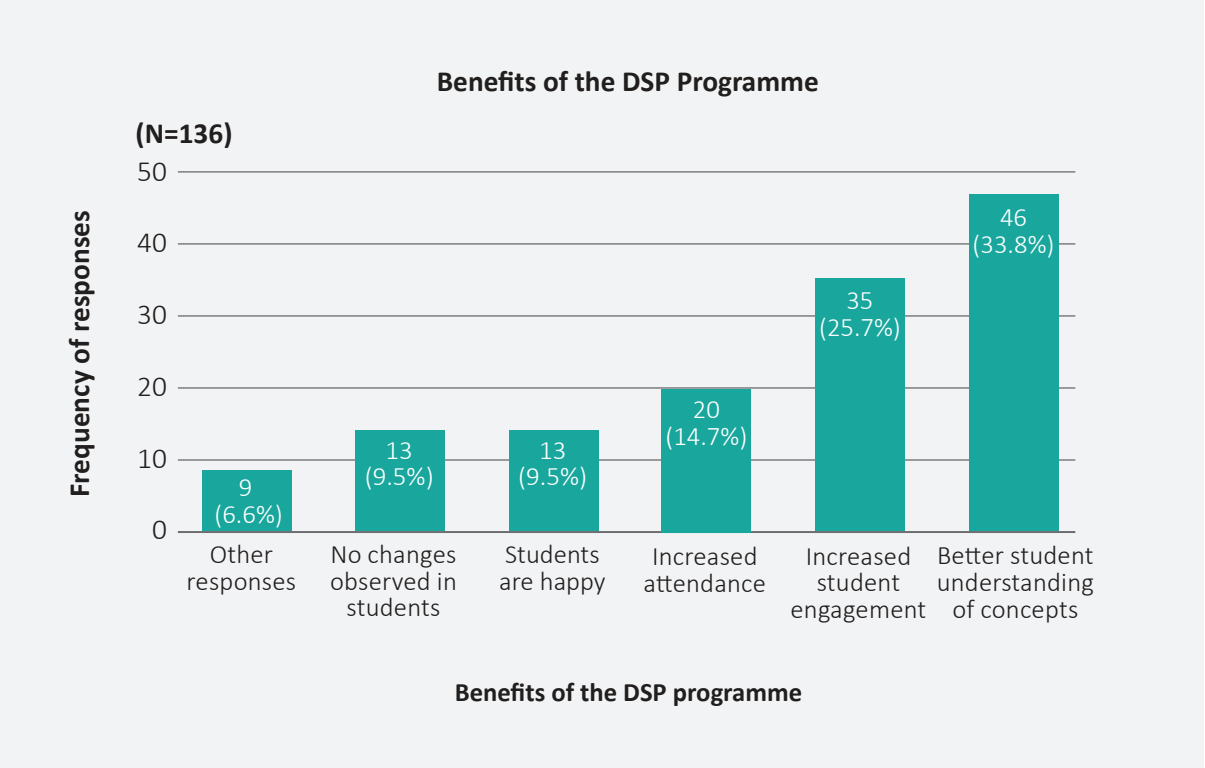
A few responses (13/136) indicated that there were no noticeable changes in the student's post-implementation of the DSP programme.

Four out of 136 responses indicated that there was an increased awareness of the general knowledge, as a result of the DSP programme.

Four responses out of the 136 responses stated that they believe the DSP-TV to be beneficial for primary students (not middle or secondary). A school head mentioned *"It is more useful for primary students."* Another school head said, *"However I think that it must be given to the primary students who study well on TV."*

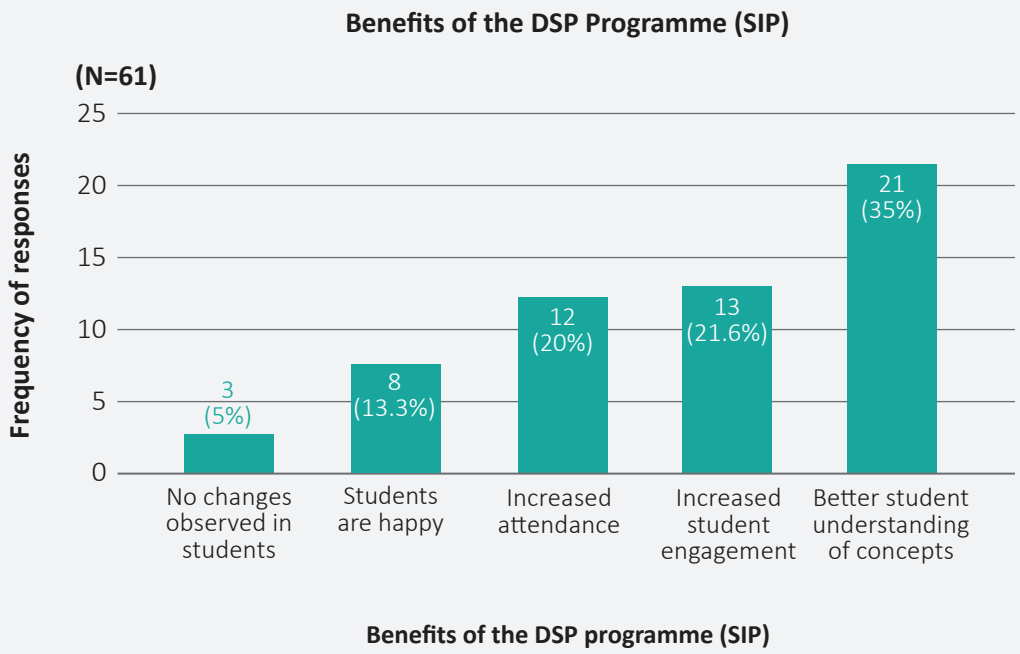
One school head did not give any response about the benefits of the DSP-TV programmes.

Figure 4.4.16: Findings of School Head Interview: Benefits of the DSP Programme



SIP: Out of the 135 responses, 61 were from SIP school-heads. Within these 61 responses, 34 responses were from Category 1 schools, 25 were from Category 2 schools, and two responses were from Category 5 schools.

Figure 4.4.17: Findings of School Head Interview: Benefits of the DSP Programme SIP



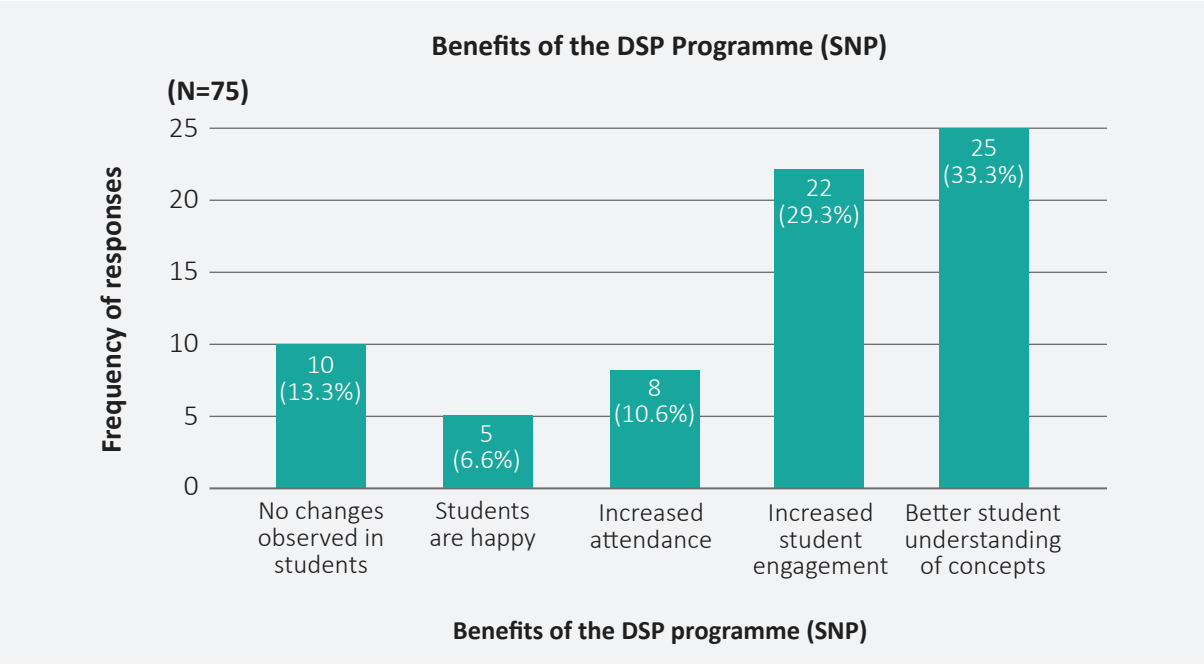
Some responses (21/61) indicated that implementation of the DSP-TV programme has led to a better understanding and comprehension of subject concepts in students. Similarly, some more responses (13/61) indicated that the implementation has led to increased student engagement in classes, and some responses (12/61) mentioned that it has led to an increase in student attendance. A few responses (8/61) indicated that the students are happy with the implementation of the DSP-TV programme (Fig. 4.4.17). Two responses out of 61 responses indicated that there was an increased awareness of the general knowledge, as a result of the DSP-TV programme. Two responses out of the 61 responses stated that they believe the DSP-TV to be beneficial for primary students. A few responses (3/61) indicated that there were no noticeable changes in the students post-implementation.

- **SNP:** Out of the 135 responses, 75 were from SNP school-heads. Within these 75 responses, 12 responses were from Category 1 schools, 23 were from Category 2 schools, eight responses were from Category 3 schools, two were from Category 4 schools and 30 were from Category 5 schools.

  Some responses (25/75) indicated that implementation of the DSP-TV programme has led to a better understanding and comprehension of students. While, some more responses (22/75) indicated that the implementation has led to increased student engagement in classes. A few responses (8/75) mentioned that the implementation has led

to an increase in student attendance, and a few more responses (5/75) indicated that the students are happy with the implementation of the DSP-TV programme. Two responses out of 75 responses indicated that there was an increased awareness of general knowledge, as a result of the DSP-TV programme.

Figure 4.4.18: Findings of School Head Interview: Benefits of the DSP Programme SNP



Two responses out of the 75 responses stated that they believe the DSP-TV to be beneficial for primary students. A few responses (10/75) indicated that there were no noticeable changes in the students post-implementation of the DSP-TV programme. One response out of the 75 responses indicated that the DSP-TV programme has not benefited the students in their school.

iii. Usefulness for Teachers

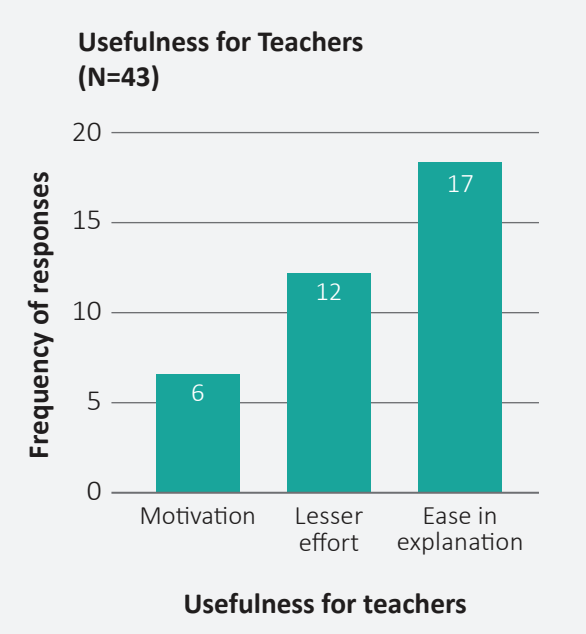
In both SIP and SNP schools, 38 school-heads responded to this question; their 43 varied responses indicated that the DSP-TV is useful for teachers in their schools.

Some responses (17/43) indicated that the DSP-TV makes it easier for teachers to explain and teach their classes (Fig. 4.4.19). A school-head said that, *"Every teacher has their own technique of teaching and with the help of YouTube etc. they explain very well and it helps students."* Another school-head mentioned that, *"If we miss something while teaching, TV can fill in the gaps and help students understand better."* Some responses (12/43) indicated that the DSP-TV allows teachers to extend less effort while teaching. A school-head said that, *"It reduces the burden of the teachers."* Another school-head mentioned that, *"It is easier for the teachers too; they no longer have to make diagrams on the blackboard. The video has practical things."* A few responses (6/43) indicated that the DSP-TV motivates/increases interest in teachers to teach. A school-head said that, *"The teachers are also motivated to teach."* Another school-head mentioned that, *"Teachers are also getting interested in teaching through smart TV."*

Three responses out of 43 indicated that the use of the DSP-TV has led to the gaining of knowledge by teachers, another three responses indicated

that the DSP-TV aids teachers in keeping students occupied. A school-head stated that, *"If a subject teacher is absent then another (subject) teacher can teach using TV and maintain the routine. Students can ask questions to the (main subject) teacher later."*

Figure 4.4.19: Findings of School Head Interview: Usefulness for Teachers



One response out of 43 mentioned that the use of the DSP-TV has led to an increase in the number of classes, while another response (1/43) mentioned that it has led to increased teacher engagement.

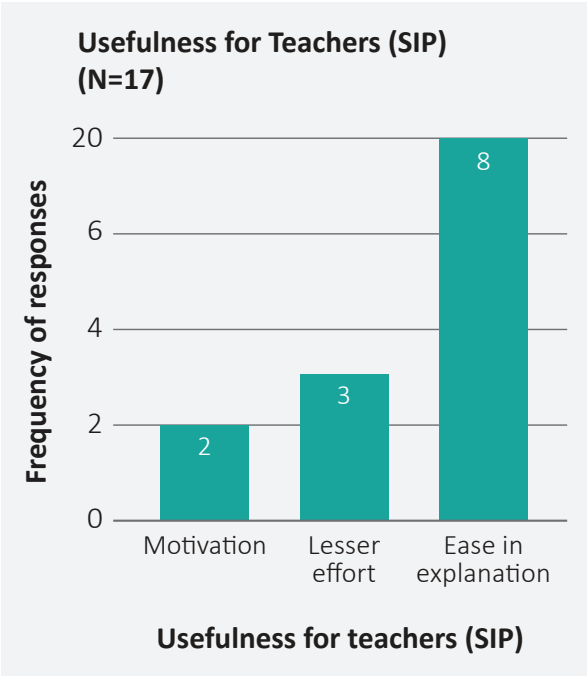
16 school-heads (out of 54) did not give any response concerning the usefulness of the DSP-TV for teachers in their schools.

- **SIP:** Out of the 43 responses, 17 were from SIP school-heads.

  Within these 17 responses, 12 responses were from Category 1 schools, five were from Category 2 and none of the responses were from Category 5 schools.

  Several responses (8/17) indicated that the DSP-TV makes it easier for teachers to explain and teach their classes (Fig. 4.4.20). Some responses (3/17) indicated that less effort is required while teaching, due to the use of the DSP-TV. A few responses (2/17) indicated the DSP-TV motivated teachers to teach. Two responses out of 17 indicated that the DSP-TV aids teachers in keeping students occupied. One response out of 17 indicated that the use of the DSP-TV has led to the gaining of knowledge by teachers. One response out of 17 mentioned that the use of the DSP-TV has led to an increase in the number of classes.

Figure 4.4.20: Findings of School Head Interview: Usefulness for Teachers - SIP

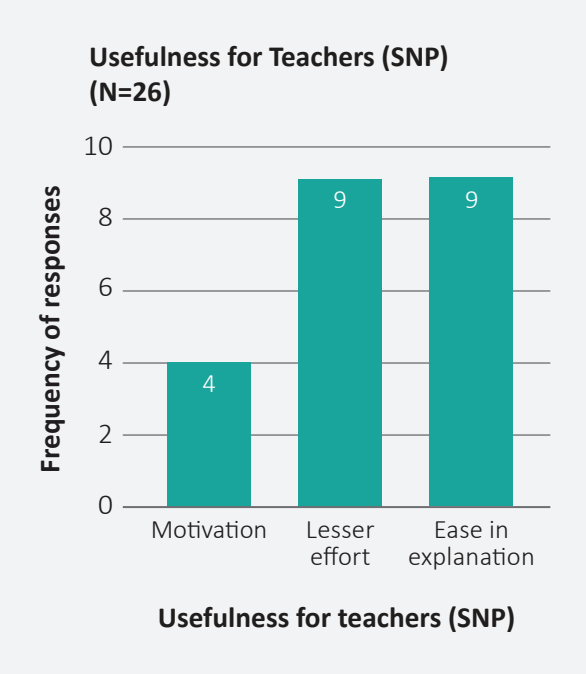


SNP: Out of 43 responses, 26 were from SNP school-heads. Within these 26 responses, six responses were from Category 1 schools, seven were from Category 2 schools, two responses were from Category 3 schools, one was from Category 4 schools and 10 were from Category 5 schools.

Some responses (9/26) indicated that the DSP-TV makes it easier for teachers to explain and teach their classes (Fig. 4.4.21). Some responses (9/26) indicated that less effort is required while teaching, due to the use of the DSP-TV. Some responses (4/26) indicated that the DSP-TV motivated teachers to teach. Two responses out of 26 indicated that the use of the DSP-TV has led to the gaining of knowledge by teachers. One response out of

26 indicated that the DSP-TV aids teachers in keeping students occupied. One response out of 26 mentioned that the use of the DSP-TV has led to increased teacher engagement.

Figure 4.4.21.: Findings of School Head Interview: Usefulness for Teachers - SNP



4.4.6 Decision Making Body Concerned With the DSP-TV Installation and Use

In both SIP and SNP schools, 42 responses from 40 school heads reported that the various decisions for DSP-TV installation and use was either taken by the school administration or taken by Muskan Dreams Foundation. Examples of decisions taken were, *"We made the decision because of the security factor"* and "*They (Muskaan Dreams) decided. They said the decision was made as per the position (for the TV), security point-of-view and grades."*

Several responses (18/42) indicated that the decisions concerning the DSP-TV were taken by the school administrations'. A school-head said that, *"We (school administration) suggested for 7th and 8th grade. Then, when it's time to go to 9th grade, they will be better prepared."* Some responses (14/42) indicated that the decision regarding the DSP-TV was made by Muskan Dreams Foundation. A school-head said that, *"They (Muskan Dreams) decided as per the facility and students' seating arrangement."* 10 out of 42 responses indicated that they were unsure of who made the decision regarding DSP-TV installation. 14 school-heads did not give any response concerning who decided for the DSP-TV installation.

- **SIP:** Out of the 42 responses, 17 were from SIP school-heads. Within these 17 responses, 10 responses were from Category 1 schools, six were from Category 2 and one response was from Category 5 schools.

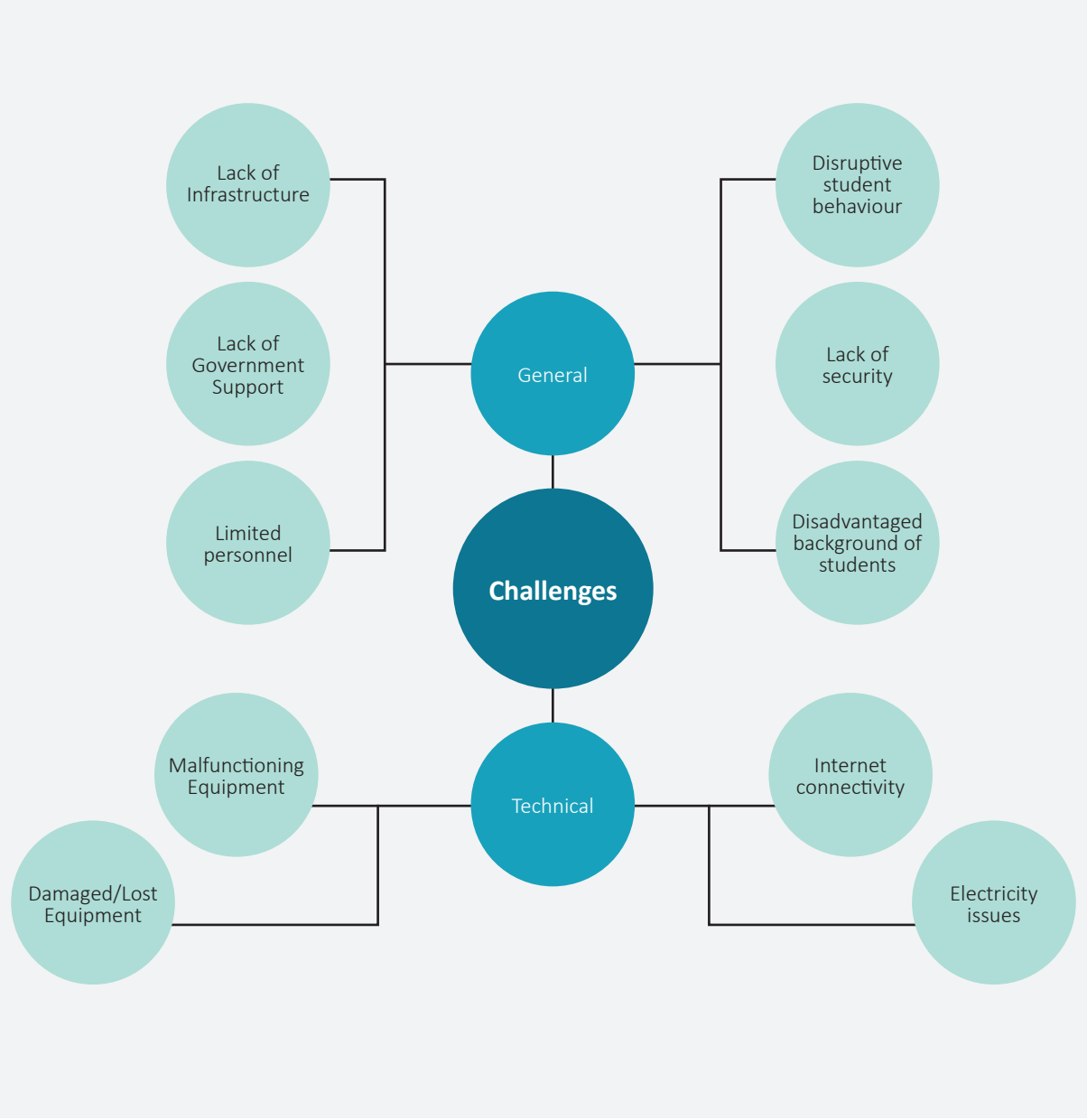
  Several responses (9/17) indicated that the various decisions regarding the DSP-TV were taken by Muskan Dreams Foundation. While several other responses (7/17) indicated that the decisions concerning the DSP-TV were taken by the school administrations'. One out of 17 SIP school-heads who responded was unsure of the decision that was taken about DSP-TV.

- **SNP:** Out of the 42 responses, 25 were from SNP school-heads. Within these 25 responses, five responses were from Category 1 schools, seven were from Category 2 schools, two responses were from Category 3 schools, none of the responses were from Category 4 schools and 10 were from Category 5 schools.

  Some responses (9/25) indicated that the decision regarding the DSP-TV was taken by school administrations. While, some other responses (7/25) indicated that the decisions concerning the DSP-TV were made by Muskaan Dreams Foundation. Nine out of 25 SNP school-heads who responded were unsure of the decision that was taken about DSP-TV installation.

4.4.7. Challenges

Figure 4.4.22: Findings of School-Head Interview: Challenges



i. Summary of Findings- Challenges

Findings from interviews with school heads indicate that they did not face any challenges during the installation of the DSP-TV. However, they did face challenges while implementing the DSP-TV program, including lack of government support, insufficient infrastructure, limited personnel, disruptive student behavior, students from disadvantaged backgrounds, and lack of security. Additionally, school heads from both SIP and SNP schools reported various technical issues and challenges, including malfunctioning, damaged or lost equipment, electricity issues, and internet connectivity problems.

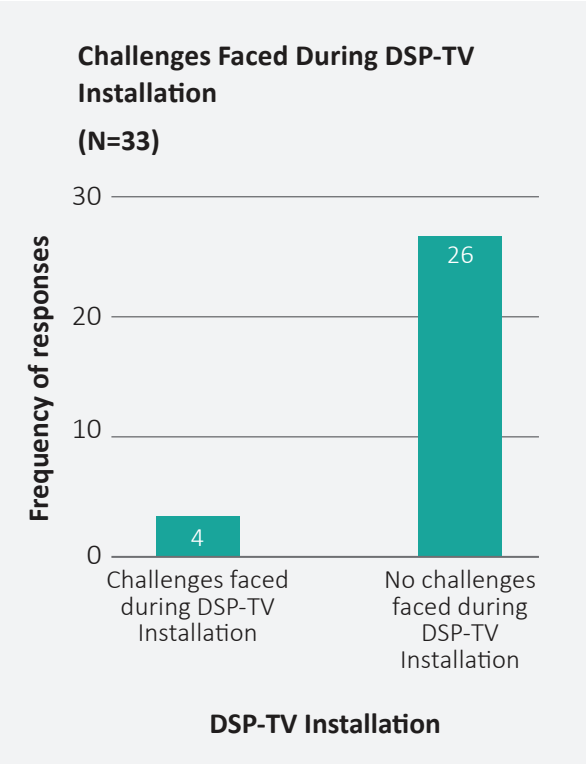
ii. Challenges Faced During DSP-TV Installation

In both SIP and SNP schools, 33 responses from 31 school-heads mentioned various challenges faced during installation of the DSP-TV (Fig. 4.4.23).

Most responses (26/33) indicated that there were no challenges faced during the installation of the DSP-TV. A few responses (4/33) indicated that there were challenges faced during the installation of the DSP-TV. A school-head said that, *"First it was installed in 7th class but in the wrong direction. We called them to install it again but they were charging fees." Another school-head mentioned that, "There were some electricity problems."*

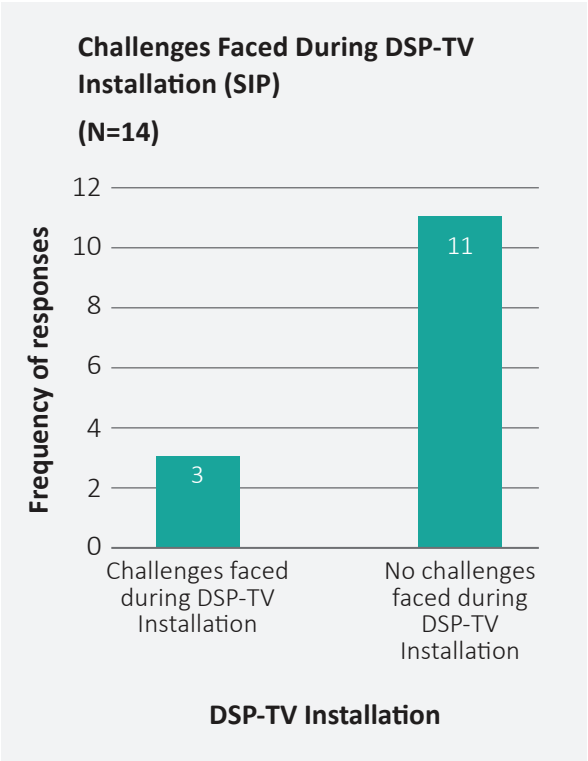
Three out of 31 school-heads who responded were unsure of the challenges faced during the installation of the DSP-TV. 23 school-heads did not give any response concerning the decision that was taken for the DSP-TV installation.

Figure 4.4.23: Findings of School Head Interview: Challenges Faced During DSP-TV Installation



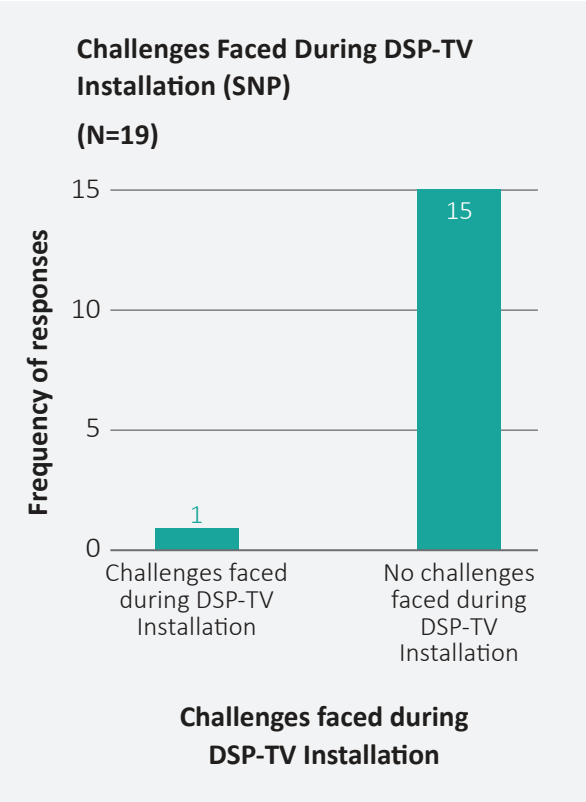
SIP: Out of the 33 responses, 14 were from SIP school-heads. Within these 14 responses, seven responses were from Category 1 schools, five were from Category 2 and two responses were from Category 5 schools. Most responses (11/14) indicated that no challenges were faced during the installation of DSP-TV. Some responses (3/14) indicated that challenges were faced during the installation of DSP-TV (Fig. 4.4.24).

Figure 4.4.24: Findings of School Head Interview: Challenges Faced During DSP-TV Installation - SIP



SNP: Out of the 33 responses, 19 were from SNP school-heads. Within these 19 responses, two responses were from Category 1 schools, seven were from Category 2 schools, three responses were from Category 3 schools, none of the responses were from Category 4 schools and seven were from Category 5 schools. Most responses (15/19) indicated that no challenges were faced during the installation of DSP-TV while one response (1/19) indicated that challenges were faced during the installation of DSP-TV (Fig. 4.4.25). Three out of the 19 SNP school-heads who responded were unsure of the challenges faced during the installation of the DSP-TV.

Figure 4.4.25: Findings of School Head Interview: Challenges Faced During DSP-TV Installation - SNP



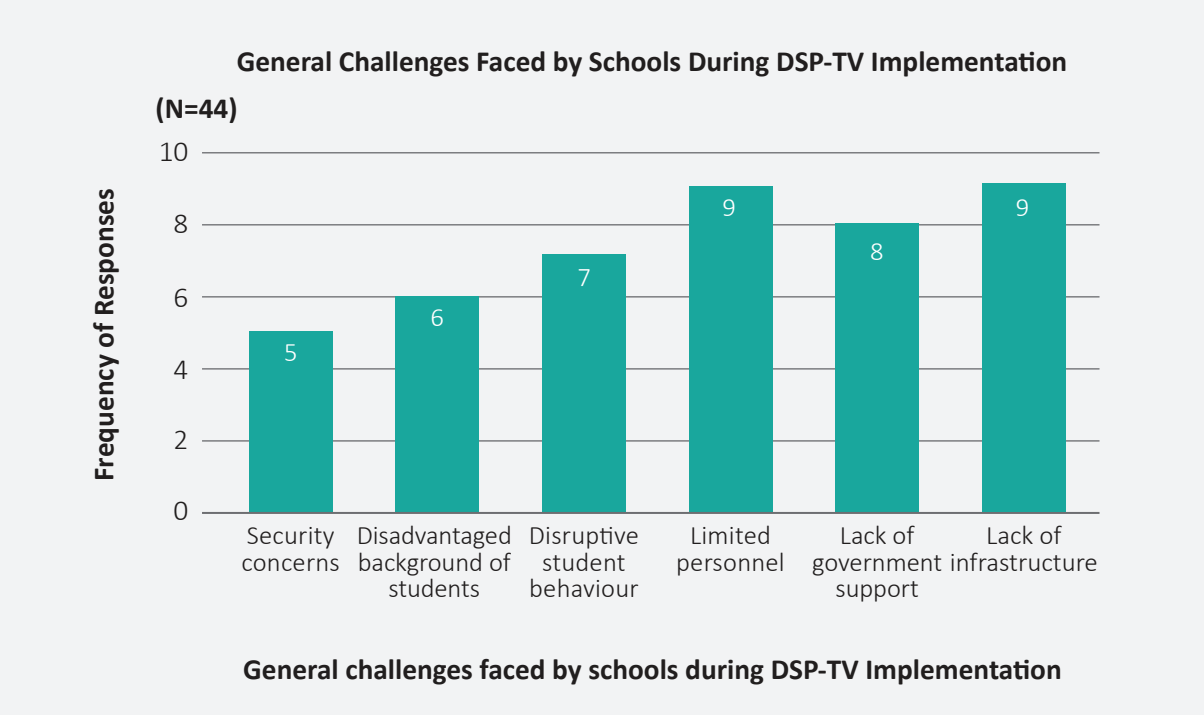
iii. General Challenges Faced by Schools During DSP-TV Implementation

When asked about the challenges faced while implementing the DSP-TV, school-heads reported about the lack of government support, lack of infrastructure, limited personnel, disruptive student behavior, disadvantaged background of students and lack of security.

In both SIP and SNP schools, 44 responses from 33 school-heads indicated challenges faced by the school. Some responses (9/44) reported a lack of infrastructure (space and furniture). A school-head mentioned that, *"Structural issues need to be fixed. Infrastructure needs to be improved."*

Some other responses (8/44) indicated that they face a lack of government support (funds). Another school-head said that, *"There has not been any support provided by the government."*

Figure 4.4.26: Findings of School Head Interview: General Challenges Faced Schools During DSP-TV Implementation



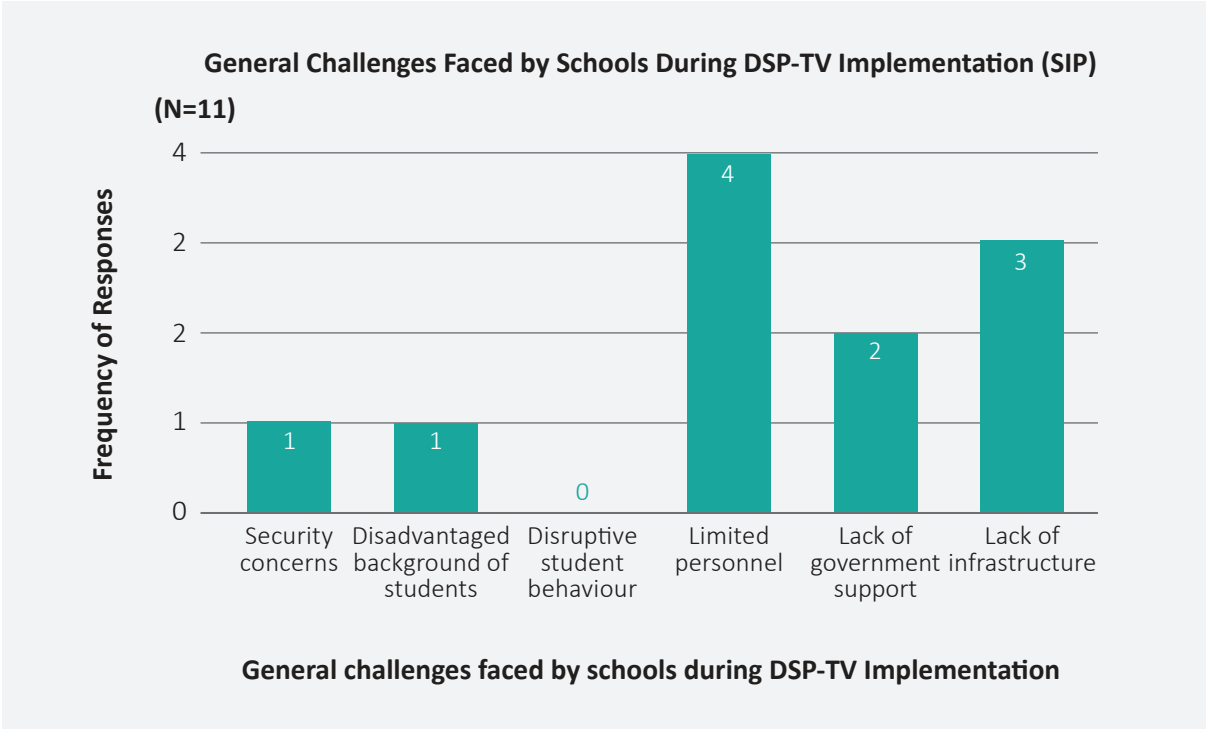
Some responses (9/44) stated that their schools have a limited number of personnel (security and teachers), while some other responses (7/44) stated that the disruptive behavior of students during classes was one of the challenges they faced. A school-head said that, *"In normal classes there is distraction."* A few responses (6/44) indicated that their students come from a disadvantaged background. A school-head said that, *"In rural areas children do not have much facilities."* A few responses (5/44) stated that lack of security is a common challenge faced by their schools (Fig. 4.4.26). A school-head mentioned that, *"Theft is an issue if it is in a rural area. Cable is also stolen. We have kept the TV in a central lock."*

22 schoolheads did not give any response about the challenges faced by the schools.

- **SIP:** Out of the 44 responses, 11 were from SIP schools. Within these 11 responses, seven responses were from Category 1 schools, four were from Category 2 and none of the responses were from Category 5 schools.

Some responses (3/11) indicated that they faced a lack of government support, while some other responses (2/11) faced a lack of infrastructure. Some responses (4/11) stated that their schools have limited personnel (Fig. 4.4.27). One response indicated that their students came from a disadvantaged background. One response stated that lack of security is a common challenge faced by their schools.

Figure 4.4.27: Findings of School Head interview: General Challenges Faced by Schools During DSP-TV Implementation - SIP



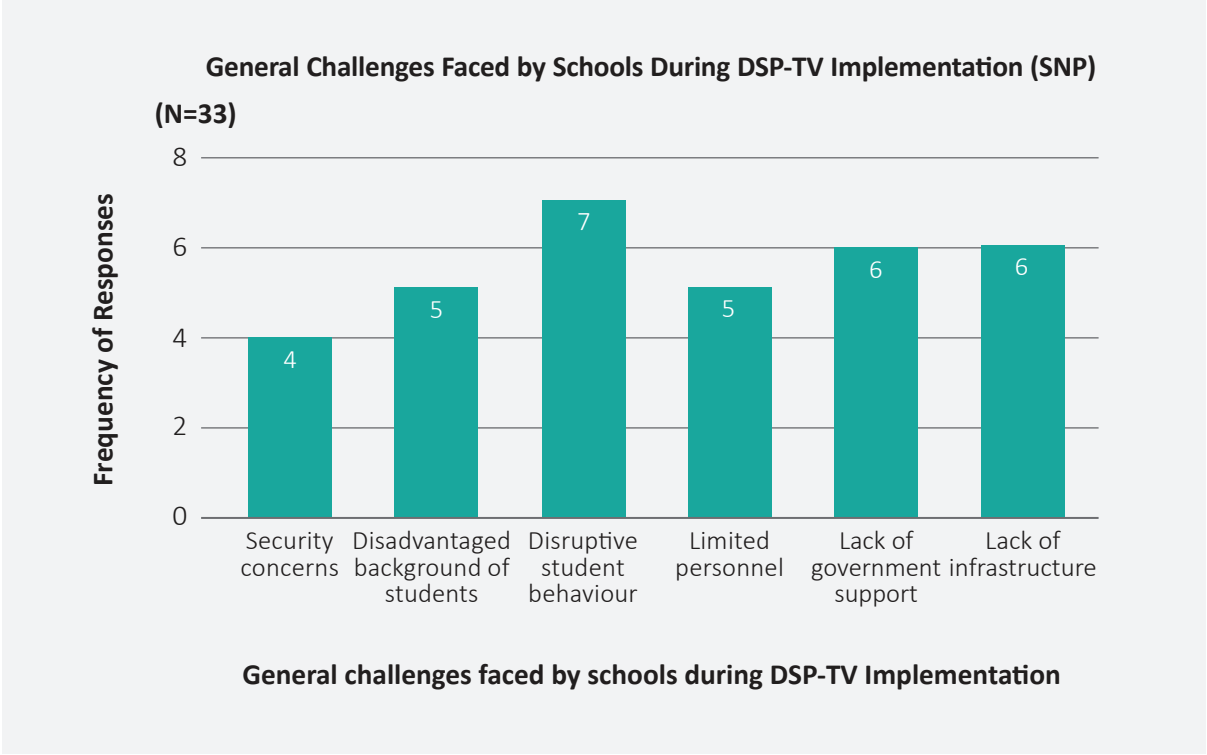
SNP: Out of 44 responses, 33 were from SNP schools.

Within these 33 responses, 10 responses were from Category 1 schools, six were from Category 2 schools, two responses were from Category 3 schools, one response was from Category 4 schools and 14 were from Category 5 schools.

Some responses (6/33) indicated that they faced a lack of government support, similarly some other responses (6/33) portrayed that they faced a lack of infrastructure. Some responses (7/33) stated that disruptive behavior of students during

classes is one of the challenges they faced, and some other responses (5/33) stated that their schools have limited personnel. Some responses (5/33) indicated that their students come from a disadvantaged background which is a challenge. A few responses (4/33) stated that lack of security is a common challenge faced by their schools (Fig. 4.4.28).

Figure 4.4.28: Findings of School Head Interview: General Challenges Faced by Schools During DSP-TV Implementation - SNP



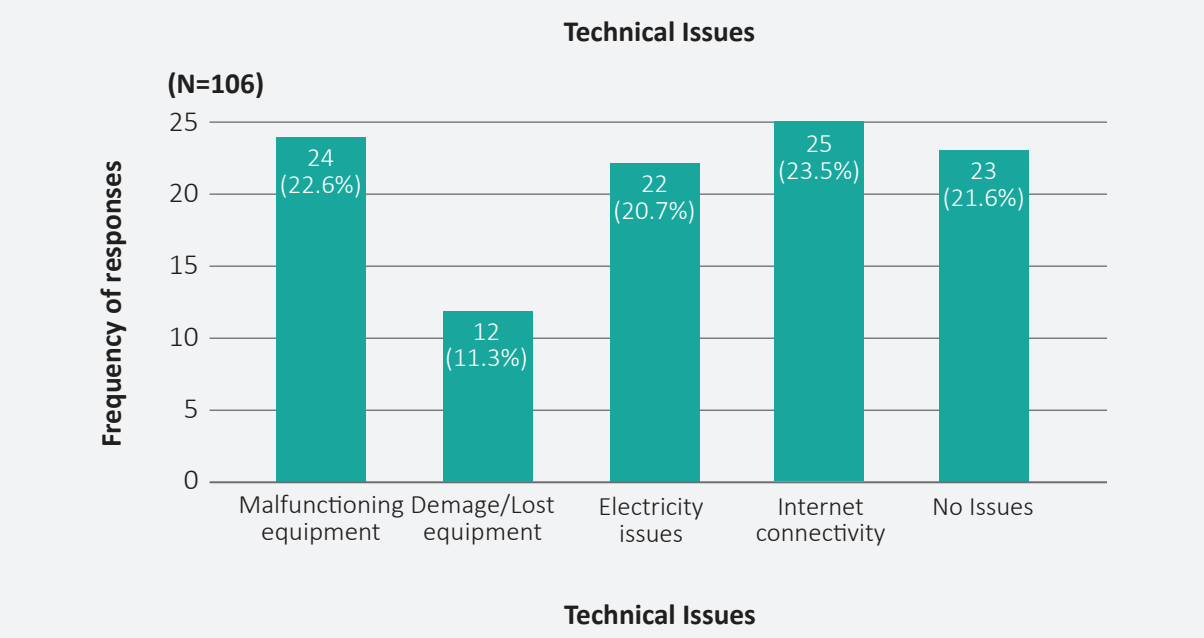
iv. Technical Issues

In addition to the responses recorded under general challenges, these responses indicate specific technical issues faced by the schools.

In both SIP and SNP schools, 106 responses from 53 school-heads reported various technical issues and challenges faced by the schools while implementing the DSP-TV programme. Some responses (25/106) indicated that the technical issues faced are due to internet connectivity. A school head mentioned that, *"We use our personal phone data. There is no internet connection in school."* Some responses (24/106) stated that the devices (TV, pen drive, dongle, inverter) provided by Muskan Dreams were not adequately functioning. A school-head stated, *"The data in the pen drive is corrupted. and when we install the pen drive in the TV it (content) is not showing."* Another school head said that, *"The inverter has been given by Muskaan Dreams but it is not working as well."* Another school head mentioned, "One of the TV won't start from the beginning." Some responses (22/106) stated that the technical issues are electricity problems. A school-head said that, *"There is an issue of electricity. We do not know how long it will last."* 7 out of 106 responses stated that the equipment they were given had been damaged whereas 4 responses mention that the equipment they were given is lost. 1 response states that *"The battery was stolen."*

Some responses (23/106) indicated that they did not face any technical problems and challenges concerning the DSP-TV programme (Fig. 4.4.29). One school head did not give any response about the technical challenges they were facing.

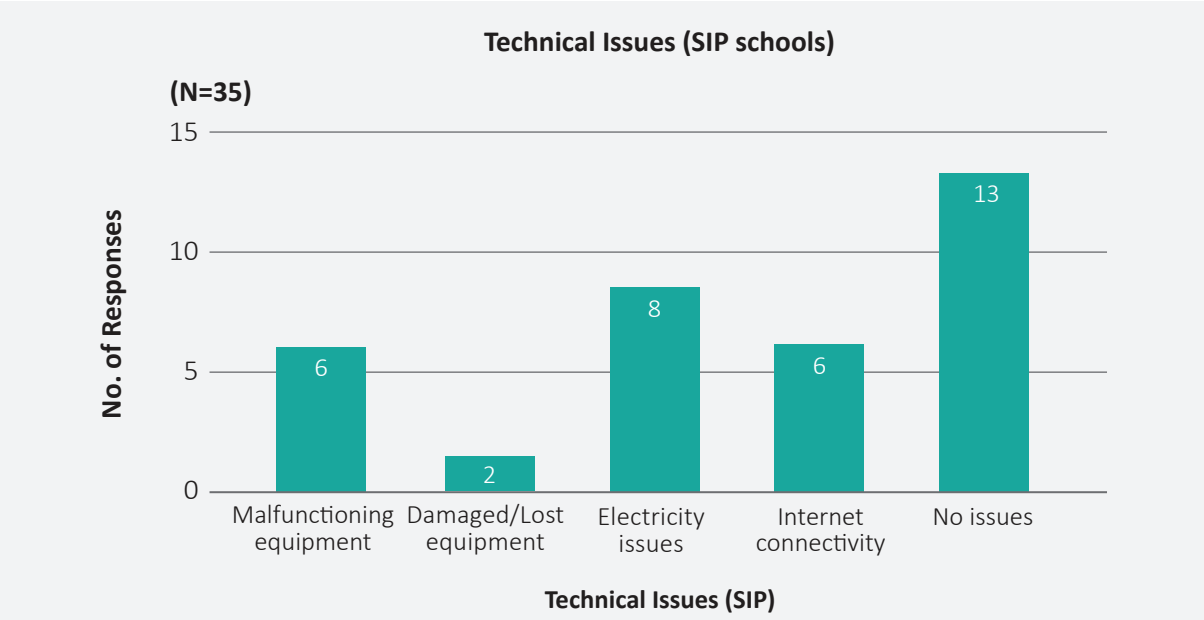
Figure 4.4.29: Findings of School Head Interview: Technical Issues



- **SIP:** Out of 106 responses, 35 were from SIP school-heads. Within these 35 responses, 24 responses were from Category 1 schools, 8 were from Category 2 and 3 responses were from Category 5 schools.

  Some responses (8/35) stated that the technical issues are electricity problems. While, some more responses (6/35) indicated that the technical issues faced were due to internet connectivity (Fig. 4.4.30). A few responses (6/35) stated that the devices (TV and pendrive) provided by Muskaan Dreams were not adequately functioning. Two responses (2/35) indicated that the equipment they were provided with had been damaged. Some responses (13/35) indicated that they did not face any technical problems or challenges concerning the DSP-TV programme.

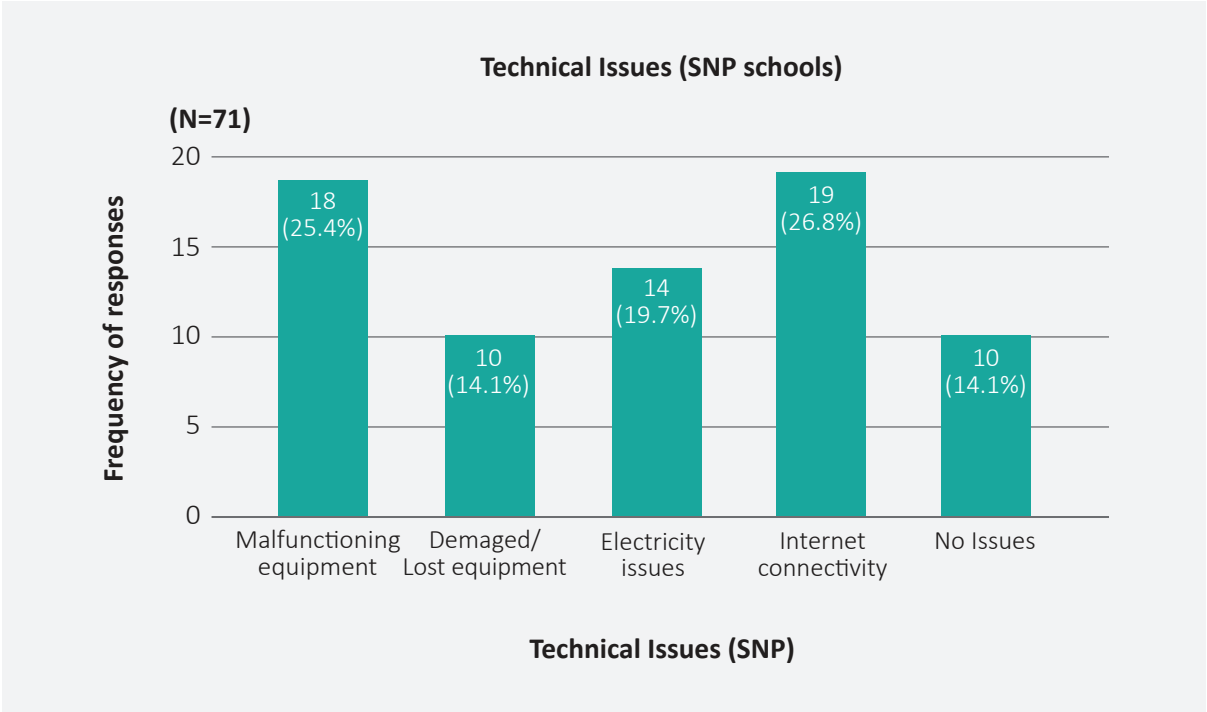
Figure 4.4.30: Findings of School Head Interview: Technical Issues - SIP



- **SNP:** Out of the 106 responses, 71 were from SNP school-heads. Within these 71 responses, 13 responses were from Category 1 schools, 20 were from Category 2 schools, seven responses were from Category 3 schools, four responses were from Category 4 schools and 27 were from Category 5 schools.

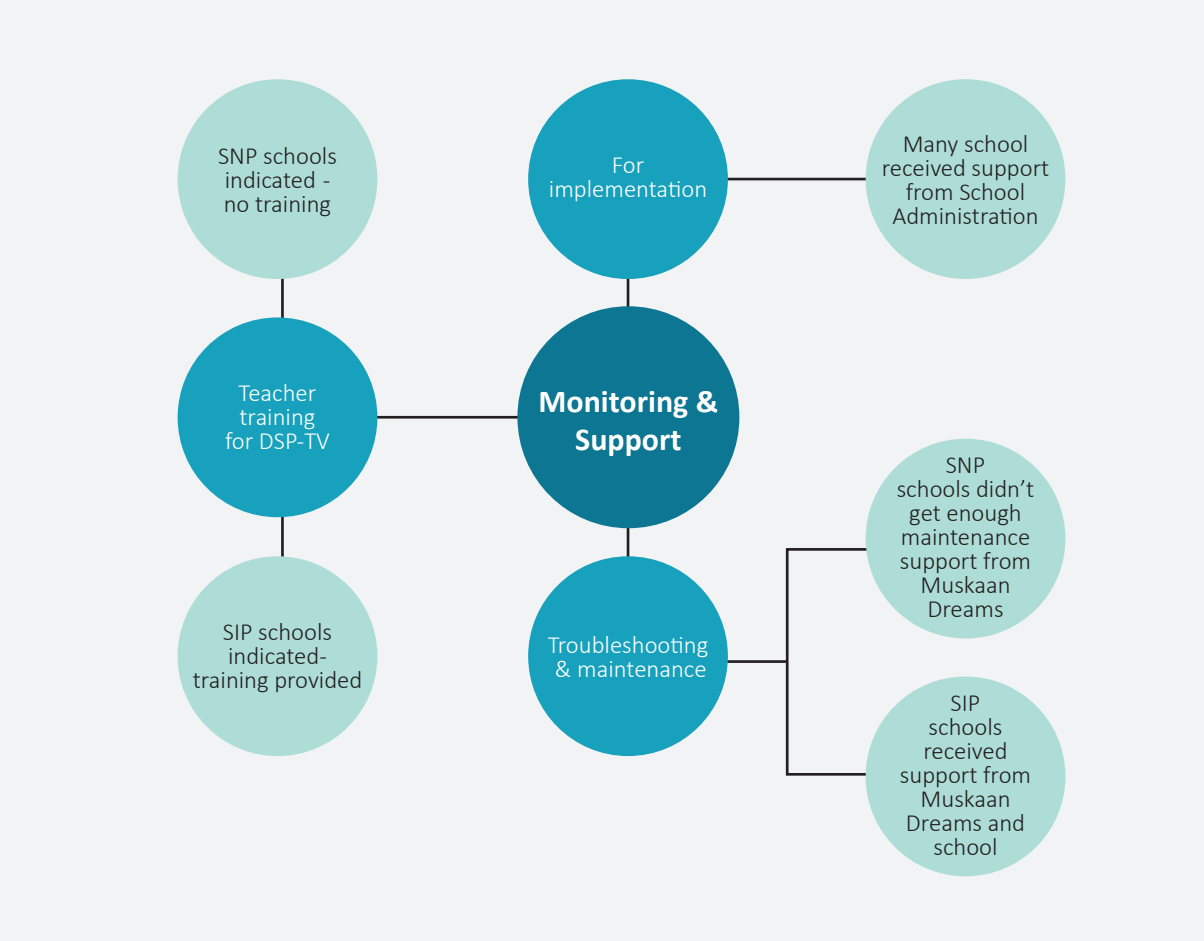
  Some responses (19/71) indicated that the technical issues faced are due to internet connectivity. Some responses (18/71) stated that the devices (TV, pen drive, dongle, inverter) provided by Muskaan Dreams were not adequately functioning. Some responses (14/71) stated that the technical issues are electricity problems (Fig. 4.4.31). A school-head mentioned that, "The problem is that it (implementation) is not regular because of the electricity. Especially to explain our content." 5 responses stated that the equipment they were provided with had been damaged. 4 responses mentioned that the equipment they were given was lost, and 1 response stated stolen equipment. A few responses (10/71) indicated that they did not face any technical problems and challenges about the DSP-TV programme.

Figure 4.4.31: Findings of School Head Interview: Technical Issues - SNP



4.4.8. Monitoring and Support

Figure 4.4.32: Findings of School Head Interview: Monitoring and Support



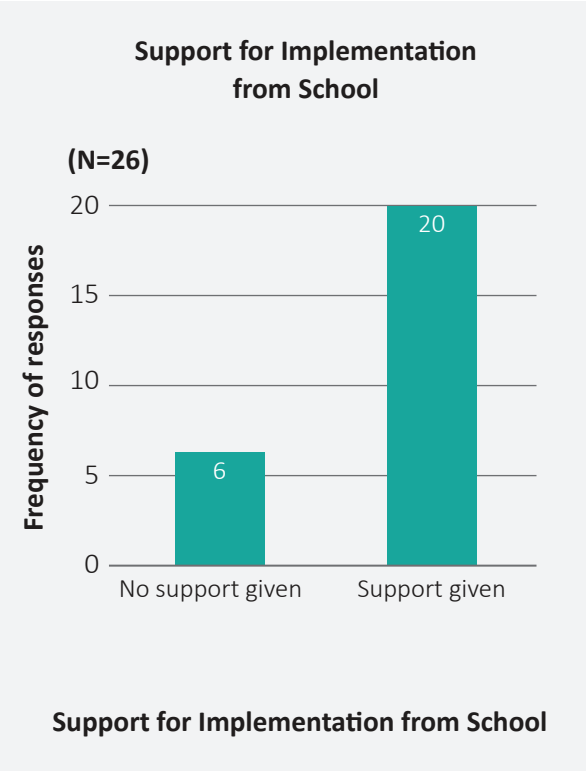
i. Summary of Findings: Monitoring and Support

Many responses indicated that the school administration extended support to teachers implementing the DSP programme.Regarding troubleshooting and maintenance support, responses from school heads indicated that the SIP schools received maintenance support from Muskaan Dreams. However, responses from SNP school heads indicated that they didn't get enough maintenance support from Muskaan Dreams. Many responses from SIP schools indicated teacher training was provided concerning the DSP-TV. Several responses from SNP schools indicated that no teacher training was provided in the matter of the DSP-TV.

ii. Support for Implementation

In both SIP and SNP schools, 26 responses from 26 school-heads reported on the support extended by the school administration for teachers implementing the DSP programme. Many responses (20/26) indicated that the school administration extended support to teachers implementing the DSP programme. A school-head said that, *"We (the school administration) engage with continuous use of DSP-TV."* Another school-head mentioned that, *"We do motivate those teachers who do some kind of innovation."* Some responses (6/26) indicated that no support was extended by the school administration to teachers implementing the DSP-TV programme. 28 school-heads did not give any response regarding the support extended by the school administration for teachers implementing the DSP-TV programme.

Figure 4.4.33: Findings of School Head Interview: Support for Implementation

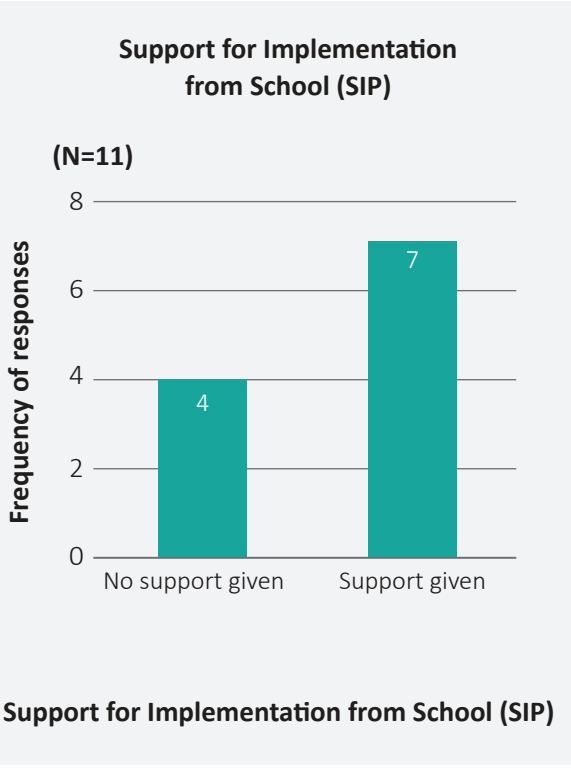


Support for Implementation from School

- **SIP:** Out of the 26 responses, 11 were from SIP school-heads.

  Within these 11 responses, six responses were from Category 1 schools, four were from Category 2 and one response was from Category 5 schools. Many responses (7/11) indicated that the school administration extended support to teachers implementing the DSP-TV programme. Some responses (4/11) indicated that no support was extended by the school administration to teachers implementing the DSP-TV programme.

Figure 4.4.34: Findings of School Head Interview: Support for Implementation: SIP



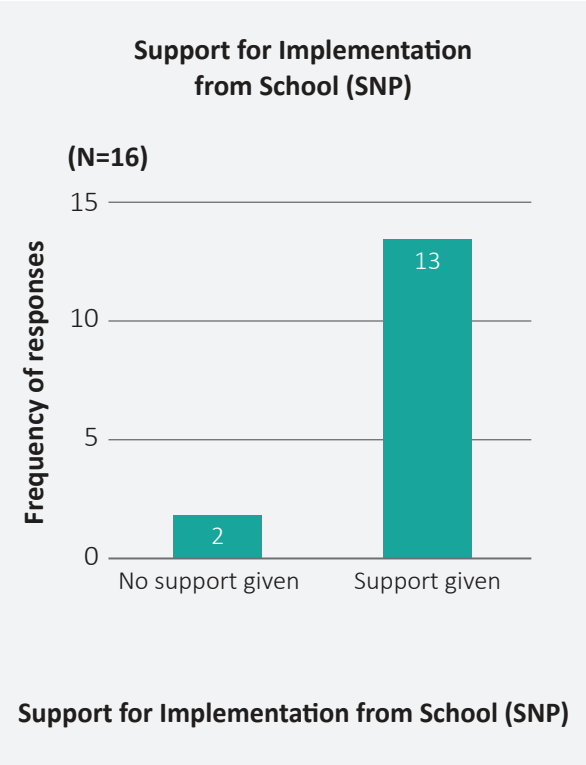
Support for Implementation from School (SIP)

- **SNP:** Out of the 26 responses, 15 were from SNP school-heads.

  Within these 15 responses, one response was from Category 1 schools, five were from Category 2 schools, one response was from Category 3 schools, one response was from Category 4 schools and seven were from Category 5 schools.

  Most responses (13/15) indicated that the school administration extended support to teachers implementing the DSP-TV programme. Some responses (2/15) indicated that no support was extended by the school administration to teachers implementing the DSP-TV programme.

Figure 4.4.35: Findings of School Head interview: Support for Implementation: SNP

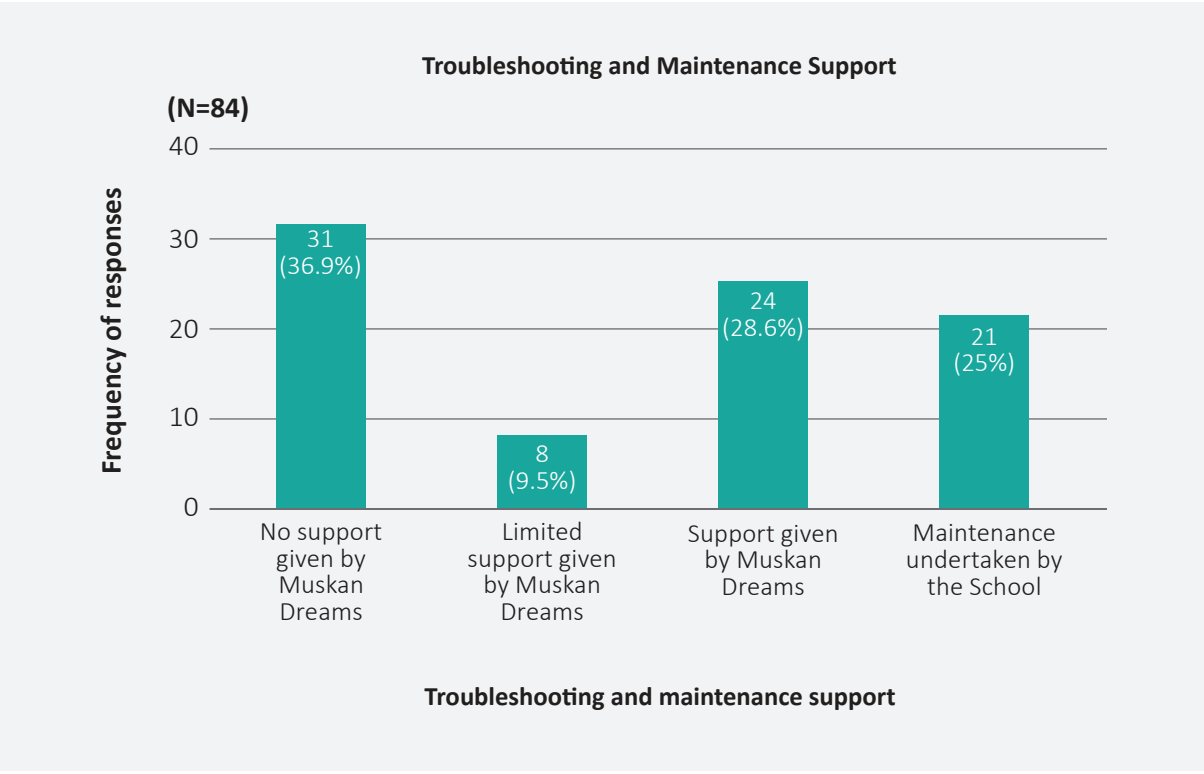


iii. Troubleshooting and Maintenance Support

In both SIP and SNP schools, 84 responses from 41 school-heads reported about troubleshooting and maintenance support. Some responses (31/84) stated that Muskaan Dreams did not provide any troubleshooting and maintenance support. A school-head stated, *"When we call the Muskaan Dreams person, he is non responsive."* A school-head mentioned, *"We talked about this with the Muskaan Dreams but they didn't do anything about it."*

On the other hand, some responses (24/84) also stated that Muskaan Dreams has been active in terms of troubleshooting and maintenance support. A school-head said that, *"We are requested to just teach, in case of any technical difficulties, we have been asked to contact Muskaan Dreams."* A school-head mentioned that, *"Once a month, the Muskaan Dreams staff member comes to see whether we are facing any problem or not."*

Figure 4.4.36: Findings of School Head Interview: Troubleshooting and Maintenance Support



A few responses (8/84) stated that Muskaan Dreams provides limited support. A school-head stated that, *"Muskaan Dreams associates only visit to monitor whether the DSP-TV is used regularly or not."*

A school-head mentioned, "The school is paying for the repair (not Muskaan Dreams)." Some responses (21/84) indicated that the troubleshooting and maintenance support is undertaken by the school. A school-head reported that, *"School will be responsible (for maintenance)."* Another school-head mentioned that, *"Schools only maintain these TVs (DSP-TVs). A school-head also mentioned that, "School covers the costs. Muskaan Dreams did not bear any expenses."*

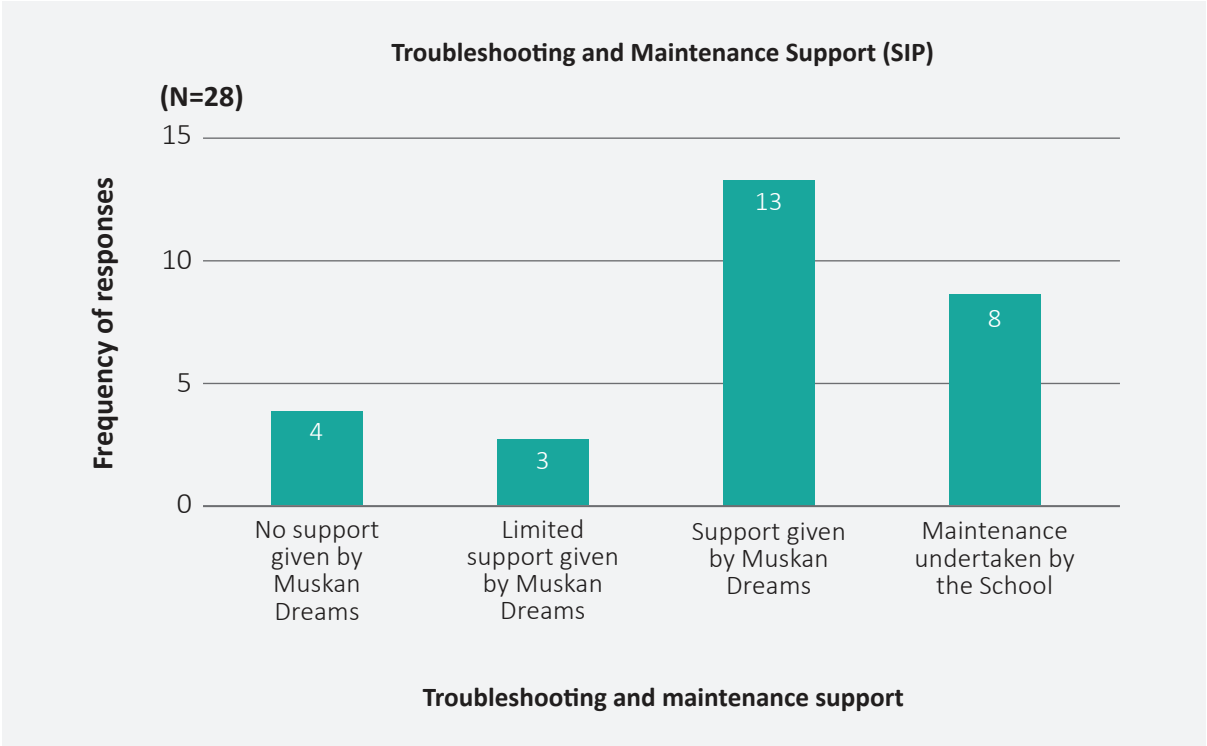
13 school-heads did not give any response concerning troubleshooting and maintenance support.

- **SIP:** Out of 84 responses, 28 were from SIP school-heads.

Within these 28 responses, 17 responses were from Category 1 schools, eight were from Category 2 and three responses were from Category 5 schools.

A few responses(4/28) stated that Muskaan Dreams did not provide any troubleshooting and maintenance support. Several responses (13/28) indicated that Muskaan Dreams have been active in terms of troubleshooting and maintenance support. A school-head reported that, *"if we have any problem related to DSP-TV, we sort it out when they come."* A few responses (3/28) stated that Muskaan Dreams provided only limited support. Some responses (8/28) indicated that the troubleshooting and maintenance support is undertaken by the school. A school head stated that, *"Muskaan Dreams were denied for repair."*

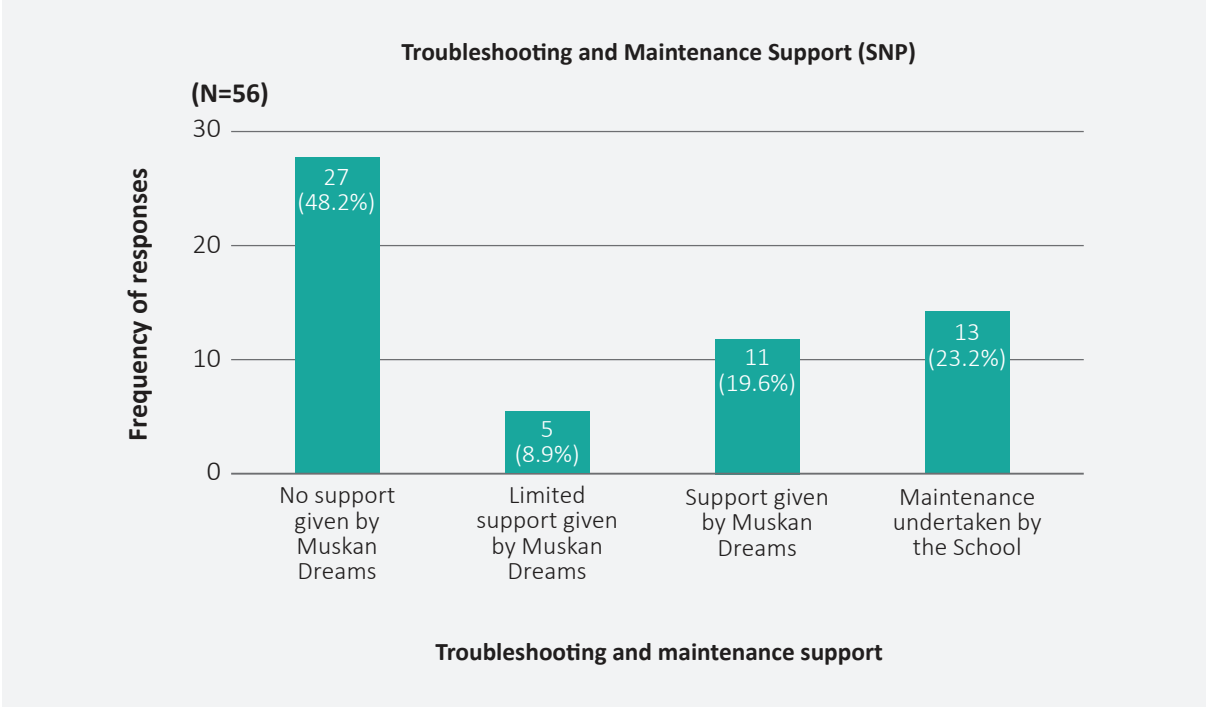
Figure 4.4.37: Findings of School Head Interview: Troubleshooting and Maintenance Support - SIP



- **SNP:** Out of 84 responses, 56 were from SNP school-heads.

  Within these 56 responses, nine responses were from Category 1 schools, 23 were from Category 2 schools, six were from Category 3 schools, none of the responses were from Category 4 schools and 18 were from Category 5 schools.

Figure 4.4.38: Findings of School Head Interview: Troubleshooting and Maintenance Support - SNP



Several responses (27/56) stated that Muskaan Dreams did not provide any troubleshooting and maintenance support. A school-head stated that, *"The Muskaan Dream members have stopped coming, and we are no longer in touch with them."* Another school-head mentioned that, *"When we called the Muskaan Dream representative, he was non-responsive."* Some responses (11/56) indicated that Muskaan Dreams have been active in terms of troubleshooting and maintenance support. A few responses (5/56) stated that Muskaan Dreams provided only limited support. A school head said that, *"We talked to Muskaan Dreams members who came here to check the problem. After that they didn't come back."* Some responses (13/56) indicated that the troubleshooting and maintenance support is undertaken by the school (Please note that as per their implementation strategy, Muskaan Dreams did not continue their support to SNP schools after two years).

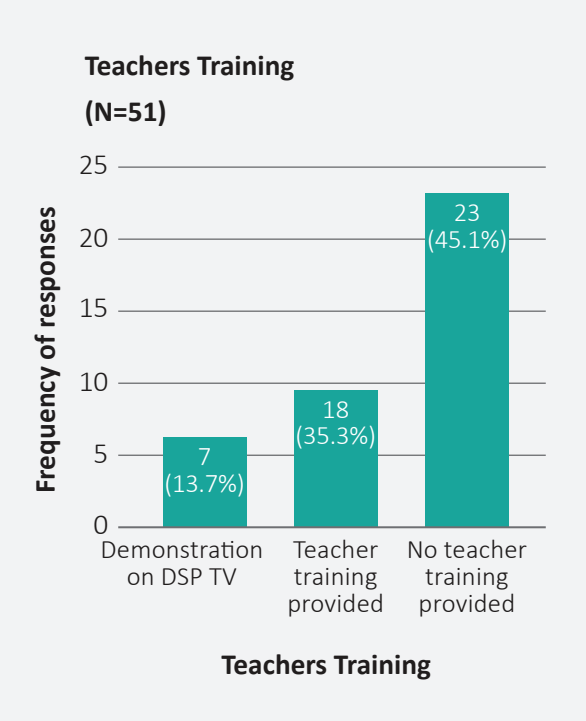
iv. Teacher Training

In both SIP and SNP schools, 51 responses from 51 school-heads reported about the training of teachers in the matter of the DSP-TV.

Several responses (23/51) indicated that no teacher training was provided in relation to the DSP-TV. A school-head said that, *"No, the teacher did not undergo any training by Muskaan Dreams. We require training."* Some responses (18/51) indicated that teacher training was provided in relation to the DSP-TV. A school-head mentioned that, *"Yes, the training was conducted. Online training was conducted."* A few responses (7/51) indicated that only a demonstration was provided about the DSP-TV to the teachers. A school-head said, *"No. There was no training. They just gave a demonstration of how the TV was used."*

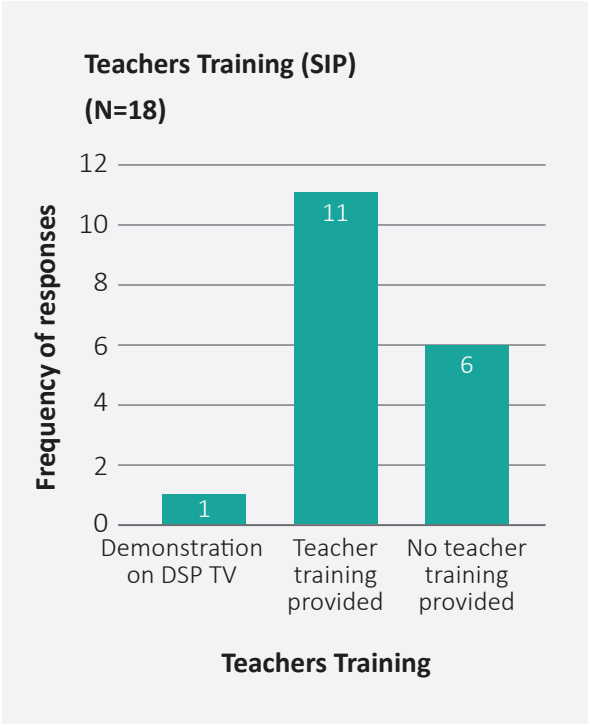
Three out of 51 school heads were unsure of the training of teachers concerning the DSP-TV. Three school-heads out of 54 did not give any response about teacher training.

Figure 4.4.39: Findings of School Head Interview: Teacher Training



- **SIP:** Out of the 51 responses, 18 were from SIP school heads. Within these 18 responses, 11 responses were from Category 1 schools, six were from Category 2 and one response was from Category 5 schools. Many responses (11/18) indicated teacher training was provided concerning the DSP-TV. A school-head mentioned that, *"Yes, the teachers were trained and then they started using the TV."* Some responses (6/18) indicated that no teacher training was provided in the matter of the DSP-TV. One response (1/18) indicated that only a demonstration was provided concerning the DSP-TV.

Figure 4.4.40: Findings of School Head Interview: Teacher Training: SIP

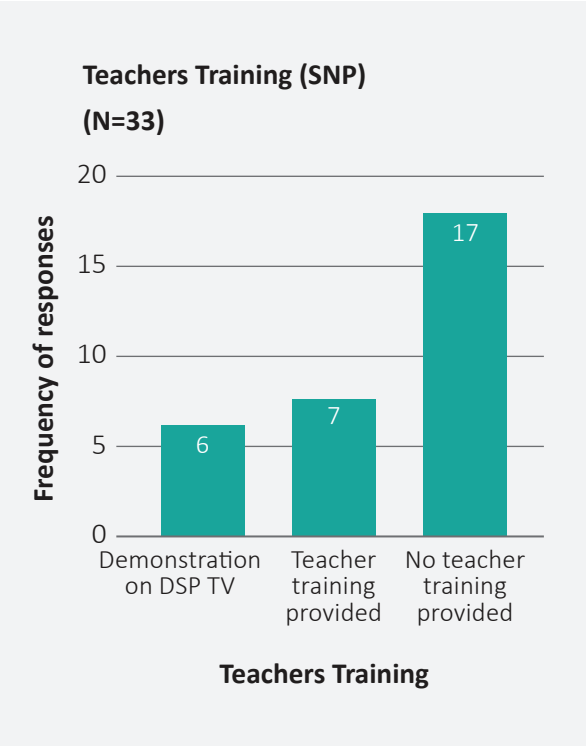


- **SNP:** Out of the 51 responses, 33 were from SNP school-heads.

  Within these 33 responses, five responses were from Category 1 schools, 10 were from Category 2 schools, three were from Category 3 schools, one of the responses was from Category 4 schools and 14 were from Category 5 schools.

  Several responses (17/33) indicated that no teacher training was provided in the matter of the DSP-TV. A school-head said that, *"No, it should have been there".* Some responses (7/33) indicated teacher training was provided with regard to the DSP-TV. Some responses (6/33) indicated that only a demonstration was provided in the matter of the DSP-TV. A school-head said, *" No. There was no training. They just gave a demonstration of how the TV was used."*

Figure 4.4.41: Findings of School Head Interview: Teacher Training - SNP



4.4.9 Parental Perception

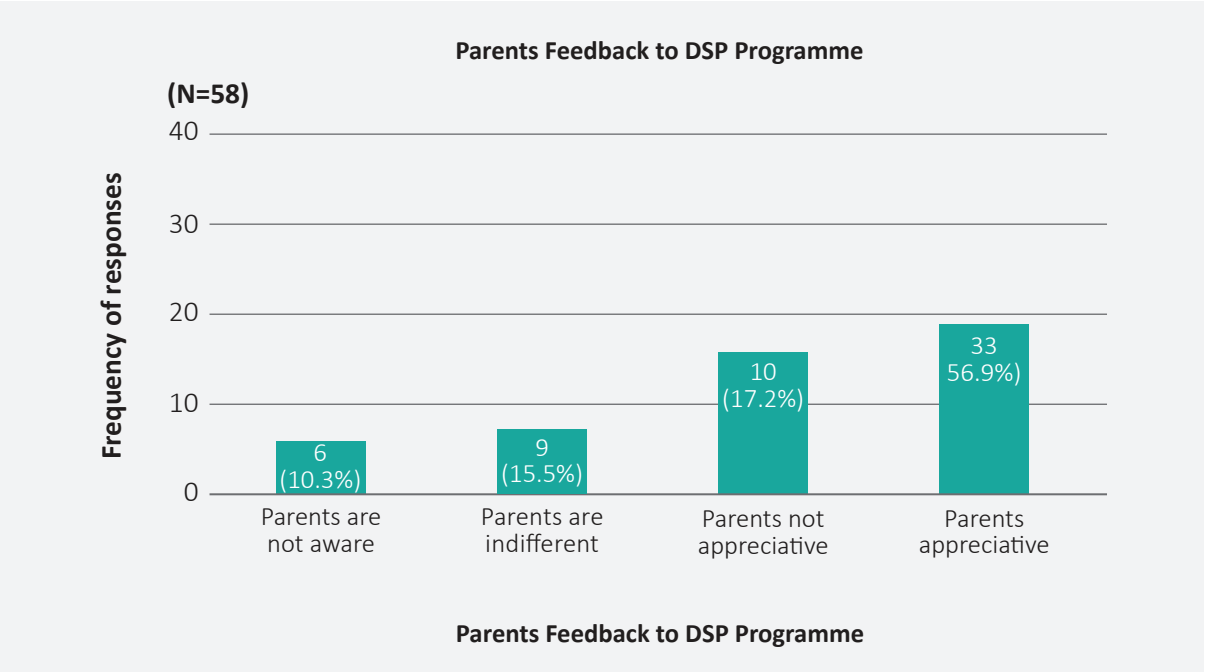
i. Summary of Findings - Parental Perception

Several responses of school heads from both SIP and SNP indicated that parents were appreciative of the DSP programme being implemented in their children's schools.

ii. Parents Feedback to DSP-TV Programme

In both SIP and SNP schools, 58 responses from 48 school-heads reported parents' feedback on the DSP programme. Six school-heads did not give any response about parents' feedback on the DSP programme. Several responses (33/58) indicated that parents were appreciative of the DSP programme being implemented in their children's schools. A school-head said that, *"The parents also feel pride and happiness that their children's schools are competing with private schools."* Some responses (9/58) indicated that parents were indifferent to the DSP-TV programme being implemented. A school-head said that, *"No they don't even know which class their children are in. They are laborers."*

Figure 4.4.42: Findings of School Head Interview: Parents feedback to DSP Programme



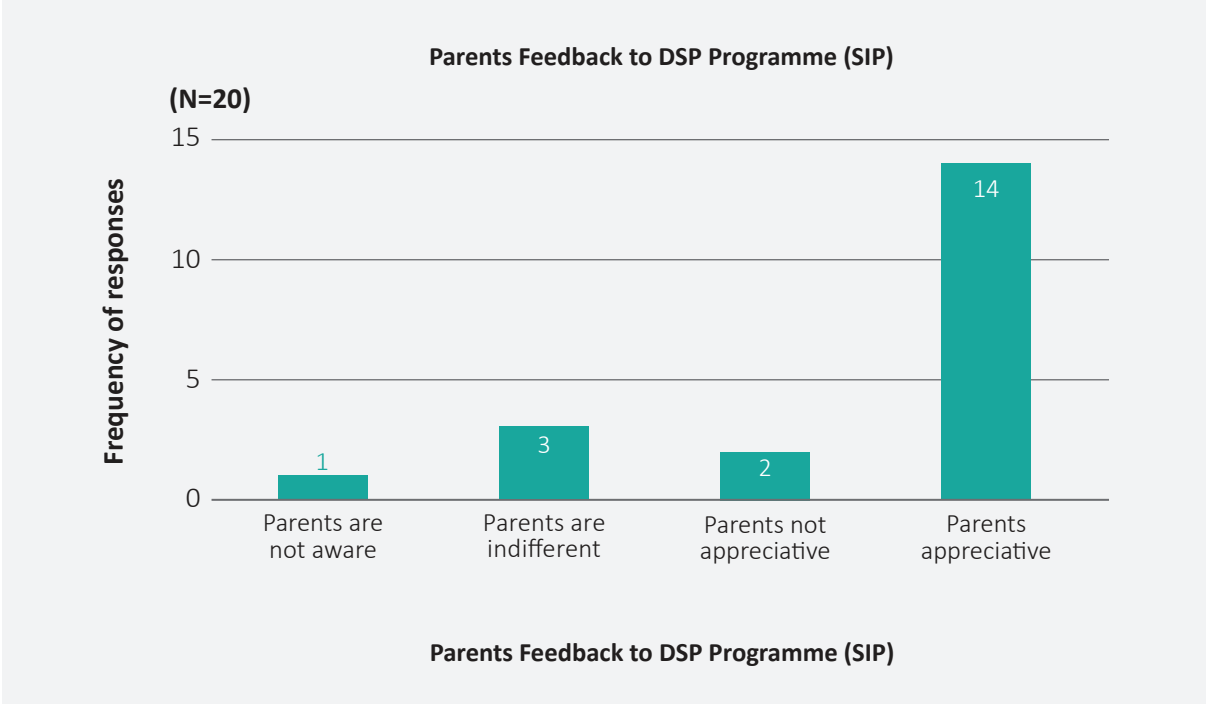
- **SIP:** Out of 58 responses, 20 were from SIP school-heads.

  Some responses (10/58) indicated that parents were not appreciative of the DSP-TV programme being implemented in their children's schools. A school-head mentioned that, *"Parents feel that we are playing movies and not teaching."*

  A few responses (6/58) indicated that parents were not aware of the DSP-TV programme. A school-head said that, *"In this environment, parents' involvement is very minimal."* Within these 20 responses, 12 responses were from Category 1 schools, seven were from Category 2 and one response was from Category 5 schools.

  Many responses (14/20) indicated that parents were appreciative of the DSP-TV programme being implemented in their children's schools. A school-head mentioned that, *"Yes, they feel good about it that the students are doing good in studies."* Some responses (3/20) indicated that parents were indifferent to the DSP-TV programme being implemented. A few responses (2/20) indicated that parents were not appreciative of the DSP-TV programme being implemented in their children's schools. One response (1/20) indicated that parents were not aware of the DSP programme.

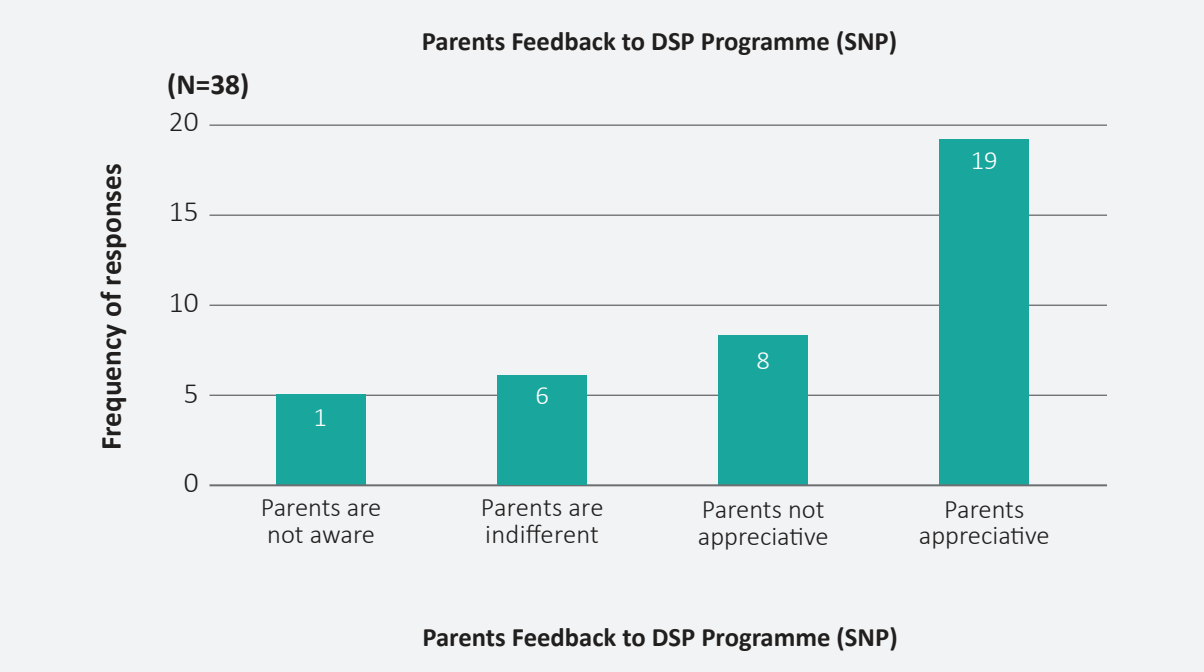
Figure 4.4.43: Findings of School Head Interview: Parents ceedback to DSP Programme SIP



- **SNP:** Out of the 58 responses, 38 were from SNP school-heads.

  Within these 38 responses, 11 responses were from Category 1 schools, 10 were from Category 2 schools, three were from Category 3 schools, one of the responses was from Category 4 schools and 13 were from Category 5 schools.

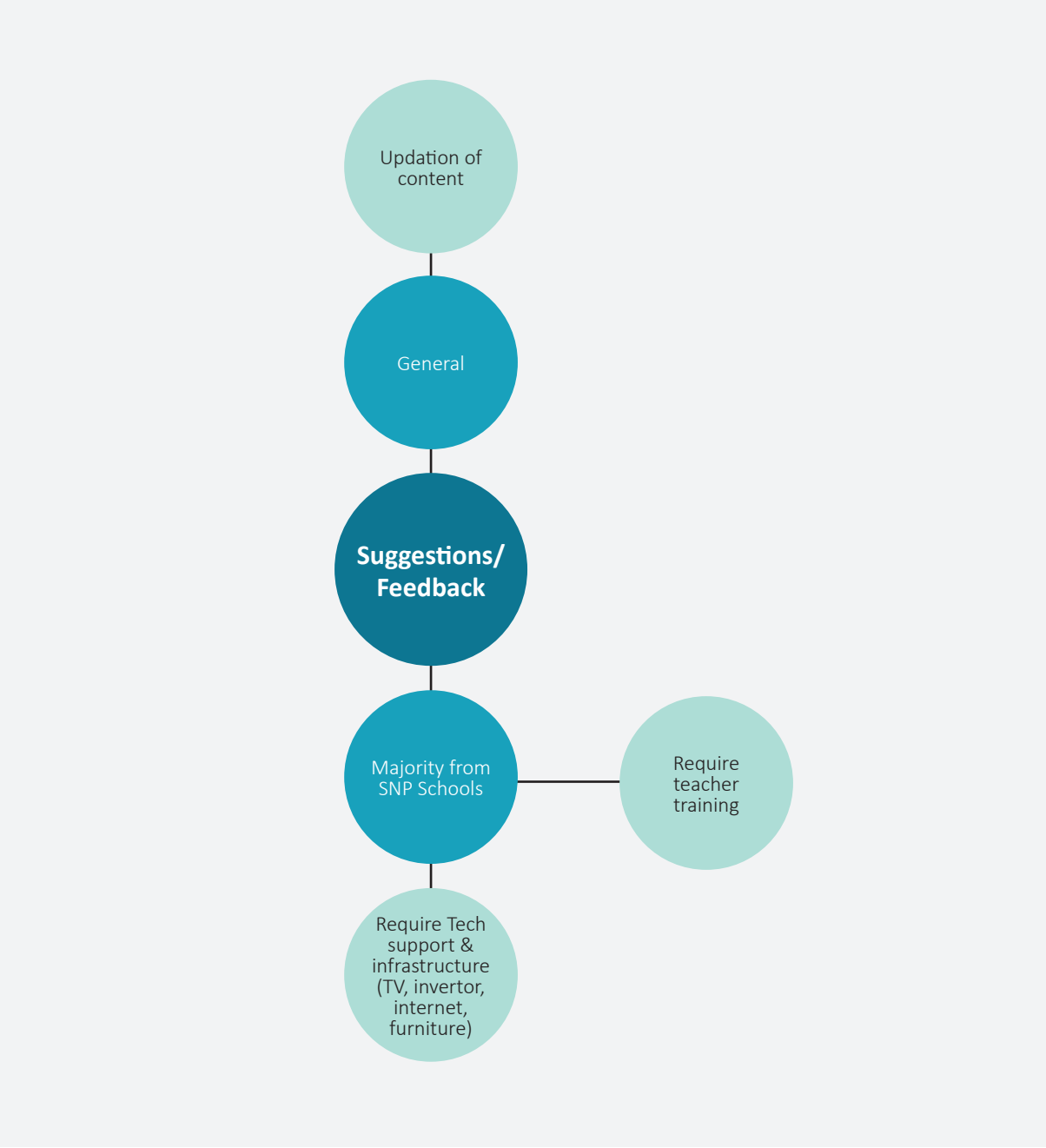
Figure 4.4.44: Findings of School Head Interview: Parents feedback to DSP Programme SNP



Several responses (19/38) indicated that parents were supportive of the DSP-TV programme being implemented in their children's schools. A school head mentioned that, *"Yes they are aware. They are happy because the students get facilities."* Some responses (6/38) indicated that parents were indifferent to the DSP-TV programme being implemented. A school-head said that, *"Yes, they know but they don't have any reaction."* Some responses (8/38) indicated that parents were not supportive of the DSP-TV programme being implemented in their children's schools. A school head said, *"The parents said, 'If you are making students watch TV, what will they study?'"* A few responses (5/38) indicated that parents were not aware of the DSP programme. A school-head said that, *"This school comes under a rural area. So parents do not have that much awareness."*

4.4.10 Suggestions

Figure 4.4.45: Findings of School Head Interview: Suggestion



i. Summary of Findings- Suggestions

One of the major suggestions from the school heads was to update the content of videos. Other suggestions, mainly from SNP schools, highlight the need for teacher training, technical support, and infrastructure such as TV, inverter, internet, and furniture.

ii. Feedback for the DSP-TV Programme

In both SIP and SNP schools, 91 responses from 50 school-heads reported feedback for the DSP-TV programme. Some responses (22/91) indicated that the DSP programme was successful in their respective schools. A school-head said that, *"Yes, because visuals help in better understanding of the concepts."* Another school-

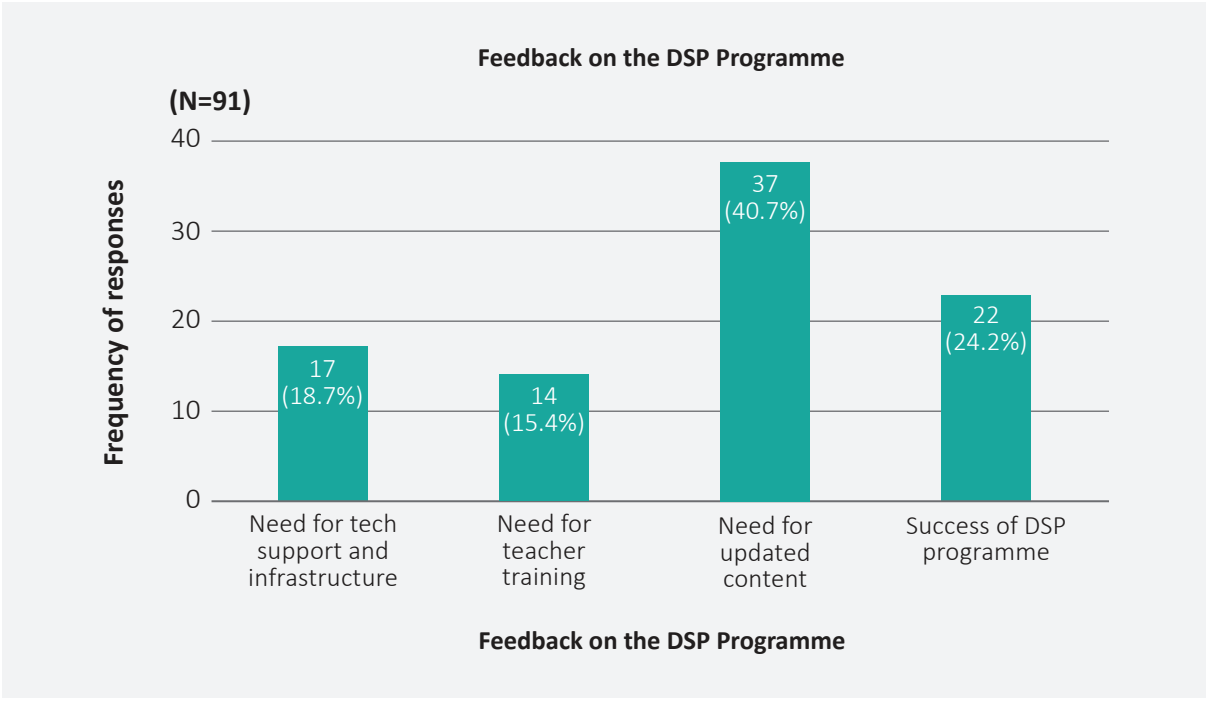
head mentioned that, *"Yes, we are getting so many benefits. Even if some teachers are not free or have some work then also they can learn from the TV. They used their time effectively."*

Several responses (37/91) stated that there is a need for updated content in the DSP-TV. A school-head mentioned that, *"...However the content is very limited. It should be broad."* Another school-head said that, *"The content needs to be changed. The current content does not include the recent course changes that have happened."*

Some responses (17/91) indicated that there is a need for technical support and infrastructure (TV, inverter, internet, furniture). Some responses (14/91) indicated that there is a need for training of teachers. A school-head mentioned that, *"We do not have a trained teacher. So we are not able to use the TV."* One response out of 91, stated that the DSP-TV programme was a failure in their respective schools. The school head said that, *"This should be closed and it will be better if we hire new teachers instead."*

Four school heads (out of 54) did not give any response with regards to feedback for the DSP programme.

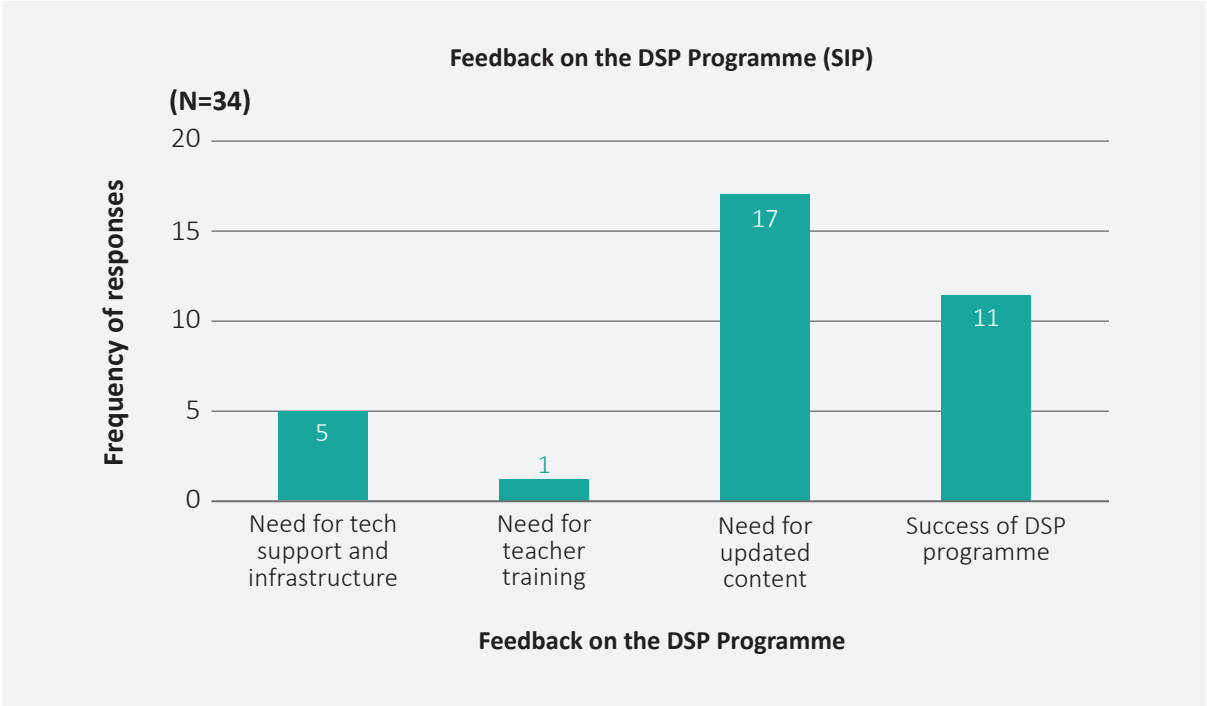
Figure 4.4.46: Findings of School Head Interview: Feedback on the DSP Programme



- **SIP:** Out of the 91 responses, 34 were from SIP school heads.

  Within these 34 responses, 22 responses were from Category 1 schools, 11 were from Category 2 and one response was from Category 5 schools.

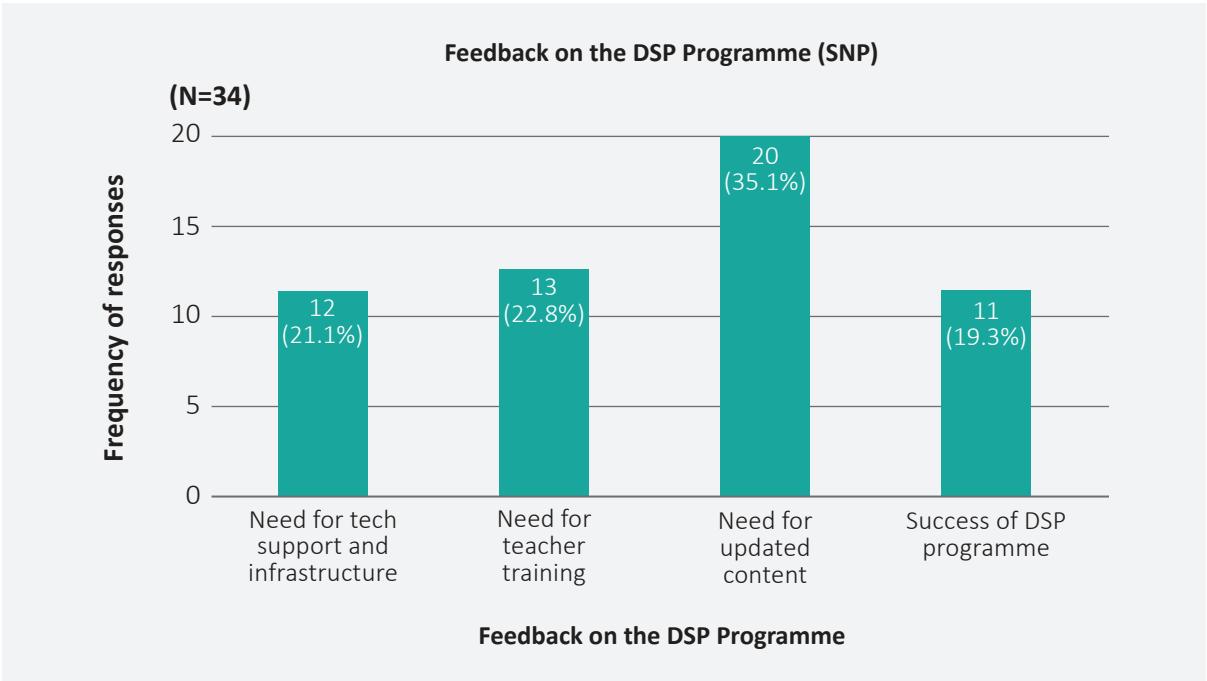
Figure 4.4.47: Findings of School Head Interview: Feedback on the DSP Programme - SIP



Some responses (11/34) indicated that the DSP programme was successful in their respective schools. Several responses (17/34) stated that there is a need for updated content. A few responses (5/34) indicated that there is a need for technical support and infrastructure. One response indicated that there is a need for training of teachers.

- **SNP:** Out of the 91 responses, 57 were from SNP school heads.

Figure 4.4.48: Findings of School Head Interview: Feedback on the DSP Programme - SNP



Within these 57 responses, nine responses were from Category 1 schools, 20 were from Category 2 schools, five were from Category 3 schools, none of the responses were from Category 4 schools and 23 were from Category 5 schools.

Some responses (11/57) indicated that the DSP-TV programme was successful in their respective schools. Some responses (20/57) stated that there is a need for updated content. Some responses (13/57) indicated that there is a need for training of teachers. Some responses (12/57) indicated that there is a need for technical support and infrastructure. One response out of 57, stated that the DSP-TV programme was a failure in their respective schools.

4.4.11. Regularity of Update Meetings Between School Head and Teachers

In both SIP and SNP schools, 33 responses from 33 school heads indicated that they hold regular update meetings with teachers on the usage of the DSP-TV. Out of these 34 responses, 21 were from SIP school heads and 12 were from SNP school heads. However, there is no clarity with regards to the frequency of the meetings, the objectives of the meetings or any documentation of these meetings. 21 school heads did not give any response with regards to holding regular meetings to update teachers on the usage of the DSP-TV.

4.4.12. Future Purchase of DSP-TV

In both SIP and SNP schools, 38 responses from 36 school heads indicated their decision to purchase a DSP-TV in the future.

Among the 13 responses from SIP school heads, 10 were from Category 1 schools, two were from Category 2 schools, and one response was from Category 5 schools. Additionally, within the 25 responses from SNP school-heads, 5 responses were from Category 1 schools, 4 were from Category 2 schools, 3 were from Category 3 schools, 1 of the responses was from Category 4 schools and 12 were from Category 5 schools.

20 out of 38 responses indicated that they would purchase a DSP-TV in the future. Out of these 20 responses, seven were from SIP school-heads, and 13 were from SNP school heads. A school head said that, *"There should be more TV in the school. Because all the batches are not getting the facility."* Another school-head stated that, *"Yes, sir. It would be good if we could buy a TV. The problem is that we don't have the funds to buy a TV."* Furthermore, another school head said, *"Yes. It will be useful for the teachers. We can use it if the electricity source is sorted."*

18 out of 38 responses indicated that they would not purchase a DSP-TV in the future. Out of these 18 responses, 12 were from SNP school-heads and 6 were from SIP school-heads. A school-head stated that, *"We need infrastructure improvement. We need inverters and moisture issues are also there and it becomes very expensive."*

18 school heads did not give any response regarding their decision to purchase a DSP-TV in the future.

4.5. Findings from the District Officials' Interviews

Table 4.5

Findings of District Administrators Interviews
In-charge of Smart Class, 1-8th Grade
DPC: District Project Coordinator, Gwalior
DEO Office, Designation: Assistant Director of School Education
Block Resource Centre members

Interaction with officials not only helped to grasp the issues, challenges, and worries at the heart of the situation, but it also suggested solutions to these problems. Several key challenges have been highlighted through discussions with district officials from offices and Block Resource Centre members (BRC), all of which were critical for the proper implementation of the Digitalshala Programme (DSP) at the school level.

BRCs are essential in developing the educational infrastructure, including teachers' professional development, curriculum creation, resource utilization, and pedagogical methods. One of the primary goals of BRC is to give teachers the necessary training and support to improve their teaching techniques. BRCs conduct workshops, training sessions, and seminars to help teachers to improve their skills and expertise.

4.5.1. Methods of Data Collection

- **Interviews:** The interviews were conducted with the District Project Coordinator, in-charge of the smart-class and the Assistant Director of School Education at the DEO office. The interviews were guided by open-ended questions, which allowed for a variety of responses and encouraged respondents to provide extensive and meaningful comments.

- **Focus Group Discussion (FGD):** Considering the critical role of the BRCs, a focus group discussion was conducted with six BRC members from six educational blocks to collect the data.

The consent for recording was not been given during the FGDs and Interviews and the summaries are based on detailed notes taken during the process.

To understand the effects of the district's DSP initiative, interviews, and FGDs were thematically summarized as follows:

4.5.2. Benefits of DSP for Students

- The person in-charge of the smart class stated that the integration of content and technology has been highly beneficial for students. He further added that it improved the learning capacity of students and piqued their interest. He was of the view that students have different learning styles and while some students learn better through reading books others find it boring. For students who struggle to learn through the traditional methods of teaching, the use of smart classrooms may provide a more engaging and effective alternative. He further added that, the use of technology has positive psychological effects and makes learning joyful and interesting. It also helps students understand complex concepts in a better way. He concluded that the smart classroom is an effective tool for both teachers and students, providing a more dynamic and engaging learning experience.

- The Assistant Director of School Education stated that learning through visual media is very beneficial for students. Earlier DEO offices did not have a budget for a digital classroom. Later, Muskaan Dreams initiated and provided the DSPs which were good for student's learning, especially in rural areas. Now the government is looking forward to transforming conventional classrooms into digital ones. The schools are receiving smart TVs which can also be used as smart boards apart from digital classrooms.

4.5.3 Primary Key Concerns and Challenges

i. Skills and Capacity Building

- During the FGD, members of the BRC shared that teachers were struggling to use DSP-TV in their classes. Teachers did not receive adequate training, which affected their ability to use technology in their teaching. Despite the fact that the younger teachers were able to upskill themselves to take classes using technology, they were not able to use DSP-TV in the classroom due to overload of other work than teaching.

- The person in-charge of the smart class mentioned the mindset and beliefs of the teachers. He expressed his concern about the senior teachers who were towards the end of

their teaching career and their challenges and willingness in accepting changes in teaching practices and acquiring basic technological skills to operate DSP-TV. He suggested requirement of training for them.

The person in-charge of smart class also emphasized the need of training, especially for the Math and Science teachers and the School Heads, since the education department was providing Smart TVs in schools. Though the DPC office had limited knowledge about technology integration in classrooms, they expressed their willingness to provide support, budgets and resources to upskill the teachers. The DPC office was in the process of conducting a well-structured training program to help teachers make the most of the technology available in the classrooms. He also recommended Muskaan Dream's intervention in teacher training for the schools where the Government is in the process of installing the Smart classrooms.

- A National Initiative for Proficiency in Reading with Understanding and Numeracy (NIPUN) fellow was also present during the meeting with the DPC, and she was asked to shareher thoughts on integrating technology into classroom teaching. In response, the NIPUN fellow highlighted the issue of long gaps between training sessions and suggested the need for regular training for effective technology integration. She also suggested the need for handbooks, manuals or online content that can help teachers implement technology in their classes. The NIPUN fellow also emphasized on the importance of monitoring the effectiveness of the training to ensure that the teachers can effectively incorporate the learnings in their classes.

- As stated by DPC, the young teachers were mentally prepared to adopt technology. He also added that the officials were conducting virtual meetings with teachers on Google Meet and the updates were presented by school administrations using applications such as Microsoft (MS) Powerpoint. He also added that, after rigorous training, all teachers were able to use email.

- The Assistant Director of School Education at the DEO office expressed her concern regarding teacher training as well. She shared the need for a manual or recordings of earlier training sessions, that could be used by even school heads for the training of teachers in case teachers who received training were retired or transferred. Additionally, she also suggested a well-structured virtual training program for all teachers. She expressed her concern over the communication gap regarding regular updates between the district education department and Muskaan Dreams and suggested more regular updates by Muskaan Dreams for a smoother implementation.

- At the end of the interview, the DPC emphasized that training of teachers is essential for DSP-TV integration in the classroom. He assured that issues and concerns, such as the regular uninterrupted electrical supply and teacher training would be addressed on a priority basis.

ii.Infrastructure

a. Electricity

- During the interview, the Assistant Director of School Education highlighted the issue of shortage of electricity and the fact that the education department did not have jurisdiction over the electrical and power department. She mentioned that the electricity supply was interrupted four to five times daily, even at the DEO office. This situation was worse in rural areas as compared to urban areas, though all schools had access to electricity connections. However, regular use of DSP-TV became difficult in the absence of electricity.

- Furthermore, the in-charge of smart class mentioned that there were several reasons for the irregular supply of electricity in schools. For example, there was a constant case of wire theft in many places, and in a few cases, theft of DSP-TV. The schools received electricity from the Distribution Panel (DP), which was common for everyone in the locality. If the

community around the schools did not pay the electricity bills, the supply of electricity was stopped by the electricity department.

- During the focus group discussion, members of the BRC raised concerns about how electricity issues are affecting the regular use of DSP-TV programmes in the classroom. They gave an example of a teacher who used DSP to introduce a new topic to the class, but due to a power cut, he had to switch to books and blackboard in the next class. The member also added that after a teacher had completed a chapter, it was not always feasible to revisit the topic and play the corresponding videos.
- The person in-charge of the smart class mentioned that involving the local community, parents, and the head of the panchayat in solving the problem of electricity and wire theft provided some solutions in the past as he experienced in Morena district. He emphasized the importance of the community being mindful of the fact that their own children were getting educated in schools and that regular communication between the school and the community could provide solutions to problems like electricity. However, he agreed that changing the community's mindset takes time.

b. Lack of space in Schools

BRC members shared that most schools have only two or three classrooms, and the school infrastructure (including buildings, etc.) is often in poor condition. The BRC members also shared cases where only two classrooms were available in the school. Of those two classrooms, one room was used as an office, while the other room accommodated students of different grades. Using DSP-TV in such cases could disturb the other grades, necessitating regular student shifts.

iii. Additional Duties

During the FGD, members of the BRC shared that only a few schools in Gwalior used the DSP-TV Programme in their classrooms regularly. This was because the teachers were preoccupied with their duties as Booth Level Officers (BLO) for several months, which disrupted the regular classes. Continuing classes using DSP-TV was mentioned to be an additional challenge for teachers.

iv. Updated DSP-TV Content

The in-charge of the smart class further mentioned that as per the teachers, many sections of the content provided by the Muskaan Dreams were not updated according to the syllabus which makes it difficult to teach with DSP-TV content in the class.

v. Requirement for Regular Communication Between Government Departments and Implementing Organisation

- During the interview, the Assistant Director of School Education at the DEO office said that priorities overlap between the different programmes run by the education department. Programs that are well monitored and the implementation status was regularly updated to the education department received more attention by the department. Active and regular communication between the implementing agency and the government department was also emphasized for the smooth functioning of the program.
- The in-charge of smart class stated that a few years back the Muskaan Dream team was very active on the ground. The associates regularly visited the office to update the department about implementation. In the past year, the frequency of visits reduced. He mentioned that the continuous meetings motivated the officials to pay attention to the programme.

vi. Monitoring and Evaluation

- The usage data of DSP-TV was not received and had been raised as a concern by the smart class in-charge during the interview. Due to the lack of usage data, it was difficult to identify the school and/or teachers who were not in the practice of using DSP-TV regularly. He mentioned that the usage data could help in taking different steps to solve the issues and to take disciplinary actions if necessary.
- The in-charge of the smart class also mentioned that the officials visit schools to monitor DSP-TV implementation, however,

due to busy schedules they had little time to visit schools. During the visit, the information provided by school heads were cross-checked with the parents and the community. He further stated that he interacted with a few parents and the parents were very happy with the DSP-TV programme. The parents also mentioned that the students insisted on going to schools even on holidays and on Sundays. He further stated that the enrollment of students increased and their attendance also improved.

- During the interview with the DPC, the NIPUN fellow stressed on the importance of accountability in monitoring and evaluating effectiveness. She suggested that accountability should be ensured and that the school head could be the primary point of contact, followed by the Cluster Resource Centres (CRC), Block Resource Centres (BRC), and the district school administration. She further added that teachers had no orientation on where to seek help. Therefore, better communication among different stakeholders remained crucial to addressing such issues effectively.

Some differences in opinions regarding the consistent supply of electricity were observed during the interviews with DPC and DEO officials. The DPC office stated that they would provide electricity. However, the Assistant Director of School Education at the DEO office responded differently, stating that while electricity connections have been given to all schools under their jurisdiction, the supply of electricity falls under the jurisdiction of the electricity department.

During the interview at the DPC office, it was shared that the decision to provide digital classrooms through the DSP initiative is a top-down approach, with Rajya Shiksha Kendra being solely responsible for selecting the schools that will receive them. The district's education department has limited authority in this matter. However, it came to the DPC office's attention that a school that already had digital classrooms had been selected for the DSP-TV programme. Consequently, the DPC office submitted an application to the collector to choose another school for the DSP-TV programme. The collector forwarded the application to Rajya Shiksha Kendra in Bhopal, and eventually, the schools were changed accordingly.

The DPC office was responsible for managing the school system from 1st to 8th grade. During the interview, the district's smart class coordinator shared that the office organized a meeting to discuss digital classrooms and a decision was taken to conduct training for Science and Math teachers and school heads in the upcoming months. He further added that out of 201 digital classrooms, 101 schools received the DSP-TV from the Muskaan Dreams, and 100 received the TVs from the state government. However, it was observed that the DPC office did not have information on schools with active DSP-TV classrooms and schools with inactive DSP classrooms and non-functional DSP-TVs. Therefore, the DPC has instructed the smart class coordinator to get a bifurcation based on active and inactive schools during the interview.

During the focus group discussion, the BRC members unanimously shared their concerns and challenges of space problems in the school, poor infrastructure, and their regular involvement in non-teaching activities like BLO duty.

4.6 TicTac Learn Video Usage from Back-end Data: Summary

The following summary consolidates the analysis of TicTac Learn video usage in 17 SIP schools under the Digital Shala Programme (DSP) for the subjects of science and mathematics from grades 6 to 10. This analysis is based on the backend data collected by the Muskaan Dreams Application installed in DSP TVs. This our study, a total of 64 schools were sampled, of which 21 were SIP schools and 43 were SNP schools. However, the analysis only considered the usage of 17 SIP schools during the 2023-24 academic year. The remaining 43 SNP and 4 SIP schools were excluded from the analysis since their usage data were not recorded properly due to software issues (as reported during data collection). The time frame for this analysis is restricted to the academic year 2023-24 for the same reason.

For better understanding, the number of working days was identified, and the class hours were calculated, omitting the assembly and lunchtime. Finally, 561 entries (defined below) of TicTac Learn video usage across the 17 SIP schools during the working days of the 2023-24 academic year, from 17th April 2023 to 31st March 2024, were obtained and analyzed using SPSS software.

The findings are summarized below. Out of the 17 schools, 10 are located in rural areas, 4 in semi-urban areas, and 3 in urban areas. In addition, 9 schools are categorized as Category 1, 6 as Category 2, 1 as Category 4, and 1 as Category 5 schools.

4.6.1 Method of Data Collection

In DSP, the teachers were expected to use TicTac Learn content through the Smart TVs for 0.5-1 hour (two periods) per day with their students. They were also expected to take the help of the videos in explaining the concepts of Mathematics and Science to the children. TicTac Learn videos, created by Central Square Foundation (CSF) in collaboration with Google are accessible online but were made available offline by Muskan Dreams (MD) in DSP schools by transferring videos in pen drives. The average duration of a video was 5-7 minutes.The number of videos in Math and Science in each grade is provided in the table below. Muskaan Dreams' application was installed on the TVs, with an individual teacher profile that monitored usage when connected to the Internet.
Each "entry" recorded in the backend consisted of the following information: device identity (ID) (an alphanumeric ID unique to a TV), school name, device name (class for which the content is played), profile name (name of the teacher with which the profile was registered), file path (details of the file played from the content library in the format class/subject/chapter/topic/part), file subject (e.g. mathematics), the file name (topic from the subject), timestamp (beginning and end time of the video), and usage duration in seconds. Henceforth, the term "back-end data entry" will be used to refer to all of this information together. Note that each entry does not refer to a unique video played.

Table 4.6.1

Number of TicTac Learn Videos For Mathematics and Science Across Grade 5-10		
Grade	**Subject**	**No.of Videos**
6	Mathematics	217
	Science	27
7	Mathematics	26
	Science	53
8	Mathematics	239
	Science	30
9	Mathematics	206
	Science	74
10	Mathematics	180
	Science	76

The video player took the count whenever a video is actively played. Therefore, the term "play duration" specifically refers to the time for which TicTac Learn videos were actively played on the DSP TVs, counting only the duration while the video was playing and not when it was paused. Additionally, rewinding the video did not create a new entry in the backend. However, once a video was closed and opened again, it was counted as a new entry. For example, if a 5-minute video was played for 4 minutes, then rewound rewind to 0 and played to completion, the total play duration would be 9 minutes.

The data collected by Muskaan Dreams (MD) across the schools under DPS were transferred through spreadsheets, which were then verified and filtered for analysis.

i. Sorting of Backend Data Entries

The backend data received from MD included information for all the schools under the DSP program. After scrutiny, details for 64 schools of this study (43 SNP and 21 SIP) were extracted from the dataset. However, it was found that there was no available data for most of the SNP schools (29 out of 43), and for the remaining 14 out of 43 SNP schools, there were errors in the entry. The errors included having "NULL" as the entry in the timestamp and duration column or having a wrong timestamp (e.g., year recorded as 1970 and 2000). A total of 2196 entries were

available for the 21 SIP schools from 1st January 2018 to 31st March 2024. 713 out of 2196 entries had errors (400 NULL entries and 313 entries had wrong timestamps). The MD team informed us that errors were due to software issues, and the usage duration for none of the SNP schools was properly recorded. Hence all 43 SNP Schools were not considered for this usage analysis. Further CSF team also suggested considering the data after 17th April 2023 (2023-24 academic year commencement). Therefore, all the entries of 21 SIP schools after 17th April 2023 were considered.

On examination, 630 entries were obtained during the academic year 2023-2024 (from April 17, 2023, to March 31, 2024) across 21 SIP schools. Most of the entries (612 out of 630), were valid and were recorded across 17 out of 21 SIP Schools. The remaining few entries (18 out of 630 entries) were not valid (wrong timestamp and zero duration). 2 out of 21 SIP schools had all their entries invalid (15 out of 18 invalid entries). There was no data available for the 2 out of 21 SIP schools. Thus, 612 valid entries across 17 SIP schools through 32 DSP TVs, during the academic year 2023-24 were obtained. Hence, the further analysis utilized the valid entries during the academic year 2023-24 to provide a comprehensive analysis of Tic Tac Learn video usage. This is also relevant since the period of classroom observations, focus group discussions, teacher interviews, and surveys were held from November 2023- February 2024.

For a more in-depth analysis, we identified the number of effective working days, working hours, and work weeks.

ii. Working Days and Class Hours

The classes commenced for students on 17th April 2023. Grades 6-8 had 215 working days, grade 9 had 225 working days and grade 10 had 205 working days (validated by the Enrollment & Retention (E&R) department within Rajya Shiksha Kendra, MP through CSF). The school working hours were from 10:30 am to 5:00 pm, excluding prayer sessions (maximum of 20 minutes) and lunch breaks (maximum of 40 minutes) the class hours were calculated to be 5.5 hours per day. This implies the total class hours across the academic year for grades 6-8 is 1182.5 hours, for grade 9 is 1237.5 hours and for grade 10 is 1127.5 hours. Further, considering six working days per week, working weeks for grades 6-8, grade 9, and grade 10 are 35.8, 37.5, and 34.2 weeks respectively.

A few entries (51 out of 612) were recorded in May 2023, during the summer vacation, and were analyzed separately. Finally, 561 entries of TicTac Learn video usage across the 17 SIP schools during the working days of the 2023-24 academic year, from 17th April 2023 to 31st March 2024, were obtained and analyzed using SPSS software. The findings are summarized below based on the themes that emerged.

4.6.2 Total Play Duration of TicTac Learn Videos

The 17 SIP schools played the videos together for 38.41 hours, suggesting a school played 2.26 hours on average during the academic year. There were 561 entries in total, with an average duration of play of 0.07 hours (4.1 minutes). The distribution of play duration of Tic Tac Learn videos was analyzed against the number of schools. Several schools (8 out of 17) played for less than 2 hours during the year. Some of them (6 out of 17 schools) had a play duration of 2-4 hours. While a few of them had a play duration of 4-6 hours (2 out of 17 schools) and 8-10 hours (1 out of 17 schools) respectively. It should be noted that total class hours across the academic year for grades 6-8 is 1182.5 hours, for grade 9 is 1237.5 hours and for grade 10 is 1127.5 hours.

Table 4.6.2

Total TicTac Learn Video Usage Across 17 SIP Schools from April 17 2023 to March 31 2024 (Working days)					
No. of Schools	**Total no.of times played**	**Average no.of times per school**	**Total duration of videos played**	**Average duration per school**	**Average play duration of a video**
17	561	33	2304.7 minutes7	135.57 minutes	4.11 minutes
In hours			**38.41**	**2.26**	**0.07**

Table 4.6.3

Grade-wise Usage Total TicTac Learn Video Usage Across 17 SIP schools from April 17 2023 to March 31 2024 (Working days)							
Grade	**No.of times videos played**	**Minimum play duration (min)**	**Maximum play duration (min)**	**Total duration of videos played (min)**	**Total duration of videos played (hrs)**	**Average duration of video played (min/ video)**	**No.of times played per week per school**
Class 6	164	0.03	9.98	573.35	9.56	3.50	0.3
Class 7	103	0.02	16.33	514.93	8.58	5.00	0.2
Class 8	183	0.02	17.12	840.67	14.01	4.59	0.3
Class 9	48	0.03	11.47	149.73	2.50	3.12	0.1
Class 10	63	0.15	12.3	226.08	3.77	3.59	0.1

The videos were played for 9.56 hours in grade 6, 8.58 hours in grade 7, 14.01 hours in grade 8, 2.50 hours in grade 9, and 3.77 hours in grade 10. The play duration is highest in grade 8 and lowest in grade 9. This cannot be accounted for by the number of working days as grade 9 had more working days than other grades. It is worth noting that the total play duration in each grade was much less compared to the total class hours available in the entire academic year. Additionally, the number of times videos were played in each grade per week per school respectively are 0.3 (grade 6), 0.2 (grade 7), 0.3 (grade 8), 0.1 (grade 9), and 0.1 (grade 10). This implies that, on average, no school played the videos at least once per week throughout the academic year.

Figure 4.6.1: TicTac Learn Video Usage from Back-end Data: Grade vs Play Duration in Hours

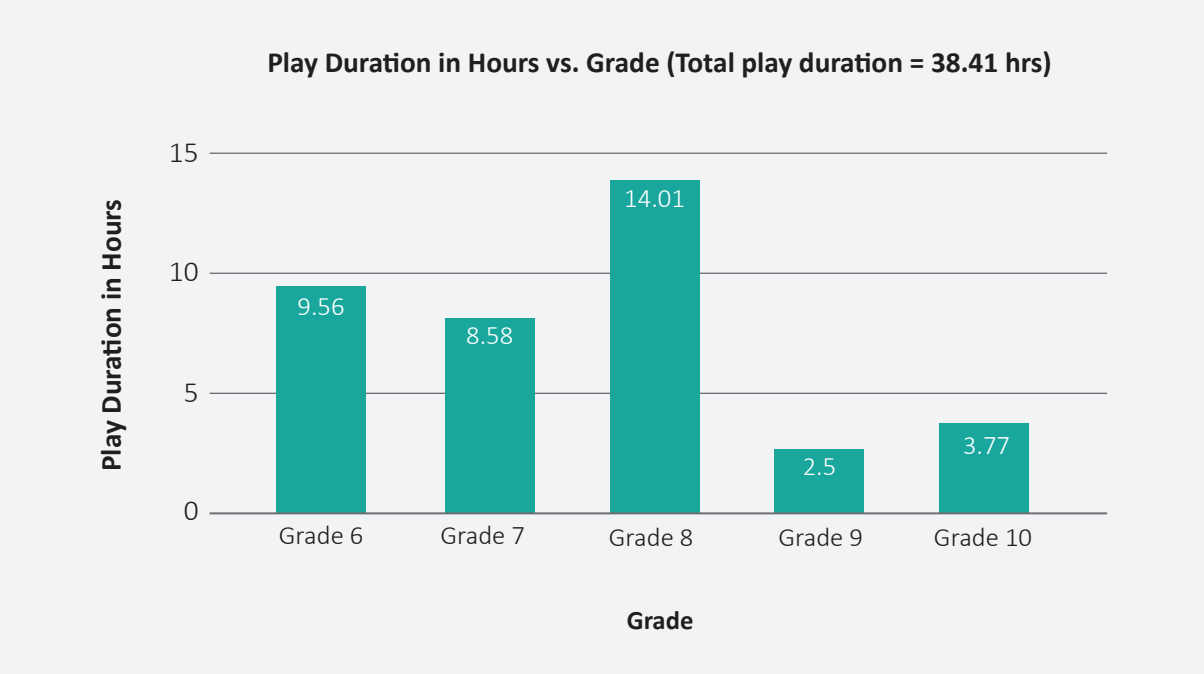


Table 4.6.4: Subject-wise Usage

Total Play Duration - Subject Wise				
Subject	**No.of times Videos Played**	**Play Duration in Minutes**	**Play Duration in Hours**	**Average Duration per Video (minutes)**
Mathematics	257	710.63	11.84	2.77
Science	304	1594.13	26.57	5.24

The videos from Mathematics were played 257 times, for a total duration of 11.84 hours (out of 38.41 hours) with an average of 2.77 minutes per video. The videos from Science were played 304 times, for a total duration of 26.57 hours (out of 38.41 hours) with an average of 5.24 minutes per video. The average duration of videos played for mathematics is less than the average length of the videos (5-7 minutes).

The subject-wise distribution of the play duration of each grade provided more insights into this. The videos were played for a longer duration in grade 8 science and mathematics (4.67 hours and 9.34 hours respectively). The lowest contribution was from grade 9 for both Mathematics and Science (0.72 hours and 1.76 hours, respectively). Moreover, a major part of the total play duration was contributed by grades from 6 to 8 in both mathematics (10.13 hours out of 11.84 hours) and science (22.02 hours out of 26.57 hours).

Figure 4.6.2: TicTac Learn Video Usage from Back-end Data: Subject-wise a) total play duration b) no. of times videos played

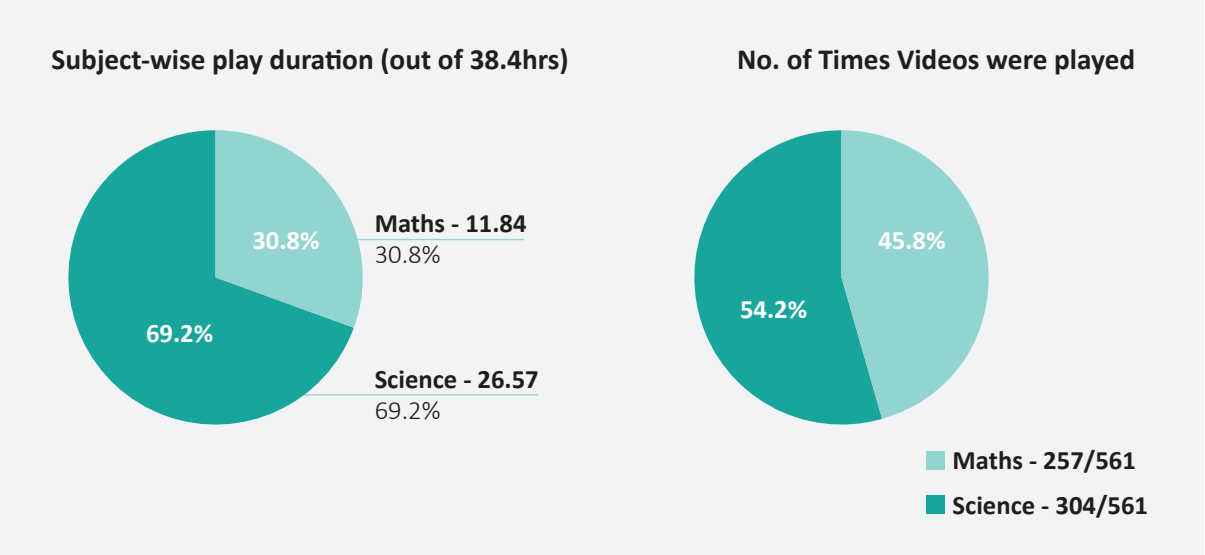


Table 4.6.5

Grade-wise Subject-wise Play Duration								
Subject	**Grade**	**No.of times the videos played**	**Minimum duration (minutes)**	**Maximum duration (minutes)**	**Maximum duration (minutes)**	**Total duration of videos played (hours)**	**Average duration per v ideo (minutes)**	**No.of times played per week per school**
Mathematics	6	76	0.03	6.98	183.03	3.05	2.41	0.12
	7	40	0.18	9.98	144.77	2.41	3.62	0.07
	8	89	0.02	9.88	280.38	4.67	3.15	0.15
	9	18	0.03	5.95	43.67	0.73	2.4	0.03
	10	34	0.15	4.2	58.78	0.98	1.7	0.06
Total		**257**			**710.63**	**11.84**		
Science	6	88	0.03	9.98	390.32	6.51	4.44	0.15
	7	63	0.02	16.33	370.17	6.17	5.88	0.11
	8	94	0.02	17.12	560.28	9.34	5.96	0.16
	9	30	0.08	11.47	106.07	1.77	3.54	0.05
	10	29	0.25	12.33	167.3	2.79	5.77	0.05
Total		**304**			**1594.14**	**26.57**		

4.6.5 Play Duration of Videos vs Number of Times Played

Further analysis of the distribution of play duration of videos vs no.of times played, indicates that many of the videos (357 out of 561) were of duration less than 5 minutes (222 from Mathematics and 135 from Science). This is less than the average video length of 5-7 minutes. Some of the videos were of duration 5-10 minutes (166 out of 561) and most of them are from science (131 out of 166). A few videos were played for more than 10 minutes (38 out of 561), and all of those were in Science.

Interestingly, 21 out of those 38 videos were in grade 8 Science. All the Math videos were played for less than 10 minutes.

Table 4.6.6

Duration Pattern of Videos Played - Grade and Subject-wise						
Subject	**Grade**	**Duration in Minutes**				
		<= 5.00	**5.01 - 10.00**	**10.01 - 15.00**	**15.01+**	**Total**
Mathematics	6	72	4	0	0	76
	7	27	13	0	0	40
	8	74	15	0	0	89
	15	3	0	0	0	18
	10	34	0	0	0	34
Total		**222**	**35**	**0**	**0**	**257**
Science	6	36	52	0	0	88
	7	24	30	8	1	63
	8	45	27	21	1	94
	9	19	10	1	0	30
	10	11	12	6	0	29
Total		**135**	**131**	**36**	**2**	**304**

4.6.6. Month-wise Usage

The analysis then proceeded to month-wise TicTac Learn video usage. The average play duration per month per school was 0.21 hours. The highest usage was measured during July (14.39 hrs), followed by August (10.85 hrs). July and August together contributed 25.24 hours out of 38.41 hrs play duration. The highest number of working days were in July and August (25 days). The lowest usage was shown during March, followed by April and June. The month of March accounted for 0 hours of usage. This could be probably due to the annual exams. April accounted for 0.02 hours, and June accounted for 0.41 hours of play duration. April and June had 11 and 12 working days respectively. One of the other observations was that no videos from grades 9 and 10 were played during January and February. Adding to this, no schools played videos in all the 11 months from April to March. The number of months throughout which videos were played is 7 and is by one school.

There were 51 entries in May, with a total play duration of 2.24 hours from 3 SIP schools. The school was closed for vacation for both students and teachers as per the academic calendar. The

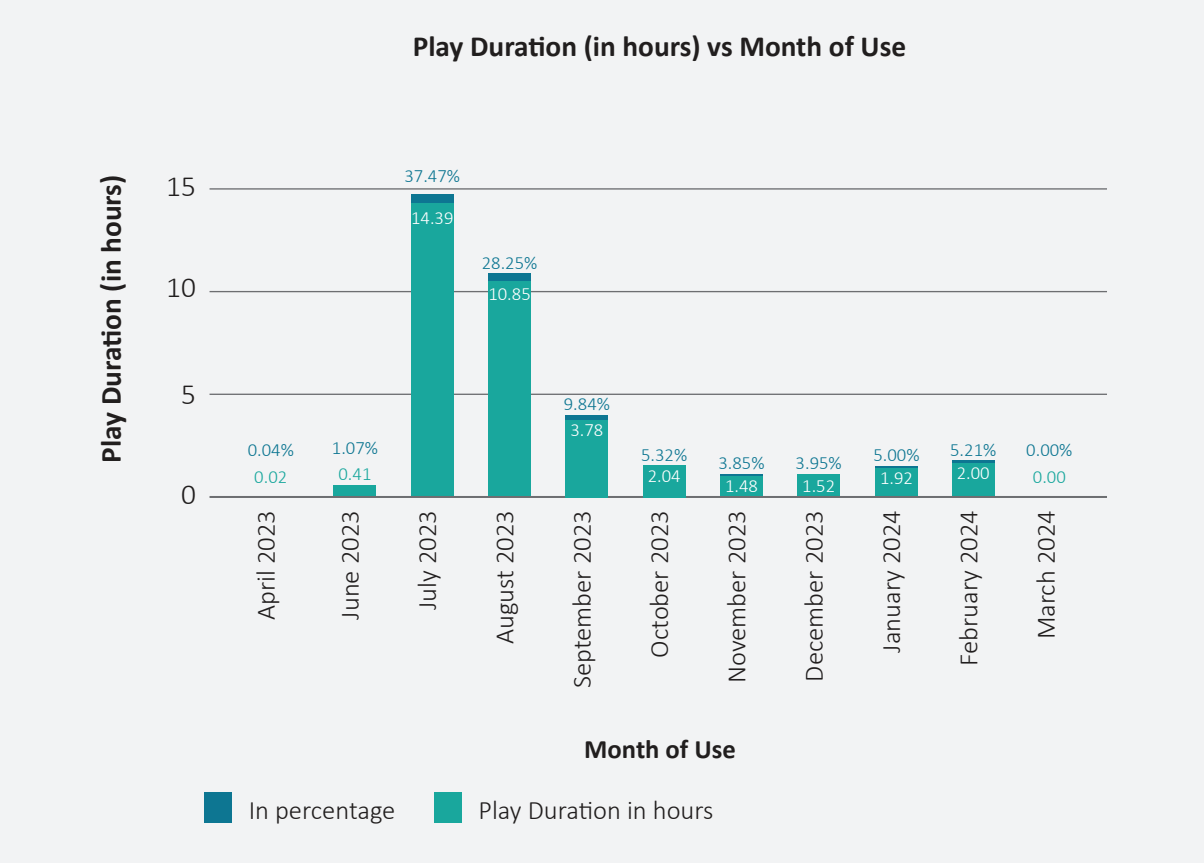
data from the month of May indicates, there was practice/training/testing of DSP TVs. Multiple consecutive entries for various grades (6,7,8 ,9) from different teachers were found. 25 out of 51 entries were from four teachers of one school across three days (0.9hrs) and 19 out of 51 entries were from two teachers of second school across two days (1.14 hours). Remaining 7 out of 51 entries were from four teachers of third school across three days (0.10 hours).

In July videos were played 240 times with a total play duration of 14.39 hours in 16 schools. Average of 15 times per school, 0.9 hours in that month. The average duration per video played was 3.6 minutes. Similarly, in August, videos were played 141 times with a total play duration of 10.85 hours. 13 schools played the video. An average of 10.8 times, videos were played per school, with the average duration per school being 0.83 hours for that month. The average duration per video played was 4.55 minutes.

Table 4.6.7

Month-wise Usage			
Month	**No.of times Videos Were played**	**Play Duration in hours**	**Average Duration of Video Played (in hours)**
April 2023	2	0.02	0.01
June 2023	7	0.41	0.06
July 2023	240	14.39	0.06
August 2023	141	10.85	0.08
September 2023	45	3.78	0.08
October 2023	23	2.04	0.09
November 2023	24	1.48	0.06
December 2023	29	1.52	0.05
January 2024	24	1.92	0.08
February 2024	26	2.00	0.08
March 2024	0	0.00	0.00
Total	***561***	***38.41***	***0.07***

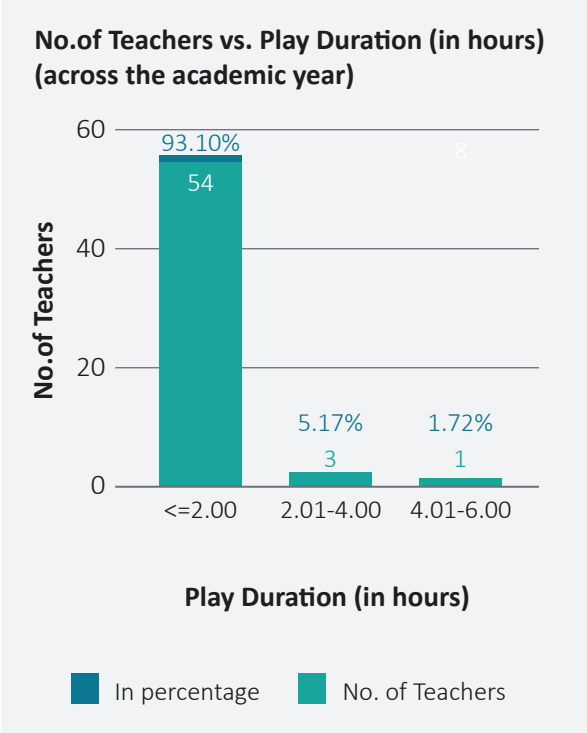
Figure 4.6.3: TicTac Learn Video Usage from Back-end data: Play Duration (in hours) vs Month of Use



4.6.7. Teacher-wise Usage

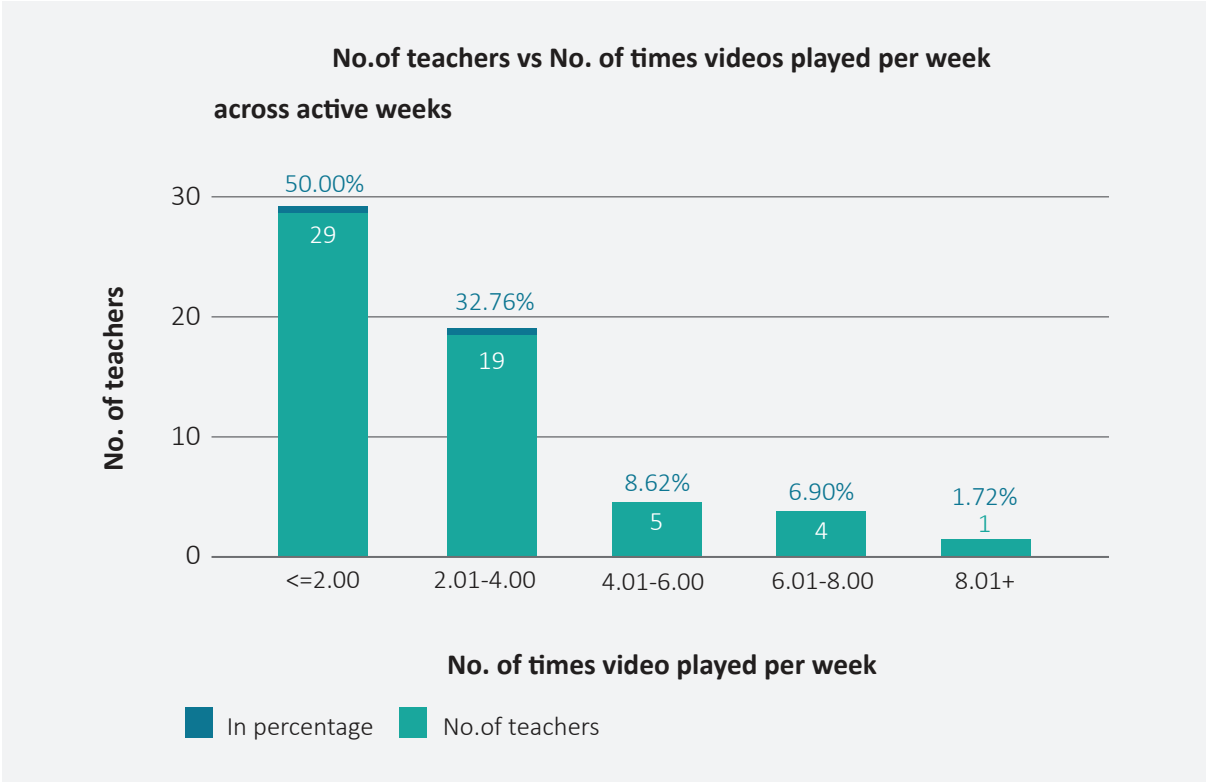
Most of the teachers (54 out of 58) played the videos for less than 2 hours in the entire academic year. A few of them (4 out of 58) played the videos for more than 2 hours. This is far less than expected as in DSP teachers are expected to use TicTacLearn videos through the Smart TVs for 0.5-1 hour (two periods) per day with their students.

Figure 4.6.4: TicTac Learn Video Usage from Back-end Data: No. of teahers vs Pay Duration (in hour



To gain a better understanding, the number of weeks across which teachers used the videos was analyzed (from the recorded date in the database). Among the 58 teachers 21 used the videos for 1 week, 10 used them for 2 weeks, 7 used them for 3 weeks, 6 used them for 4 weeks, 5 used them for 5 weeks, 3 used them for 6 weeks, 2 used them for 7 weeks, 2 used them for 8 weeks, and 2 used them for 9 weeks. We further analyzed the usage across these weeks. Half of the teachers (29 out of 58) played the videos more than twice a week on average. Many of the teachers (35 out of 58) have an average play duration of less than 10 minutes a week. Some of the teachers (14 out of 58) have an average play duration of 10-20 minutes a week. The remaining teachers (15 out of 58) used the videos for 20-40 minutes a week on average.

Figure 4.6.5: TicTac Learn Video Usage from Back-end data: No. of Teachers vs no. of Times Videos Played per Week (Across Active Weeks)



i. Comparison with Teacher Responses from Interviews

Interviews were done with teachers during the field visit, and responses were coded using MAXQDA. When the interview data was compared with the backend data, information was available for 17 out of 58 teachers. The responses of these 17 teachers on the frequency of DSP-TV usage were extracted from MAXQDA and mapped with the average number of times TicTac Learn videos played per week for each teacher calculated from the backend data, considering only the active months of usage recorded in the backend for each teacher. Many of the teacher interview responses (11 out of 17) matched the average number of times used per week calculated from backend data. The remaining 6 out of 17 responses were not matching and also over reported the use.

4.6.8. Category-wise Usage

To obtain more insights, a category-wise analysis was conducted. 9 schools from Category 1 played the videos for 25.70 hours, with an average duration per school of 2.85 hours. The 6 schools from Category 2 played the videos for 9.64 hours with an average duration per school of 1.60 hours. The schools from categories 1

and 2 played the videos for a total duration of 0.70 hours and 2.71 hours respectively. The lower duration of category 4 and 5 schools were expected. As per the backend data, both schools used the DSP TVs only in July and August. But the data also indicated that 2 schools in Category 1 used the TicTac Learn videos only for a month. Though the number of schools was less, note that, the play duration in Category 5 schools ws closer to the average play duration in Category 1 schools.

Table 4.6.8

Category-wise Usage				
Category	**No.of school**	**No.of times videos were played**	**Total duration of videos played (hrs)**	**Average duration per school (hrs)**
Category 1	9	346	25.70	2.86
Category 2	6	156	9.64	1.61
Category 4	1	14	0.70	0.70
Category 5	1	45	2.37	2.37
Total	**17**	**561**	**38.41**	**2.26**

4.6.9. Urban/Rural/Semi-Urban

The analysis shows a total play duration of 28.31 hours across the 10 schools in rural areas, with an average of 2.8 hours per school. Semi-urban had the second-highest average play duration per school of 1.9 hours, with a total play duration of 7.43 hours across 4 schools. The urban region had the lowest average play duration per school of 0.9 hours with a total duration of 2.67 hours across 3 schools.

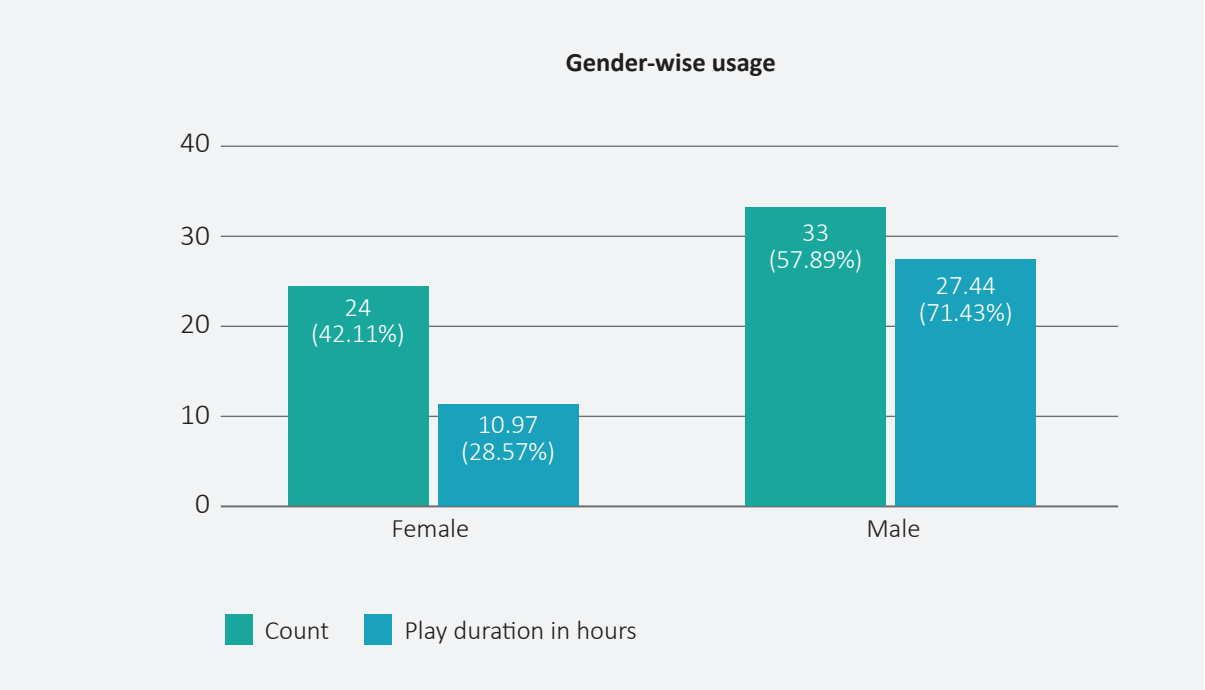
Table 4.6.9

TicTac Learn Video Usage Across Urban/Semi Urban/ Rural areas			
Region	**No.of schools**	**Total play duration (in hours)**	**Average play duration per school (in hours)**
Urban	3	2.67	0.9
Rural	10	28.31	2.8
Semiurban	4	7.43	1.9
Total	**17**	**38.41**	**2.3**

4.6.10. Gender-wise Usage

There were 58 teacher profiles monitored by the backend. Of these, 24 were female and 34 were male. The analysis shows, 71.4% of total play duration is contributed by males (27.44 hours out of 38.41 hours) and 28.6 % of total play duration is contributed by females (10.97 hours out of 38.41 hours).

Figure 4.6.6: TicTac Learn Video Usage from Back-end Data: Gender-wise Usage



4.6.11. Limitations/ Challenges

- **SNP Schools were Not Included in the Analysis:** The backend data received from MD included information for all the schools under the DSP program. After scrutiny, details for 64 schools (43 SNP and 21 SIP) were extracted from the dataset. However, it was found that no data was available for most of the SNP schools (29 out of 43), and there were errors for the remaining 14 out of 43 SNP schools. The errors included having "NULL" as the entry in the timestamp and duration column or having a wrong timestamp (e.g., year recorded as 1970 and 2000). The MD team informed that the usage duration for none of the SNP schools was properly recorded due to a software issue. Hence, many of the schools (43 out of 64) had to be excluded from the usage analysis.

- **4 SIP Schools were Not Included in the Analysis:** Examination of 21 SIP schools showed that 713 out of 2196 entries had errors (400 NULL entries and 313 entries had wrong timestamps). It was found that 4 out of 21 schools had errors in all their entries. Hence these 4 schools are not considered for the usage analysis (Altogether 47 out of 64 schools were excluded).

- **Consideration of Timeframe as Academic Year 2023-24**

- A total of 2196 entries were available for the 21 SIP schools from 1st January 2018 to 31st March 2024. Several entries (1264 out of 2196) were in 2023. A few entries were in 2022 (269 out of 2196), 2018 (260 out of 2196), and 2024 (50 out of 2196). There was only one entry in 2019, which was recorded as "NULL''. There were no entries recorded in 2020 and 2021. 713 out of 2196 entries had errors (400 NULL entries and 313 entries had wrong timestamps).

- All the entries in 2018, (260 entries out of 2196) were found on the same date: January 1st, 2018. Out of which several entries were showing "NULL" (123 out of 260).

The remaining 137 out of 260 entries were recorded on the same date on the same device. There were 269 out of 2196 entries in 2022, out of which several entries (160 out of 269) entries were recorded as “NULL”. The remaining entries were recorded on three different dates and showed a similar trend as in 2018. Similarly, several entries (1249 out of 2196) were in 2023. However, 601 out of 1249 entries were recorded on 14th April 2023, during the year break (the academic year started on April 17, 2023).

- MD team informed that this trend could be due to technical glitches. The CSF team recommended focusing on data after April 17, 2023, when the academic year 2023-24 began.
- Further, there were 630 entries during the academic year 2023-2024 (from April 17, 2023, to March 31, 2024) across 21 SIP schools. 18 out of 630 entries) were not valid (wrong timestamp and zero duration). 2 out of 21 SIP schools had all their entries invalid (15 out of 18 invalid entries). There was no data available for the 2 out of 21 SIP schools.

5. Discussion

Most SIPs were actively using DSP-TV, and about 50% of SNP schools were functional or actively using DSP-TV. Overall, sustaining without support from the external organization was an achievement for the SNP. Drawing from the adoption literature, some factors that could have supported this sustainability can be related to factors found valuable to use and sustain DSP in both types of schools. Some of the factors are highlighted in bold.

- **Ease of use** (Davis, 1989; Granić, 2022) of the digital product and teachers' self-efficacy are related to their competence in using the product. The DSP-TV (product) can be perceived as a standard TV that students and teachers have at home. Although the observation revealed difficulty in accessing and navigating content in the DSP-TV by a few teachers, there was no indication in the self-report of the difficulty in use. Moreover, students operating DSP-TV in the classroom could have further strengthened the teachers' perception of ease of use.

- **Ease of access,** except for continuity in electricity, there did not seem to be a high demand for infrastructure or restructuring of the current infrastructure in schools, especially its non-dependence on internet connectivity, made it viable even in the rural areas.

- The efficiency of DSP has some (not strong) evidence for leveraging teacher efforts and time.

- Teachers also rated higher competence in handling DSP-TV in teaching, indicating higher **self-efficacy,** which is also a significant indicator of sustainability in technology integration literature (Davis, 1989; Granić, 2022; Venkatesh et al., 2003).

- Besides attributing **teaching and learning value** to the DSP-TV use, the teachers, students and school heads all indicated a **sense of pride or dignity** and parity with private or urban schools, which are perceived to be teaching with technology infrastructure in their schools.

- One practical value that both teachers and students suggested was **substituting for teacher absence,** which is quite prominent in these schools due to administrative priorities in the system (Ball, 2003; Manjrekar, 2013). The literature on **self-regulation of technology and learning** by learners is picking up (Call to Action, Edu-Summit, 2023) with suggestions of seamless boundaries across formal and informal learning platforms (Lewin & Charania, 2018), and in the DSP programme, further thought is required to enhance DSP-TV and its videos for self-regulated usage within the school system.

- From the sustainability literature (Niederhauser et al., 2018), the DSP programme showed signs of adaptation and assimilation in schools and classrooms. For example, none of the teachers or school heads and students use the word TicTac learn or DSP; they perceive it as videos for teaching. The teachers had **the autonomy** to use other multimedia e-content. YouTube had comparable reported usage in the data, and the DSP-TVs were used for out-of-curricular activities, adding to their usefulness. To some extent, these factors showed **adaptation** or tinkering with the fidelity of the original programme, an important milestone of reinvention of the intervention for sustainability (Rogers, 2003), the DSP-TV, to suit the needs of the school context, teachers and students, thus supporting ownership and sustainability. On the other hand, the videos, except for the brand name, there was not much explored to adapt and play around with its content or use patterns.

- Overall, there was a high level of alignment on usage patterns, frequency, value and challenges of the programme across teachers, students and heads of the schools. Thus, indicating **cohesiveness** of the programme among users, beneficiaries, and decision-makers within the school context, which is also associated with sustainability.

- Drawing from the teacher's beliefs in technology integration and sustenance over

time (Ertmer, 2005), the teachers' attachment to the **learning value of DSP-TV in terms** of remembering and clearing concepts, improving students' interest levels and its confirmation over time through positive responses from the students and school heads (Ertmer, Venkatesh, 2023) could have also been a significant factor in sustaining the use over time.

- Muskaan Dreams association with the government and formal Memorandum of Understanding (MOU) with the state and districts also brought the **acceptance of the programme** to be adopted in a regular timetable system.

Another factor of sustainability that can be debated for fostering in future is the teacher-directed or direct teaching method with the DSP-TV. The way DSP-TV videos were used in the classroom, aligned with the teacher-directed methods of teaching in these schools, 'sage on the stage' approach, only with minor disruption, teacher sharing the stage with the DSP-TV.

5.1 Concerns with Frequency of Use

Although sustaining the use of DSP-TV and videos for teaching in SNP is a positive indicator of the programme's usefulness, there are doubts about the actual frequency of use in the entire academic year. The self-reports from participants in the school indicated regular use of DSP-TV, while the backend data of TicTac Learn shows very scanty use. However, the available backend data for the DSP programme was only from a few SIP schools and was limited to data from TicTac learn videos. Apart from the backend data, teachers and students' responses were documented for usage. The frequency of active months in the backend data usage was a relatively close match with the frequency of usage in the self-report data across students, teachers and heads of the schools. July and August in the academic year 2023 were the months where DSP-TV was used the most across 17 schools in the backend data. Exploration of school working days and academic calendar revealed that these two months had the highest working days in the academic calendar.

No noteworthy association was found between the active status of the DSP-TV schools and the schools designated as Chief Minister Rise Schools (CM Rise) and Prime Minister adopted schools.

Steps must be undertaken to **strengthen the monitoring and tracking system** of usage data. Since the DSP-TV is Android-based, it can also track the usage of applications other than TicTac Learn. If the monitoring system is disseminated and made transparent, it will allow schools to monitor its own usage (self-regulated use can be motivated for pedagogic intervention) and compare it with others. **An extrinsic motivation system** adopted by the government administration can be explored. On the other hand, such a system should not result in punitive action against teachers who are not using DSP-TV. The district officers also demanded sharing of individual schools and teacher usage data. It will be useful to share a summary of usage data, but sharing of individual data needs more thought, as it may invite more vigilance and top-down approach for monitoring regular use for teachers, and might be detrimental to long term sustainability.

5.2 Factors that Could Have Deterred the Continuation of the Programme

Unlike the location of active SNP schools that was both in rural and urban areas, in both rural and urban areas, most of the non-active SNP schools were in rural areas. The main reasons reported for discontinuation in non-active schools were electricity shortages, loss or lack of DSP-related infrastructure and space crunch. There was not much significant difference between active SNP and active SIP on the variables under study. Many active DSP schools also reported electricity shortages, which must be addressed in collaboration with the government administration. One pertinent observation of researchers on the field was that many times, the electricity shortages were only in the schools and not in the neighboring facilities; one of the reasons explained by the school authorities for this disparity was because the neighboring facilities acquired electricity through illegal means which was not possible for the schools to

follow. Thus, besides government administration **community intervention** would be more important in solving **electricity shortage-related issues**.

5.3 Relationship between Teacher Characteristics and Usage Frequency

Teacher competence in DSP-TV has been identified as an important factor not only associated with but also predicting usage. Given that most teachers have reported no or lack of training (limited to initial demonstration) supporting their use of DSP-TV, steps can be taken to build teacher competence in operating DSP-TV, especially navigating the videos, which has a significant positive relationship with usage in the regression model. Another important relationship which has been strongly supported in the literature is teacher beliefs playing an important role, the bidirectional relationship between beliefs and practice (Tondeur et al., 2017), and sometimes an intermediary between external factors (training, infrastructure, etc) and use of digital technologies (Ertmer, 2005; Etmer et al., 2012). The interviews and survey indicated most teachers attributed positive learning and social value to the DSP. The survey data further established that teachers who liked using DSP-TV and indicated that it has improved their teaching also reported higher frequency use. Thus, directing to the possibility of bi-directional relationship with usage, which offers an opportunity to influence teacher beliefs about DSP positively through professional development on better engagement, competence in use, showcasing best practices, evidence of impact on student learning, etc.

Another teacher characteristic that was positively related to self-reported teacher competence in DSP-TV was the age and experience of teachers. Younger teachers and less experienced teachers (age and experience were significantly positively correlated) had higher self-efficacy in their competence in using DSP-TV than the older teachers. Similar trends are seen in literature of teachers' characteristics and competence in digital technologies. This finding indicates that focus should be drawn on older and experienced teachers during training. There is no evidence to support this association in observation data. On the contrary, the classroom observation and teacher interviews have documented exemplary practices that include older and more experienced teachers.

Gender (biological) as a teacher demographic characteristic and its association has contradicting findings across survey and backend data of usage. Again, pointing towards a possibility of difference between perceived use and actual usage. Female teachers reported higher use in the interviews, while the male teachers' actual usage of TicTac Learn data showed higher use than female teachers. This could be due to lower competence of DSP-TV use of female teachers as reported by students and observed in the classroom, or just limited backend data with only TicTac Learn usage.

5.4 Factors to be Considered for Improving the Frequency of DSP-TV and TicTac Learn Use

From the above analysis, it can be said that strengthening factors of sustainability and controlling factors associated with discontinuation may improve the frequency of usage. Thus, keeping the mechanics simple and accessible, allowing self-regulated learning, maintaining teacher autonomy including repurposing or reinventing use, unanimous positive perceived learning and social value of the DSP across stakeholders in the school, and Muskan Dreams buy-in for the programme to make it systemic. Intervening electricity shortage issues, the safety of DSP-TV, the competence of teachers in operating and navigating TicTac Learn, and a robust and reliable system of usage tracking may influence the increase in the use of DSP-TV in schools.

Deeper engagement in learning with the help of DSP-TV and TicTac Learn will also improve its use frequency and vice versa. The section below reflects on engagement with DSP.

5.5 Engagement in DSP-TV Class

Overall, the findings suggest that teachers and students felt that the student engagement in the classroom was better with DSP-TV, the school heads extended further to report that it improved attendance. The self-reported data indicated higher teaching and learning value of the DSP-TV and its videos, **it supported conceptual clarity due to its media-rich demonstration, story-based nature and authentic examples,** and both teachers and students had a fair idea of its accepted use behavior in the classroom. For example, both students and teachers indicated videos should be paused for explanation, questions and discussion, note-taking should be a regular practice in DSP-TV classes, and lesson plans are a good practice for preparing for the DSP-TV classrooms. Although the teachers and students reported an expected or positive engagement, not all of these behaviors were seen during the classroom observations. For example, most teachers were not undertaking lesson planning, and most students were not taking notes on their own during the DSP-TV classrooms.

Learning engagement of students reported and observed was limited to the affordance of DSP-TV-based infrastructure, teachers sharing the stage with the DSP-TV using a teacher directed method for teaching.

The teachers **were using direct teaching methods** in DSP-TV enabled classrooms, this method of teaching fit with the affordance of the DSP including, its infrastructure and an orientation (expectation) provided to the teachers. Further it fits well with the existing ecosystem. Especially in government schools that follow a fixed pattern of seating arrangement, such as the 'sage on the stage' approach where students face the teacher, the board, and now also the DSP-TV.

Although teacher-driven or direct teaching methods are often criticized by constructivist pedagogies, a one-size-fits-all instruction is not an optimal solution for learning in all topics, subjects and contexts; using constructivism as the only pedagogical approach will limit the scope of a constructivist approach to teaching and learning.

The aim of education in the constructivist approach supports the view that students construct their own knowledge. The International Standards of Technology in Education for Students (ISTE) has set seven standards of learning with technology for students that are closely associated with using the constructivist approach of teaching and learning with technology.

Although, the DSP and the context of government schools may favour a direct teaching method, considering the need of the 21st century society and economy, and guidelines by national education policy on use of active pedagogies, it is suggested that DSP disrupts a balance between ground realities and future aspirations. The following sections present some suggestions towards this end.

In the light of the discussion above and the educational aim of the DSP-TV to foster better teaching and learning processes, making learning interactive, it is useful to aspire and elevate the standard of teaching to another form of directive teaching method (if not constructivist approach), called the interactive whole-class teaching method (Westwood & Westwood, 2008). It is a form of direct teaching used in many successful education models across the globe. Here, the principles of direct teaching apply in addition to high-level interaction with students, leading to deeper understanding and higher-order thinking around the concepts. Based on the data of this study from multiple sources, the preparation of teachers, interaction of students and overall participation seemed inadequate to suit the principles of this interactive whole-class method.

Teachers will need professional development to build strategies for interaction and discussion; for example, frame open-ended questions and build on students' responses to deepen discussions, integrate or swiftly move between videos and textbooks when required for alignment with curriculum, which will also require prior preparedness of teaching in DSP-TV enabled classrooms.

Lesson planning, although desired, was seen almost absent during the classroom observation. Making lesson plans mandatory will not fit the regular practice of teachers who do not use them, and this aspect needs to be well thought out. Although it is important in technology integration, teachers develop their own pedagogy and lesson plans (Charania, 2021; Tiernan, 2019). Lesson planning is much preferred for many reasons, including more contextual learning and autonomy of the teachers than having standard plans for all teachers by outside players. One suggestion could be professional development that encourages or makes lesson plans for DSP-TV lessons, which can then be distributed across. This kind of collaborative effort will avoid a top-down approach; teachers may have more acceptance of peer-made lesson plans. Besides the lesson plans, a teacher guidebook with teaching method strategies to be used with DSP-TV videos with exemplar lesson plans from peer teachers, recognizing the teachers for their contribution, can be tried. Teachers' communities of practice groups can be explored for disseminating and motivating teachers in creating and sharing of DSP-enabled teaching plans (Jocius et al. ,2022). Many researchers and educators have emphasized the need to establish communities of practice of teachers for peer support and sharing of practices (Charania, 2022, 2023; Thirumalai, 2019). The study did not have much evidence of active engagement of teachers in the DSP WhatsApp group. Setting these pedagogical practices will also need a cadre of educators at the implementation organization and/or leveraging/capacitating the educators from the DIET system.

Only a fraction of the teachers combined an activity-based approach with the DSP-TV. Besides the dominant teaching method of explanation (teacher-directed method), there is a potential to build more activity-centered teaching and learning. These are documented in the Classroom Observation Summary chapter. Although rare, these teaching methods must be analyzed, improvised and disseminated for eclectic or integrative teaching methods and pedagogy in the DSP-TV-enabled classrooms.

As the programme advances, there is a need to strike a good balance of disruptive higher-order learning that assimilates with current teaching and learning culture, leveraging on the hero teachers and schools who showed exemplary use of TicTac Learn videos in the classroom. Some cross-picking from the data revealed the following practices as exemplary:

The "Hero schools" were identified based on the teachers' use of DSP-TV during classroom observation. Classroom observations revealed several key practices: teachers used a pause-play-pause method, introduced topics before using DSP-TV, and made learning contextual by providing real-life examples in a few cases. Teachers also actively engaged students, often asking contextual questions and summarizing the topic that was shown on the DSP-TV. Focus Group Discussions (FGDs) highlighted that students appreciated the regular use of DSP-TV and its ability to connect lessons with real-life examples, though some noted technical issues and a preference for teachers over students operating the DSP-TV was seen.

Teachers who were identified as 'hero teachers' based on the classroom observations, have significant teaching experience and use DSP-TV frequently, though only a few received formal training. Teachers reported that DSP-TV made learning more engaging and memorable but suggested improvements, including updating content to align with syllabus and adding contents of other subjects.

Despite the benefits, challenges such as insufficient content and lack of training were noted, indicating areas for further development in integrating DSP-TV into educational practices.

On the other hand, a few teachers and students did not favour using DSP-TV-enabled classrooms. Most of their reported reasons were related to the shortage of electricity and time, inadequate and updated content in the videos, and a sense of preferring the human interaction of teachers over technology (Lowenthal et al. ,2020). Many students almost unanimously vouched for DSP with the teacher, and sometimes the teacher over DSP.

Although content analysis of the videos was not the scope of this study, the following excerpt from the classroom observation is used here to suggest a review of the videos to support activity or experiential learning in the classroom. An expert's review during classroom observation highlighted that the students were having a vicarious learning experience watching the TicTac Learn video on lighting the bulb. Vicarious learning has been documented as a very useful learning technique, especially in contexts and domains where real experience is not viable or difficult, such as dissecting animals for experiments. Simulations are quite popular and give a vicarious learning experience, but they are also active and allow interaction with the vicarious or virtual reality. In this observation, vicarious learning could have been easily replaced or complemented with the actual experience of lighting the bulb in the classroom. Examples like these need to be studied by TicTac Learn to **stimulate real experience** in the classroom. Also, instead of prompting the teacher to conduct this simple experiment in the class, the video showed the students replicating the experiment at their home which was way above the social class of the students in the government school. It actually got the teacher in the class off the hook, who referred to the video and asked the students to conduct this experiment at home. It was very unlikely (confirmed with students in the FGD) for most students to conduct such experiments at home.

Besides active, interactive classrooms, the literature in engagement emphasized collaboration or collaborative activity (Bond & Bergdahl, 2022). Collaborative activities, although not a direct affordance of DSP-TV and its videos, can be brought in with activity-based approach as discussed in this section, teacher and student preparedness for such a teaching method will be required (Johnson et al., 2014).

5.6 Critical Pedagogy in the Marginalized Contexts

Besides higher order thinking and learning, and dignity attached to the DSP-TV, any digital technology or pedagogy in the education contexts of the marginalized should aim at learning immersed in issues of equity, and social issues that shape children's realities. Dialogue is the centerpiece of Freirie's teaching method. He defines dialogue as a conversation with purpose and focus between teacher and students. Through discussion and extensive open-ended questioning by the teacher, the student engages in the topic under study. For Freirie, questions and not answers are the core of the curriculum. Open-ended questions stimulate students to critically analyze their social situation and empower them to change it. In the process, the student progresses from personal reactions to social analysis to consideration of action. Teachers should help their students discover that knowledge "is socially constructed; the truth is relative not only to time and place but to class, race, and gender as well" (Freirie, p. 377) (cited in Charania, 2003).

The DSP-TV, as a democratizing tool in the classroom, should break gender stereotypes. However, the data clearly states that there were gender differences among students in the co-ed classrooms, where only boys were seen operating DSP-TV. Reports of students and observations revealed female teachers had difficulty operating DSP-TV, which could have also impacted gender differences of use among students.

5.7 Professional Development

Professional development of teachers including school heads for active and critical pedagogy, inclusivity, and competence is very important (Hargreaves, 2000). One-time demonstration or just teaching digital competence is not adequate. Professional learning in technology integration

has been studied extensively. Our experience in the Indian context suggests professional learning for technology integration should integrate technology, pedagogy, content, and context knowledge of teachers (TPACK, Koehler and Mishra, 2009, 2014), should be continuous, practice-based, collaborative and flexible (Charania et al., 2023). DSP can consider a robust professional development programme for deeper engagement of teaching and learning using technology and using some of the principles of impactful teacher professional development. Flexibility of teachers using distance technologies, and the possibility of getting professional credits for comprehensive professional development can be explored. Our recent research also suggests that female teachers are more successful in professional development in technology integration that allows flexible delivery options (Charania et al., 2024).

5.8 Ergonomics

Factors such as the size of the TV, viewing distance, resolution, and mounting height all influence picture quality and comfort. The layout and design of a classroom are also important for both students and teachers and should be planned to ensure uninterrupted learning. FGDs indicated issues with the clarity of video; one contributing factor could be the position of the DSP-TV. The classroom observations indicated instances where DSP-TV is placed beside the blackboard, above or away from the board or in the opposite directions which could have an impact on the teaching-learning experience. For the best viewing experience, DSP-TVs should be placed at specific distances and heights based on their size and resolution. For instance, Samsung's internal research suggests that a 32-inch HD TV should be placed 1.1 meters from the audience. Moreover, TVs should be mounted at or slightly below eye level, typically 42 to 60 inches from the floor. It is important to use the students' eye level as a guide, ensuring the centre of the screen aligns with their eye level when seated.

Other aspects such as the seating arrangement, the position of light sources to avoid glare, acoustics and the placement of blackboards or whiteboards should also be considered. In 18 out of 53 classrooms observed it was noticed that students were sitting on the floor. DSP-TV's position is significant here since mounting the TV too high can lead to discomfort and strain in the neck. In summary, an ergonomic analysis is crucial before investing in classroom infrastructure.

5.9 DSP Engagement Framework

Based on the discussion above, the following framework of DSP Engagement (Figure 5.1) can be considered for understanding its current strengths and potential areas for intervention.

5.10 Going Forward

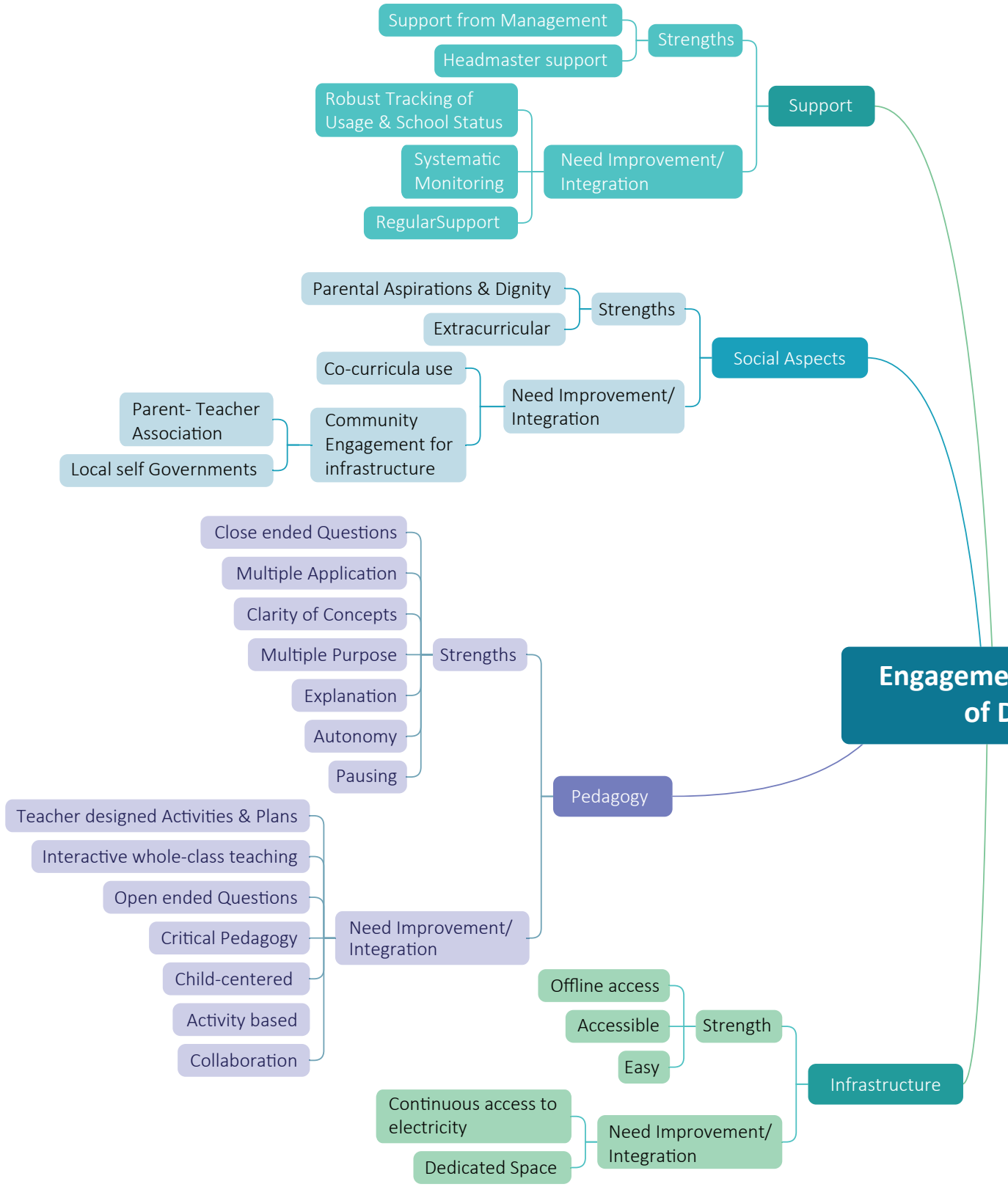
The DSP-TV being a low-tech solution had the strength to assimilate and diffuse in the context of the SIP and SNP schools. As the pressure and need to move towards hi-tech solutions builds, the findings of these studies can be helpful in clarifying and seeking higher learning goals for

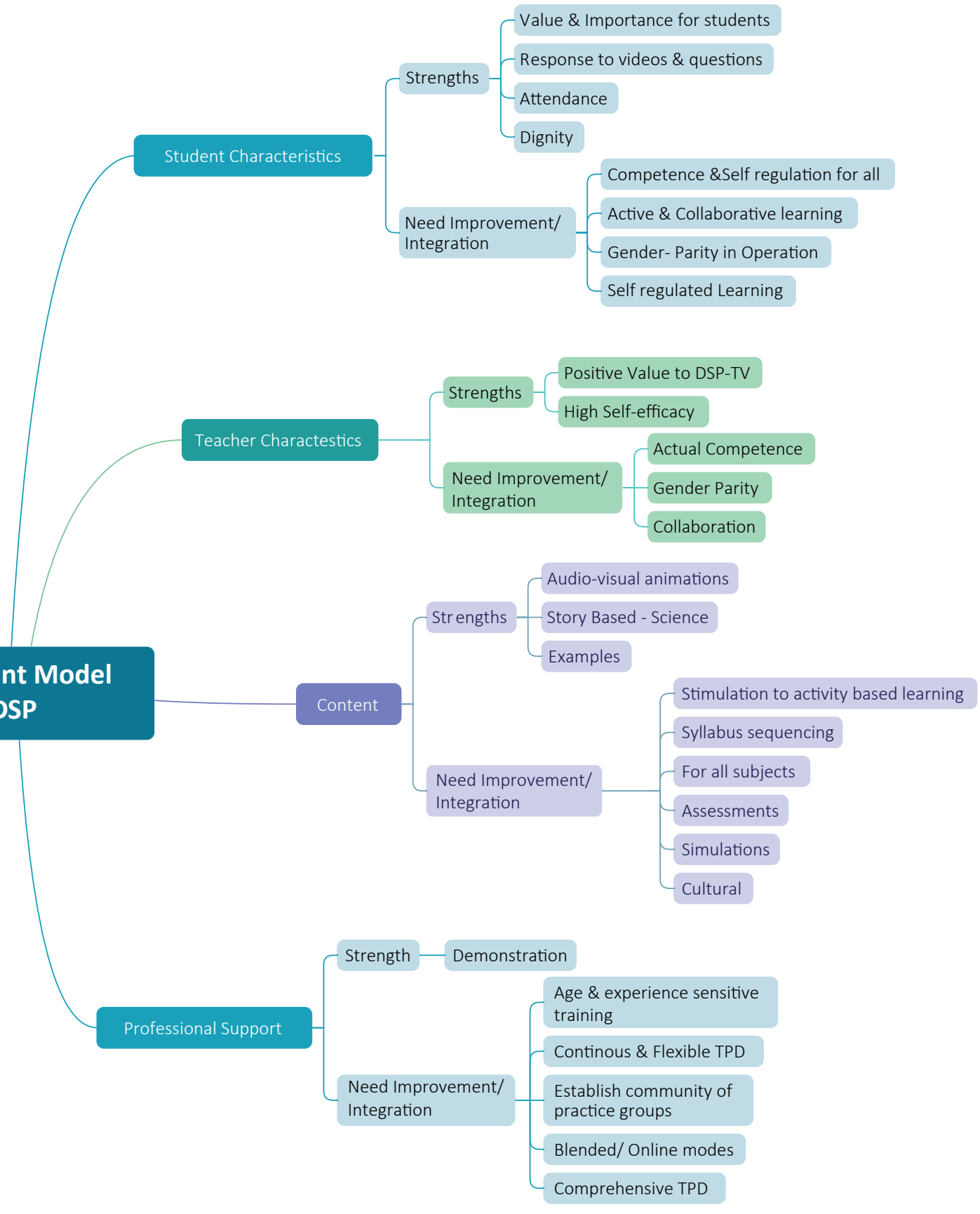
deeper engagement and the factors that can lead towards sustainability of use. Based on the study findings and literature, DSP-TV infrastructure and support to schools and teachers can aim towards achieving active and interactive teaching and learning processes in the classroom, equity, inclusion and a sense of agency[1] for its teachers and students, confidence and competence to operate and integrate DSP-TV and other accessible technology devices and applications for knowledge deepening[2]. The following Model of DSP engagement summarizes factors that can be sustained and strengthened to improve engagement with DSP.

The efforts to work on the suggestions will require more clarity in the vision and purpose of the programme. The scale of digitizing teaching and learning will require a focus on deeper and sustainable engagement in teaching and learning. Teachers and school heads' views will need to be taken along.

[1] Agency: competence, confidence, accountability, autonomy,self-regulated use and adaptation of digital technologies to suit their own and the needs of their communities.
[2] Knowledge deepening: includes multidisciplinary connections, connected to real life or personal meaning to learners, ability to relate understanding of concepts to newer contexts.

Figure 5.1.: Discussion: DSP Engagement Framework





6. Policy Recommendations

Recommendations for Effective Implementation and Sustainability of Multimedia e-Content Based Learning in Government-run Secondary Schools in India

These recommendations are compiled by Central Square Foundation (CSF) and the research group in Educational Technology at the Center of Excellence in Teacher Education (CETE), SOE, TISS.

This document outlines the main findings and recommendations based on the study conducted by the educational technology research group at CETE, TISS across upper primary and secondary in two districts of Madhya Pradesh under a multimedia e-content based learning (MME) program led by Muskaan Dreams (implementing NGO). The recommendations highlight improvements for implementing, modifying, and sustaining initiatives that centrally use MME in classrooms. This note aims to improve MME-enabled classrooms for interactive, engaging, and impactful student learning experiences in government-run schools across India.

K-12 classrooms in India that are enabled with digital technology tools and resources including multimedia e-content or video-based learning through devices like television or interactive flat panels are often called Smart Classrooms. Under the Samagra Shiksha scheme, the state's Department of School Education receives up to ₹2.40 lakh as a non-recurring grant (details in annexure)* and ₹0.38 lakh annually as a recurring grant per school to establish two smart classrooms[1] which has resulted in higher access to digital devices. However, the engagement and usage of these smart classrooms have been fairly limited.

The ICT framework of the Samagra Shiksha scheme (2023-24)[2] lists various ICT interventions to enhance learning in classrooms. The scheme also suggests developing and using MME in classrooms to complement the curriculum. In the context of this note, the NGO-led program and its infrastructure, along with the MME provided by the partner organisation is one of the at-scale ICT interventions for in-school education across three districts of Madhya Pradesh. The TISS study explored the factors driving effective usage and engagement with this MME program and examined the value students and teachers ascribe to the program infrastructure and e-content, how this content was utilized in classrooms, and the motivations and barriers to adoption. It also investigated support structures and the program's sustainability after the withdrawal of continuous implementation support. The program uses an Android-based system on a flat-screen TV (about 80 centimetres screen), enabled by a USB pen drive (plug-in and play) for uploading MME videos. The Android-based system allows teachers to display MME from other online platforms like YouTube. The program infrastructure largely supports MME for the whole class, where the TV shares the central space with the chalk or pen board and the teacher.

Findings indicated that although initial demonstration/training was provided, only 50% of schools were functional or actively using the program infrastructure after the withdrawal (after 2 years) of continuous implementation support from the implementing NGO. The key challenges that hindered continuation of the program included infrastructure issues such as electricity shortages and inadequate security, limited or no teacher training, insufficient technical and pedagogical support, and outdated MME.

The study mapped reasons for sustainability

[1] Department of School Education & Literacy.: https://dsel.education.gov.in/scheme/ict-samagra
[2] https://dsel.education.gov.in/sites/default/files/1Framework_for%20_ICT.pdf

in the rest of the 50% of schools, some of these were the ease of use and accessibility of the program infrastructure, high teacher self-efficacy on the competence of using the device, autonomy for teachers to incorporate the video content and choice of additional e-content whenever they want, the learning value of the program recognised by all stakeholders, compatibility with the teachers' usual teaching method i.e. teacher-directed instructional methods, and the dignity associated with the use of digital technologies in their schools. While stakeholders acknowledged the potential of the program to elevate the school's status, they emphasized the need for comprehensive support layers to ensure effective integration into teaching and learning processes aligned with MME pedagogy.

Based on research findings from this study, the following are recommendations to drive effective implementation, adoption and sustainability of MME classrooms using Android-based TVs to enhance the classroom teaching-learning process. These recommendations can be utilized by other digital technology-enabled initiatives related to MME, Video-based learning employing a variety of digital tools and, in general, one-to-many digital tool-enabled initiatives in the classroom.

Figure 6.1: Factors related to the effective use of MME-type classrooms

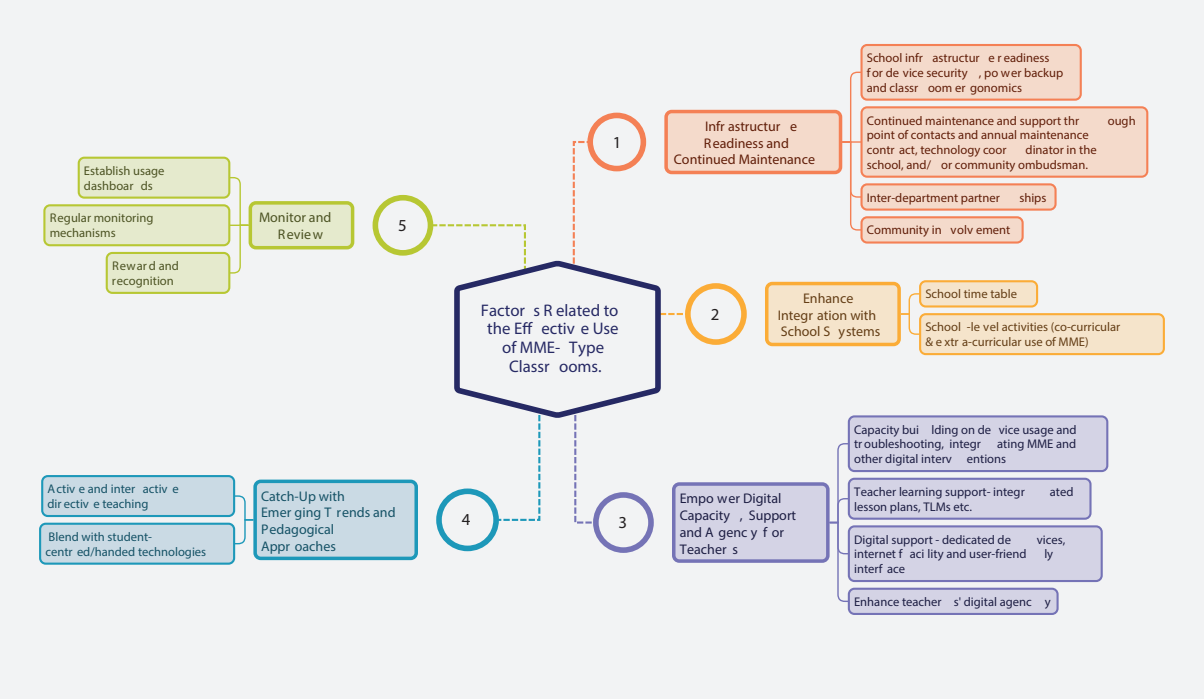


Table 6.1 Factors related to the effective use of MME-type classrooms and suggested guidelines

Factors	Components	Suggested Guidelines
Infrastructure Readiness and Continued Maintenance	**School infrastructure Readiness**	Well-lit, ventilated classrooms with ergonomic classroom layout for visibility to all students.
		Infrastructure for device security; Power backups like solar/UPS
	Continued maintenance and support	Assigning Point of Contact at all block levels as Support Team for the Program
		Consistent, accessible support should be provided to address repairs and troubleshooting or any technical issues promptly, ensuring minimal disruption to learning; through the Annual Maintenance Contract, technology coordinator in the school, alarm system for security, and/or community ombudsman.
	Inter-department Partnerships	Collaboration with local governments for sustainable power solutions and leveraging underutilised budgets for infrastructure.
	Community Involvement	Engage the School Management Committee (SMC), village councils, or interested parents in regular discussions on school technology and safety. This can enhance the sense of responsibility, collective ownership, and action, making security a shared concern.
Integration with school systems	**School Time Table**	Subject-wise, weekly MME enabled classroom usage schedules for target grades.
		School calendar/timetable for all targeted grades to access and utilize the potential of the MME class.
	School-level Activities	Integrate school-level activities with the MME, such as co-curricular activities, government program relays, and student edutainment activities.

Enhance Digital capacity, support and agency for Teachers	**Capacity Building**	Teacher capacity building should not be about individual digital technology or programmes but should include a variety of teacher- and student-centred digital technologies and their affordances.
		Train teachers on device usage and troubleshooting issues.
		Organise hands-on workshops with devices on integrating MME and other digital interventions related to classroom content with classroom teaching, with special support for older or experienced teachers.
		Refresher training on pedagogy integration and spaces to share best practices.
		Recurring capacity building to create digital technology-integrated Lesson Plans.
		Identifying high-capacity teachers in cohorts for continuous mentoring support in effectively integrating different teaching tools.
		Training should include fostering socio-technical awareness[3], ethical digital resource use, and critical thinking. Include strategies to address limiting beliefs and reinforce the positive impact of technology on learning outcomes during training.
	Teacher Learning Support	A consortium of resources for teacher support, including sample exemplar lesson plans for MME classroom integrated teaching, supplementary videos or e-content, and assessments, serves as a comprehensive repository to facilitate lesson plan creation that effectively integrates MME classroom content
		Availability of MME classroom content to the teacher on personal tablets/devices for increased teacher autonomy in the creation and customisation of lesson plans.
		Integration and mapping of MME classroom content with that of student tablets, computer labs, or any other existing school technology and resources.

[3] Socio-technical awareness involves understanding how technology can either bridge or deepen social divides based on factors like gender, class, and caste, depending on its design, use, and dissemination.

	Digital Support	**Provision of Dedicated Devices for Teachers**	Equip teachers with tablets or phones with internet connectivity to ensure they can access online resources without relying on personal devices, promoting equity and reducing personal costs. Aligning support for already existing digital devices in the schools.
	Technology should be designed with simple (preferably familiar), intuitive interfaces that make it approachable for students and teachers of all skill levels.	**Non-intimidating, User-Friendly Interface**	Technology should be designed with simple (preferably familiar), intuitive interfaces that make it approachable for students and teachers of all skill levels.
	Empower Teachers' Digital Agency	**Enhancing Teacher Autonomy and Ease of Planning**	A platform to plan, implement lessons and make adaptations to the resources to provide autonomy for teachers to make major decisions on what and how to teach.
		Incorporation of Gender Sensitivity	Targeted support for female teachers to mitigate challenges in accessing and using digital tools.
Emerging Trends and Pedagogical Approaches	**Active and Interactive Directive Teaching**		Elevating directive teaching to include higher interaction levels, thought-provoking questions, and active engagement strategies using technologies like Interactive Flat Panels (IFPs). Utilize the Technological Pedagogical Content Knowledge (TPACK) framework to train teachers in integrating technology effectively.
	Blend with student-centred/ handed technologies		Meaningfully and creatively leveraging and blending of one-to-one/small groups computer (desk/laptops or tablets) infrastructure- Child-centered/handed use of technology that aims at deeper and authentic learning, with a one-to-many approach to using technology, or the Teacher-centred use of Technology that mainly targets conceptual understanding. (Details in Annexure) **

Monitor and Review	**Establish Usage Dashboards**	User-friendly dashboards for usage monitoring, with alerts for under-utilization and corrective actions.
	Regular Monitoring Mechanisms	Integration of MME classroom usage data and insights into existing state structures.
		Periodic data tracking, report generation, and reviews on usage trends, participation, and feedback.
	Reward and Recognition	Mechanism to reward and recognise schools and teachers who engage with MME classrooms efficiently.

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*Non-recurring budgets for Smart Classrooms under the Samagra Shiksha Scheme						
Region	**FY 2022-23**		**FY 2023-24**		**FY 2024-25**	
Non-Recurring Budgets ₹2.4L for Smart Classrooms	All States (no. of schools)	Total Budget (in Lakhs)	All States (no. of schools)	Total Budget (in Lakhs)	All States (no. of schools)	Total Budget (in Lakhs)
Total New Schools for Smart Classrooms	32506	₹78014.4	23836	₹57206.4	23099	₹55437.6
Total Spillover Schools for Smart Classrooms	37875	₹90900	54895	₹131748	44194	₹106065.6
Total	**70381**	**₹168914.4**	**78731**	**₹188954.4**	**67293**	**₹161503.2**

**Blending of TCT and SCT:

MME, in the context of this paper, is a teacher-centred use of technology (TCT). The TCT puts the teacher at the front or centre of the classroom, often at par with the technology infrastructure. In the context of this study, this approach best aligns with and is suited to teachers' everyday directive teaching method. The teachers perceived MME's value in supporting conceptual understanding through its captivating and exemplifying multimedia-enabled content.

On the other hand, student-centered technology (SCT), where technology is in the hands of the students, places teachers behind or along slide the students and their devices, often called playing a facilitative role. Project-based learning and Personalized adaptive learning are some examples of SCT. In PBL, the teacher may have the opportunity to design their and their student's roles; however, in some existing PALs, the teachers are not part of the design; the PAL environments assign them to play a side or

supporting role. Some autonomy exists in some programmes where the teachers get to decide when and how much to use the given e-content or software.

The capacity building of the teachers on digital technologies often trains them to use the devices and software or e-content for TCT or SCT in isolation depending on which intervention or programme gets to be adopted by the school or district. The capacity building does not allow opportunities to reflect on various technology devices, software or programmes, their affordances to teaching and learning, their development process, alignment with curriculum assignment, the developer's background, funder their motives, etc. This half-knowledge doesn't empower the teacher to build different types of technologies based on their pedagogic preferences and student needs; instead, the teacher becomes just an implementer or facilitator of the use of technologies dictated by the authorities. This top-down technology adoption seldom allows teachers to modify the intervention to suit their teaching or their students' learning needs.

7. References

- Abrami, P. C., Bernard, R. M., Bures, E. M., Borokhovski, E., & Tamim, R. M. (2012). Interaction in distance education and online learning: Using evidence and theory to improve practice. Journal of Computing in Higher Education, 23(2-3), 82-103. DOI:10.1007/s12528-011-9043-x
- Almarghani, E. M., & Mijatovic, I. (2017). Factors affecting student engagement in HEIs—It is all about good teaching. Teaching in Higher Education, 22(8), 940–956. https://doi.org/10.1080/13562517.2017.1319808
- Annetta, L. A., Minogue, J., Holmes, S. Y., & Cheng, M. T. (2009). Investigating the impact of video games on high school students' engagement and learning about genetics. Computers and Education, 53(1), 74-85.
- Appleton, J. J., Christenson, S. L., & Furlong, M. J. (2008). Student engagement with school: Critical conceptual and methodological issues of the construct. Psychology in the Schools, 45(5), 369–386. https://doi.org/10.1002/pits.20303
- Appleton, J. J., Christenson, S. L., Kim, D., & Reschly, A. L. (2006). Measuring cognitive and psychological engagement: Validation of the student engagement instrument. Journal of School Psychology, 44(5), 427–445. https://doi.org/10.1016/j.jsp.2006.04.002
- Ashwin, P., & McVitty, D. (2015). The meanings of student engagement: Implications for policies and practices. In A. Curaj, L. Matei, R. Pricopie, J. Salmi & P. Scott (Eds.) The European higher education area. Springer, Cham. https://doi.org/10.1007/978-3-319-208770_23
- Ball, S.J. (2003). The teacher's soul and the terrors of performativity. Journal of Education Policy, 18(2), 215–228.
- Barak, M., & Dori, Y. J. (2011). Science education in primary schools: Is an animation worth a thousand pictures? Journal of Science Education and Technology, 20(5), 608–620. https://doi.org/10.1007/s10956-011-9315-2
- Bergdahl, N., & Hietajärvi, L. (2022). Social engagement in distance-, remote-, and hybrid learning. Journal of Online Learning Research, 8(3), 315-342.
- Bergdahl, N., Nouri, J., Karunaratne, T., Afzaal, M., & Saqr, M. (2020). Learning analytics for blended learning: A systematic review of theory, methodology, and ethical considerations. International Journal of Learning Analytics and Artificial Intelligence for Education (iJAI), 2(2), 46. https://doi.org/10.3991/ijai.v2i2.17887
- Bolliger, D. U., & Martin, F. (2018). Instructor and student perceptions of online student engagement strategies. Distance Education, 39(4), 568–583. https://doi.org/10.1080/01587919.2018.1520041
- Bond, M. (2019). Flipped learning and parent engagement in secondary schools: A South Australian case study. British Journal of Educational Technology, 50(3), 1294–1319. https://doi.org/10.1111/bjet.12765
- Bond, M., & Bergdahl, N. (2022). Student engagement in open, distance, and digital education. In handbook of open, distance and digital education (pp. 1–16). Springer Nature Singapore. https://doi.org/10.1007/978-981-19-0351-9_79-1
- Bradley, G., & Russell, G. (1997). Computer experience, school support and computer anxieties. Educational Psychology, 17(3), 267–284. https://doi.org/10.1080/0144341970170303
- Cappella, E., Kim, H. Y., Neal, J. W., & Jackson, D. R. (2013). Classroom peer relationships and behavioral engagement in elementary school: The role of social network equity. American Journal of Community Psychology, 52(3–4), 367–379. https://doi.org/10.1007/s10464-013-9603-5
- Charania, A. (2003). Technology for the poor: Revisiting "Hole in the Wall" (Unpublished manuscript). Curriculum and Instructional Technology, Iowa State University.

- Charania, A., Bakshani, U., Paltiwale, S., Kaur, I., & Nasrin, N. (2021). Constructivist teaching and learning with technologies in the COVID-19 lockdown in Eastern India. British Journal of Educational Technology, 52(4), 1478-1493.
- Charania, A. (2022). Introduction to integrated approach to technology in education. In A. Charania (Ed.) Integrated Approach to Technology in Education in India, pp.1-9. Routledge India
- Charania, A., Paltiwale, S., Sen, S., Sarkar, D., & Bakshani, U. (2023). Leading edge use of technology for teacher professional development in Indian schools. Education Sciences, 13(4), 386.
- Charania, A., Cross, S., Wolfenden, F., Sen, S., & Adinolfi, L. (2024). Exploring teacher characteristics and participation in TPACK-related online teacher professional development in Assam, India. Computers and Education Open, 7.
- Christenson, S. L., Reschly, A. L., & Wylie, C. (Eds.). (2012). Handbook of Research on Student Engagement. Springer US. https://doi.org/10.1007/978-1-4614-2018-7
- Christenson, S. L., Sinclair, M. F., Lehr, C. A., & Godber, Y. (2001). Promoting successful school completion: Critical conceptual and methodological guidelines. School Psychology Quarterly, 16(4), 468–484. https://doi.org/10.1521/scpq.16.4.468.19898
- Curaj, A., Matei, L., Pricopie, R., Salmi, J., & Scott, P. (Eds.). (2015). The European Higher Education Area. Springer International Publishing. https://doi.org/10.1007/978-3-319-20877-0
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319. https://doi.org/10.2307/249008
- Deci, E. L., Olafsen, A. H., & Ryan, R. M. (2017). Self-determination theory in work organizations: The state of a science. Annual Review of Organizational Psychology and Organizational Behavior, 4(1), 19–43. https://doi.org/10.1146/annurev-orgpsych-032516-113108
- Dede, C. (2009). Immersive interfaces for engagement and learning. Science, 323(5910), 66-69.
- Ertmer, P. A. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? Educational Technology Research and Development, 53(4), 25–39. https://doi.org/10.1007/BF02504683
- Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher beliefs and technology integration practices: A critical relationship. Computers & Education, 59(2), 423-435.
- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004a). School engagement: Potential of the concept, state of the evidence. Review of Educational Research, 74(1), 59–109.
- Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004b). School engagement: Potential of the concept, state of the evidence. Review of Educational Research, 74(1), 59–109. https://doi.org/10.3102/00346543074001059
- Garrison, D. R., Anderson, T., & Archer, W. (1999). Critical inquiry in a text-based environment: Computer conferencing in higher education. The Internet and Higher Education, 2(2–3), 87–105. https://doi.org/10.1016/S1096-7516(00)00016-6
- Granić, A. (2022). Educational technology adoption: A systematic review. Education and Information Technologies, 27(7), 9725–9744. https://doi.org/10.1007/s10639-022-10951-7
- Greenwood, C. R., Horton, B. T., & Utley, C. A. (2002). Academic engagement: Current perspectives on research and practice. School Psychology Review, 31(3), 328–349. https://doi.org/10.1080/02796015.2002.12086159
- GyanPitara (2024), https://www.educationportal.mp.gov.in/GyanPitara/Default.aspx. Accessed on September 12, 2024.

- Hargreaves, A. (2000). Four ages of professionalism and professional learning. Teachers and Teaching, 6(2), 151–182. https://doi.org/10.1080/713698714
- Harris, J., Koehler, M.J., & Mishra, P. (2009). What Is Technological Pedagogical Content Knowledge? Contemporary Issues in Technology and Teacher Education. 9(1). https://citejournal.org/volume-9/issue-1-09/general/what-is-technological-pedagogicalcontent-knowledge
- Heddy, B. C., & Sinatra, G. M. (2013). Transforming misconceptions: Using transformative experience to promote positive affect and conceptual change in students learning about biological evolution. Science Education, 97(5), 723–744. https://doi.org/10.1002/sce.21072
- Henrie, C. R., Halverson, L. R., & Graham, C. R. (2015). Measuring student engagement in technology-mediated learning: A review. Computers & Education, 90, 36-53.
- Hew, K. F., & Lo, C. K. (2020a). Comparing video styles and study strategies during video-recorded lectures: Effects on secondary school mathematics students' preference and learning. Interactive Learning Environments, 28(7), 847–864. https://doi.org/10.1080/10494820.2018.1545671
- Hew, K. F., & Lo, C. K. (2020b). Comparing video styles and study strategies during video-recorded lectures: Effects on secondary school mathematics students' preference and learning. Interactive Learning Environments, 28(7), 847–864. https://doi.org/10.1080/10494820.2018.1545671
- Hollister, B., Nair, P., Hill-Lindsay, S., & Chukoskie, L. (2022). Engagement in online learning: Student attitudes and behavior during COVID-19. Frontiers in Education, 7, 851019. https://doi.org/10.3389/feduc.2022.851019
- ICT@school.https://vimarsh.mp.gov.in/(S(znjaitxuyb2luzxwzdji0d5j))/ICT_Reports/ICT_home/inde x.html
- Jocius, R., O'Byrne, W. I., Albert, J., Joshi, D., Blanton, M., Robinson, R., Andrews, A., Barnes, T., & Catete, V. (2022). Building a Virtual Community of Practice: Teacher Learning for Computational Thinking Infusion. TechTrends: for Leaders in Education & Training, 66(3), 547–559. https://doi.org/10.1007/s11528-022-00729-6
- Johnson, M. L., & Sinatra, G. M. (2013). Use of task-value instructional inductions for facilitating engagement and conceptual change. Contemporary Educational Psychology, 38(1), 51–63. https://doi.org/10.1016/j.cedpsych.2012.09.003
- Johnson, D. W., Johnson, R. T., & Smith, K. A. (2014). Cooperative learning: Improving university instruction by basing practice on validated theory. Journal on Excellence in College Teaching, 25(3-4), 85-118.
- Kahu, E. R. (2013). Framing student engagement in higher education. Studies in Higher Education, 38(5), 758–773. https://doi.org/10.1080/03075079.2011.598505
- Kallio, H., Pietilä, A. M., Johnson, M., & Kangasniemi, M. (2016). Systematic methodological review: Developing a framework for a qualitative semi-structured interview guide. Journal of Advanced Nursing, 72(12), 2954-2965. https://doi.org/10.1111/jan.13031
- Kantar and IAMAI (2023). Internet in India 2023. https://www.iamai.in/sites/default/files/research/INTERNET%20IN%20INDIA%202023.pdf
- Kareem, J., Thomas, S., Kumar P, A., & Neelakantan, M. (2022). The role of classroom engagement on academic grit, intolerance to uncertainty and well-being among school students during the second wave of the COVID-19 pandemic in India. Psychology in the Schools, 10.1002/pits.22758. Advance online publication. https://doi.org/10.1002/pits.22758

- Kearney, S., & Maakrun, J. (2020). Let's get engaged: The nexus between digital technologies, engagement and learning. EducationSciences, 10(12), 357.https://doi.org/10.3390/educsci10120357
- Kearsley, G., & Shneiderman, B. (1998). Engagement theory: A framework for technology-based teaching and learning. Educational Technology, 38(5), 20–23. https://www.jstor.org/stable/44428478
- Koehler, M. J., Mishra, P., Kereluik, K., Shin, T. S., & Graham, C. R. (2014). The technological pedagogical content knowledge framework. In J. M. Spector, M. D. Merrill, J. Elen, & M. J. Bishop (Eds.), Handbook of research on educational communications and technology (pp. 101–111). Springer New York. https://doi.org/10.1007/978-1-4614-3185-5_9
- Lewin, C., & Charania, A. (2018). Bridging formal and informal learning through technology in the twenty-first century: Issues and challenges.
- Lowenthal, P. R., Borup, J., West, R. E., & Archambault, L. (2020). Thinking beyond Zoom: Using asynchronous video to maintain connection and engagement during the COVID-19 pandemic. Journal of Technology and Teacher Education, 28(2), 383-391.
- Manjrekar, N. (2013). Women school teachers in new times: Some preliminary reflections. Indian Journal of Gender Studies, 20(2), 335-356. https://doi.org/10.1177/0971521513482223
- Martin, F., & Bolliger, D. U. (2018). Engagement matters: Student perceptions on the importance of engagement strategies in the online learning environment. Online Learn. 22, 205–222. https://eric.ed.gov/?id=EJ1179659
- Mosher, R., & MacGowan, B. (1985). Assessing student engagement in secondary schools: Alternative conceptions, strategies of assessing, and instruments.
- Natriello, G. (1984). Problems in the evaluation of students and student disengagement from secondary schools. Journal of Research and Development in Education, 17(4), 14-24.
- NEP (2020). National Education Policy 2020. Ministry of Education. New Delhi, India. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
- Niederhauser, D. S., Howard, S. K., Voogt, J., Agyei, D. D., Laferriere, T., Tondeur, J., & Cox, M. J. (2018). Sustainability and scalability in educational technology initiatives: Research-informed practice. Technology, Knowledge and Learning, 23, 507-523.
- Nkomo, L. M. (2021). Synthesis of student engagement with digital technologies: A systematic review of the literature. International Journal of Educational Technology in Higher Education, 18, 34 (2021). https://doi.org/10.1186/s41239-021-00270-1
- Osika, A. MacMahon, S., Lodge, J.M., Carroll, A. (2022, March 22). Emotions and learning: What role do emotions play in how and why students learn? The University of Queensland.
- Parsons, J., & Taylor, L. (2011). Improving Student Engagement. Current Issues in Education,14(1). Retrieved from https://cie.asu.edu/ojs/index.php/cieatasu/article/view/745
- Pineida, F. O. (2011). Competencies for the 21st century: Integrating ICT to life, school and economical development. Procedia- Social and Behavioral Sciences, 28, 54–57. https://doi.org/10.1016/j.sbspro.2011.11.011
- Quin, D., Hemphill, S. A., & Heerde, J. A. (2017). Associations between teaching quality and secondary students' behavioral, emotional, and cognitive engagement in school. Social Psychology of Education, 20(4), 807–829. https://doi.org/10.1007/s11218-017-9401-2

- Redmond, P., Heffernan, A., Abawi, L., Brown, A., & Henderson, R. (2018). An online engagement framework for higher education. Online Learning, 22(1). https://doi.org/10.24059/olj.v22i1.1175
- Reschly, A. L., & Christenson, S. L. (2012). Jingle, jangle, and conceptual haziness: Evolution and future directions of the engagement construct. In S. L. Christenson, A. L. Reschly & C. Wylie (Eds.), Handbook of research on student engagement (pp. 3–19). New York: Springer. https://doi.org/10.1007/978-1-4614- 2018-7_1.
- Reschly, A. L., & Wylie, C. (Eds.), Handbook of Research on Student Engagement (pp. 219–235). Springer US. https://doi.org/10.1007/978-1-4614-2018-7_10
- Rogers, E. M. (2003). Diffusion of innovation. New York: Simon and Schuster
- Ryan, R. M., & Deci, E. L. (2017). Self-determination theory: Basic psychological needs in motivation, development, and wellness. The Guilford Press. https://doi.org/10.1521/978.14625/28806
- Sá, M. J. (2023). Student academic and social engagement in the life of the academy—A lever for retention and persistence in higher education. Education Sciences, 13(3), 269. https://doi.org/10.3390/educsci13030269
- Samagra Sikhsha Abhiyan (2023). PAB Minutes, 2022-23, https://dsel.education.gov.in/sites/default/files/2022-07/pab_mp_2223.pdf
- Schmidt, J. A., Rosenberg, J. M., & Beymer, P. N. (2018). A person-in-context approach to student engagement in science: Examining learning activities and choice. Journal of Research in Science Teaching, 55(1), 19–43. https://doi.org/10.1002/tea.21409
- Schunk, D. H., & Mullen, C. A. (2012). Self-efficacy as an engaged learner. In S. L. Christenson, A. L. Reschly, & C. Wylie (Eds.), Handbook of research on student engagement (pp. 219–235). Springer Science + Business Media. https://doi.org/10.1007/978-1-4614-2018-7_10
- Sinatra, G. M., Heddy, B. C., & Lombardi, D. (2015). The Challenges of defining and measuring student engagement in science. Educational Psychologist, 50(1), 1–13. https://doi.org/10.1080/00461520.2014.1002924
- Smith, C. (2015). An analysis of digital inclusion projects: Three crucial factors and four key components. Journal of Information Technology Education Research, 14, 179–188. https://doi.org/10.28945/2262
- Straub, E. T. (2009). Understanding technology adoption: Theory and future directions for informal learning. Review of Educational Research, 79(2), 625-649.
- Swan, K., & Shih, L. F. (2019). On the nature and development of social presence in online course discussions. Online Learning, 9(3). https://doi.org/10.24059/olj.v9i3.1788
- Thirumalai, B., Ramanathan, A., Charania, A., Stump, G. (2019). Designing for Technology-Enabled Reflective Practice: Teachers' Voices on Participating in a Connected Learning Practice. In: Setty, R., Iyengar, R., Witenstein, M.A., Byker, E.J., Kidwai, H. (eds) Teaching and Teacher Education. South Asian Education Policy, Research, and Practice. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-26879-4_11
- Tiernan, P., & O'Kelly, J. (2019). Learning with digital video in second level schools in Ireland. Education and Information Technologies, 24(2), 1073–1088. https://doi.org/10.1007/s10639-018-9811-6
- Tondeur, J., Devos, G., Van Houtte, M., Van Braak, J., & Valcke, M. (2009). Understanding structural and cultural school characteristics in relation to educational change: The case of ICT integration. Educational Studies, 35(2), 223–235. https://doi.org/10.1080/03055690902804349

- Tondeur, J., Van Braak, J., Ertmer, P. A., & Ottenbreit-Leftwich, A. (2017). Understanding the relationship between teachers' pedagogical beliefs and technology use in education: A systematic review of qualitative evidence. Educational Technology Research and Development, 65, 555-575.
- Tulna- EdTech Product Evaluations. (n.d.). EdTech Tulna. Accessed on August 1, 2024 from https://www.edtechtulna.org/
- Tytler, R., & Osborne, J. (2012). Student attitudes and aspirations towards science. In B. J. Fraser, K. Tobin, & C. J. McRobbie (Eds.), Second international handbook of science education (pp. 597–625). Springer Netherlands. https://doi.org/10.1007/978-1-4020-9041-7_41
- UDISE (n.d.).. Retrieved October 10, 2023, from https://www.udiseplus.gov.in/#/home
- UNESCO (2022). Ease of operations for budget private schools in India. GEM: Paris. https://unesdoc.unesco.org/ark:/48223/pf0000383514
- Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly, 27(3), 425–478. https://doi.org/10.2307/30036540
- Wang, M., & Degol, J. (2014). Staying engaged: Knowledge and research needs in student engagement. Child Development Perspectives, 8(3), 137–143. https://doi.org/10.1111/cdep.12073
- What We Do – Muskaan Dream Creative Foundation. (n.d.). Accessed on August 1, 2024 from https://muskaandreams.org/whatwe-do/

Abbreviations

AI	*Artificial Intelligence*
ASER	*Annual Status of Education Report*
AY	*Academic Year*
BRC	*Block Resource Centres*
BLO	*Block-Level Officer*
CETE	*Centre of Excellence in Teacher Education*
CLIx	*Connected Learning Initiative*
Co-Ed	*Co-Educational*
CoP	*Communities of Practice*
CM RISE	*Chief Minister Rise Schools*
CRC	*Cluster Resource Centres*
CRO	*Classroom Observation*
CSF	*Central Square Foundation*
D	*Dimension*
DEO	*District Education Officer*
DIET	*District Institute for Education and Training*
DIKSHA	*Digital Infrastructure for Knowledge Sharing*
DP	*Distribution Panel*
DPC	*District Project Coordinator*
DPO	*District Project Officer*
DSP	*Digital Shala Program*
DSP-TV	*Television used in Digital Shala Program*
E&R	*Enrollment & Retention*
FGD	*Focus Group Discussions*
GHS	*Government High School*
GMS	*Government Middle School*
ICT	*Information and Communication Technology*
ID	*Identity*
IDRC	*International Development Research Centre*
IFIP	*International Federation for Information Processing*
ISTE	*International Standards of Technology in Education for Students*
ITE	*Integrate approach to Technology in Education*
KGBV	*Kasturba Gandhi Balika Vidyalayas*
MCQ	*Multiple Choice Questions*
MD	*Muskan Dreams*
MHRD	*Ministry of Human Resources Development*
MME	*Multimedia e-Content Based Learning*
MOU	*Memorandum of Understanding*
MP	*Madhya Pradesh*

MS	*Microsoft*
NCERT	*National Council of Educational Research and Training*
NEP	*National Education Policy*
NGO	*Non Governmental Organisation*
NIPUN	*National Initiative for Proficiency in Reading with Understanding and Numeracy*
NISHTHA	*National Initiative for School Head' Teachers' Holistic Advancement*
NTSE	*National Talent Search Examination*
PAB	*Project Approval Board*
PDF	*portable document format*
PLC	*Professional Learning Community*
RMSA	*Rashtriya Madhyamik Shiksha Abhiyan*
RTICT	*Reflective Teaching with ICT*
SDG	*Sustainable Development Goals*
SIP	*Schools Implementing*
SMC	*School Management Committee*
SNP	*Schools Not implementing*
SPSS	*Statistical Package for the Social Sciences*
STEM	*Science, Technology, Engineering, and Mathematics*
TES	*Teacher Engagement Survey*
TPACK	*Technological Pedagogical Content Knowledge Framework*
TV	*Television*
UDISE	*Unified District Information System for Education*
UNESCO	*United Nations Educational Scientific & Cultural Organisation*
UT	*Union Territories*

List of Tables, Figures and Photos

8. Annexure

Tools for Data Collection

Check List of School Status

(To be filled by the researchers taking information from headmasters)
Basic information about the school is to be filled in by the researcher in conversation with the HM or the school in-charge.

Note: Explain about the project to the HM

Field	**Information**
School Name	
School Code	
School Code	☐SIP ☐SNP (.....Usage Rating)1
District	☐Indore ☐Gwalior
Block	
Location	☐Rural ☐Urban
Grades Taught in the school	
No. of Students (School) in the school	☐Boys ☐Girls
No. of Teachers (School) in the school	☐Male ☐Females .....Permanent .....Contractual
Teacher-Students Ratio	
No. of Classrooms with DSP TV	
Classrooms Involved in DSP-grades and respective enrollment	
Names of Teachers and Subjects who currently use DSP	
No. of Teachers Trained under DSP, Names	
For how many years DSP TV has beens installed in this school	☐1 year, ☐2 years, ☐3 years, ☐More
Electricity sustainability	☐Solar ☐Inverter ☐Other:

1 Usage rating:

Researchers' interpretation based on the answers on usage: the teacher belongs tot he following category:

1. The DSP TV is used in the last 3 months for TicTacLearn.
2. The DSP TV was used in the last 3 months for TicTacLearn and other applications for teaching.
3. The DSP TV was used in the last 3 months for teaching but using other application other than TicTacLearn
4. The DSP TV was used for non teaching purposes in the last 3 months.
   a. Like what?
5. The DSP TV is not used at all for any purpose.

Participant Information Sheet

Title of Project: Students and Teachers Engagement with Digital Classrooms in Secondary Government Schools in Madhya Pradesh at Centre of Excellence in Teacher Education (CETE), TISS, Mumbai

This Participant Information Sheet (referred to as PIS) gives you important information about this research study. It describes the purpose of the study, the risks and possible benefits of participating in the study. Please take time to review this information carefully. Please ask for an explanation in case you do not understand word/s or sentence/s in the PIS. After you have read the PIS, you are free to talk to the /researchers about the study and ask them any questions you have. You will be given a copy of the PIS and the signed informed consent document for your future reference.

Your participation in the study is voluntary. You have the right to withdraw from the study at any stage without giving reasons for your withdrawal.

1. What is the study about?
This study will understand the current value and potential of the digital classroom programme, its effects on students' and teachers' classroom engagement, and explore various factors that facilitate or challenge its current adoption and use.

2. What is the relevance of the information being collected to the community or respondents?
Through this research study, we will be able to understand students and teachers' engagement with Digital Classrooms in secondary government schools, how the schools are receiving the support, and the underlying issues and challenges. The information collected in the study through interactions, surveys, and interviews will help to understand how technologies can support student teaching and learning. The findings of the study will be shared broadly and helpful in informing the government, school and other stakeholders in making informed decisions before scaling the implementation further.

3. How long will you be in the research study?
You will be in this research study till March 2024.

4. What are the possible risks and inconveniences that you may face by being in the research study?
There are no known risks involved in participating in this study. But during the course of this period, you may have to spare some time for surveys, telephonic interviews or talk to research investigators from TISS to respond to questions. In case of activities and events conducted after the school hours, you will be informed.

5. What are the possible benefits to you being in the research study?
There are no direct benefits by being in this research study. No remuneration will be provided for participating in this research. Indirectly, by participating in the research study, your participation will help us to understand how technological interventions impact learning, how the project is progressing, plug gaps and improvise the project design in future and also strengthen implementation.

6. How will your privacy and confidentiality be maintained?
Your identity will be kept completely confidential and the data collected during the research study will be anonymised. The data will be used only for research purposes.

7. Will you have to bear any Expenses or Costs by participating in the research study?
All the costs of participating in the research will be borne by the project.

8. Whom do you call if you have questions or problems regarding rights as a participant?
If you do NOT wish to give consent to use your data for research purpose or have any other queries then please contact CETE, TISS team members on the contact details mentioned in the consent forms, between 10:00 a.m. to 5:00 p.m. within a month of receiving this PIS.

Contact Details:
CETE
Tata Institute of Social Sciences, Mumbai

Participant Information Sheet

Title of Project: Students and Teachers Engagement with Digital Classrooms in Secondary Government Schools in Madhya Pradesh

Dear Parent,
This Participant Information Sheet (PIS) gives you important information about this research study. It describes the purpose of the study, the risks and possible benefits of your children participating in the study. Please take time to review this information carefully. Please ask for an explanation in case you do not understand word/s or sentence/s in the PIS. After you have read the following PIS, you are free to talk to the researchers about the study and ask them any questions you have. You can get a copy of the PIS document for your future reference.

Your participation in the study is voluntary. You have the right to withdraw your child from the study at any stage without giving reasons for your withdrawal.

1. What is the study about?
This study will understand the current value and potential of the digital classroom programme, its effects on students' and teachers' classroom engagement, and explore various factors that facilitate or challenge its current adoption and use.

2. What is the relevance of the information being collected to the community or respondents?
Through this research study, we will be able to understand students and teachers' engagement with Digital Classrooms in secondary government schools, how the school is receiving the support, and the underlying issues and challenges. The information collected in the study through interactions, surveys, and interviews will help to understand how technologies can support student teaching and learning. The findings of the study will be shared broadly and helpful in informing the government, school and other stakeholders in making informed decisions before scaling the implementation further.

3. How long will your child be in the research study?
Your child will be a part of the study till March 2024. The child will be contacted before that for an interview/ data collection. Your child may be in the classroom where observations of classroom processes are made by the researcher. You can decide to opt out of the study at any given time.

4. What are the possible risks and inconveniences that your child may face by being in the research study?
There are no known risks involved in participating in this study. But during the course of this period, your child may have to spare some time during school hours to talk to researchers from TISS and respond to questions individually or in groups and classroom activities for research analysis. The questions will pertain to their engagement with digital education programme called Digital Shala Programme only if required, interview after school hours will be conducted in school premises, your child will be informed about it.

5. What are the possible benefits to you being in the research study?
There are no direct benefits to being in this research study. No remuneration will be provided for participating in this research. Indirectly, by participating in the research study, your child's participation will help us to understand how technological interventions and inquiry-based learning with technology impact learning, how the project is progressing, plug gaps and improvise the project design in future and also strengthen implementation.

6. How will your privacy and confidentiality be maintained?
Your child's identity will be kept completely confidential and the data collected during the research study will be anonymised. The data will be used only for research purposes. Only summary of data analysis will be shared with the administration, in no situation your child identity will be disclosed in any reports.

7. Will you have to bear any Expenses or Costs by participating in the research study?
All the costs of participating in the research will be borne by the project. Below please read and understand the consent form.

8. Whom do you call if you have questions or problems regarding your rights as a participant, or do not want your child to be part of this study?
If you do NOT wish to give consent to use your child's data and other activity data for research purpose or have any other queries then please contact CETE, TISS team members on the contact details mentioned in the consent forms, between 10:00 a.m. to 5:00 p.m. within 15 days of receiving this PIS.

Contact Details:
CETE
Tata Institute of Social Sciences, Mumbai

Informed Consent Form

Project Title: Students and Teachers Engagement with Digital Classrooms in Secondary Government Schools in Madhya Pradesh (STEDCSGS) Project

I have read/been informed about the Participation Information Sheet (PIS) for the research study titled 'Students and Teachers Engagement with Digital Classrooms in Secondary Government Schools in Madhya Pradesh (STEDCSGS) Project.'

The information in the participant information sheet, including the study's nature, purpose, safety measures, potential risks and benefits, expected duration, and my child's role as a study participant, has been explained to me in a language I understand.

I understand that my child's participation is voluntary, and I have the right to withdraw my child from the study at any stage without the need to provide a reason.

I also understand that audio recordings and classroom observations will be used solely for educational and research purposes. The information collected during the research study will be kept confidential, and my child's data will be anonymized and used only for research purposes.

If you do NOT wish to give consent to the Students and Teachers Engagement with Digital Classrooms in Secondary Government Schools in Madhya Pradesh (STEDCSGS) Project, CETE, TISS team to use your child's data and other activity data or have any other queries then please contact any of the CETE, TISS team members on the below mentioned contact details between 10:00 a.m. to 5:00 p.m. within a month of receiving this consent form.

Contact Details:
CETE
Tata Institute of Social Sciences, Mumbai

Informed Consent Form

Project Title: Students and Teachers Engagement with Digital Classrooms in Secondary Government Schools in Madhya Pradesh (STEDCSGS) project

Dear Teacher,
Your involvement in this research is of great significance, as it will offer valuable insights into the practical application of smartboards in the classroom and their potential influence on teaching and learning. The data collected will enhance our understanding of the use of smartboards in your schools and guide future research endeavors in this field. By accepting this consent form, you acknowledge the following:

- Your voluntary participation in interviews, discussions, or any other activities associated with the preliminary study.
- The information you provide will be exclusively used to gain insights into the use of smartboards in your schools and to identify factors that may shape future research in this area.
- Your responses will be handled with the utmost confidentiality, and any shared information will not be disclosed in a manner that could personally identify you.
- The audio recordings of the interview will be used solely for educational and research purposes. The information collected during the research study will be kept confidential, and my students' data will be anonymized and used only for research purposes.

If you do not wish to give consent to the Students and Teachers Engagement with Digital Classrooms in Secondary Government Schools in Madhya Pradesh (STEDCSGS) project, CETE, TISS team to use your data for the above-mentioned purposes, or if you have any other queries then please contact any of the CETE, TISS team members on the below-mentioned contact details between 10:00 a.m. to 5:00 p.m. within a month of receiving this consent form

Teacher's Signature or Recorded Audio Consent

Contact Details:
CETE
Tata Institute of Social Sciences, Mumbai

Tool for the Focus Group Discussion with Students (for SIP Schools)

Notes for the researcher: Please ensure that the consent form is shared with parents before implementing this tool.

Date:	**Time:**
School Name/Code:	Class:
Gender (Homogeneity should be maintained in FGD): Male FGD (No. of students.....) Female FGD (No. of students.....) Others	Group No (if any):
FGD strength(No.of students):	Interviewer name:

Hello. My name is .....(Interviewer name). Today we would like to have a conversation with you about DSP (Digital Shaala Programm) TV classes (the TVs came from the Muskaan Dreams team only). What we are trying to accomplish before we leave here today is to get a better understanding of your TV classrooms. Do you have any questions? Ok, let's begin-
(Please confirm if it is SIP school again, only then proceed, or use the FGD sheet for SIP schools).

Basic Questions (for Engaging Students in the Conversations)

1. Are the DSP TV classes running in your school? If not, why?

2. If yes, how often do you attend DSP TV classes?

☐Daily, ☐Weekly, ☐Twice in a month, ☐Once in a month, ☐Once in two months.

(Take vote by show of hands if students give varied answers) ...../ ..... students said DSP TV class happens..... times.

3.How many DSP TVs are there in your school? ☐ One, ☐Two, ☐Three, ☐Four, ☐Five, ☐More.

4. Does the teacher use any other digital devices apart from the TV in DSP class? If yes, what are those?

5. Did you attend DSP TV classes in the last three months?

6. Did anyone other than the teacher visit/teach your class using DSP? Can you share details of who came?

7. Does your teacher run the TV all by themselves or do you also help them?

Perceptions of DSP TV Teaching

8. How do you feel about your school having a DSP TV? Do you prefer the DSP TV in your classroom over the blackboards? If so, why? (Find if students find their DSP TV classes more easy, motivating, and enjoyable than Non-TV classes or they show no interest)?

(Take vote by show of hands if students give varied answers) ...../..... students like DSP TV Classes, .../..... students show no interest and ..... / ..... students dislike DSP TV Classes.

9. How would you feel if you had DSP TVs in all your classes (for all subjects)?
(Take vote by show of hands if students give varied answers) ...../..... students feel good about it, .../..... students feel indifferent about it and...../

..... students feel bad about it.

10. How many of you wait eagerly for coming to school for DSP TV learning?
(Take vote by show of hands if students give varied answers) ...../..... students wait eagerly for DSP classes.

11. How many of you think your learning in a DSP TV class happens better than a non-TV class?
(Take vote by show of hands if students give varied answers) ...../..... students said yes, .../..... students said no ...../..... students said (others)

12. Do you request your teachers to use the DSP TV during teaching?
(Take vote by show of hands if students give varied answers) ...../..... students request.

13. From the point of view of examinations, do you think videos help you to prepare better?

Classroom Behavior and Practices (if the classes have not been conducted in the last three months, use past tense for the questions)

14. Who starts the DSP TV in the class? How much time does it take to start? What challenges are faced in the starting?

15. Among you(those in the FGD), who all can operate the DSP TV with a remote(Get the count and gender: Put a percentage-10%,20%,30% or 40%)? Those who can operate, ask the following questions: Do you operate the DSP TV during class? What features of the DSP TV can you operate comfortably (start, rewind handling independently)?

16. Usually is it boys or girls who help teachers in starting the DSP TV? Why? (NA if it's an all-girls or all-boys school).

17. What are the major activities you do in the DSP TV classes? How are these activities different from those in a regular classroom?

18. Do students ask questions to the teacher in the DSP Class? Can you share an example of a recent question you/or your friends asked in a DSP TV class?

19. Do you take notes during DSP TV classes to write what is shown on TV? Could you say a few examples you noted in the recent past? Were these notes prompted by the teacher or did you make notes on your own?

Content-related Questions (if the classes have not been conducted in the last three months, use past tense for the questions)

20. Which apps does your teacher mostly use on the DSP TV? (TicTac, Muskaan Dreams, Amazon Prime, NetFlix, Diksha, YouTube, or any other shows like Mann ki Baat) Any reason for using it most?

21. Have you heard the name Tic Tac Learn? What is it? What types of TicTac videos do you see in the class? Can you share examples of these?

22. What types of videos help you remember and understand well? Can you give an example of such content? Which types of videos played on the DSP TCV do you like the most and why?

☐Story Form, ☐Interactive with animations, ☐Explanation with real-life examples, ☐Explanation without any images or animations, ☐Any other.

23. Can you name two to three lessons-chapters that you have learned using DSP TV?

24. Do you find TV videos showing real-life examples? Can you give an example of such content?

25. Between math and science content, which one do you like most? Why? Please give examples of which videos you liked and why?

Challenges/Suggestions (if the classes have not been conducted in the last three months, use past tense for the questions?)

26. Have you seen any changes in the DSP TV classes in recent times? Do you want to share with us any problems you have experienced with DSP TV classes? Like hard to see, content quality, technical issues, etc.

27. Do you have any suggestions on the better use of DSP TVs? If yes, please tell us.

Peer Collaboration (if the classes have not been conducted in the last three months, use past tense for the questions?)

28. Do you learn and talk to your peers in DSP TV classes more as compared to regular classes? Give examples and reasons. (Take vote by show of hands if students give varied answers)
..... / ..... students engage more with peers in DSP TV classes and
..... / ..... students engage more with peers in regular classes.

29. Do you do more activities with your peers in DSP TV classes or regular classes? Give examples.

Agency/Self-directed learning (if the classes have not been conducted in the last three months, use past tense for the questions?)

30. Can you tell how the presence of the DSP TV changed your learning? Has it reduced your need for a teacher in class? If yes, then why?

31. What would you do if you were given access to DSP TV content for extensive usage? What would you watch and why?

Home and Parental support

32. Do your parents use any digital device like a smartphone and for what kind of activities? Do they allow you to use it? If Yes, what do you see in it?

33. Do your parents know about your DSP TV classes? What are their thoughts about the use of videos for learning in the classroom?

Tool for the Focus Group Discussion with Students (for SNP Schools) Implemented on 31st October with an SNP school Observations and comments are made to this tool

Notes for the observer: Please ensure that the consent form is shared with students before conducting FGD.

Date:	**Time:**
School Name/Code:	Class:
	Section:
Category:	Group No (if any):
SIP	
SNP	
Gender (Homogeneity should be maintained in FGD):	
Male FGD (No. of students .....)	Interviewer name:
Female FGD (No. of students .....)	Last usage of DSP TV in the classroom (approx.): Months/Days
Others	
FGD strength (Total No.of students):	

Hello. My name is ……(Interviewer name). Today we would like to have a conversation with you about DSP (Digital Shaala Programm) TV classes (the TVs came from the Muskaan Dreams team only). What we are trying to accomplish before we leave here today is to get a better understanding of your TV classrooms. Do you have any questions? Ok, let's begin-
(Please confirm if it is SNP school again, only then proceed, or use the FGD sheet for SIP schools. If more than 3 months have elapsed for the DSP TV Class in their classroom, then use past tense for the FGD and ask them to remember from the past).

Basic Questions (for Engaging Students in the Conversations)

1. Are the DSP TV classes running in your school? If not, why?

2. If yes, how often do you attend TV classes? (SNP categories)

SNP school FGD: FGD will take place only if the SNP school belongs to category 1 through 3.

1. The DSP TV was used in the last 3 months for TicTac.
2. The DSP TV was used in the last 3 months for Tic Tac plus other applications for teaching.
3. The DSP TV was used in the last 3 months for teaching BUT using other application other than TicTac
4. The DSP TV was used for non-teaching purposes in the last 3 months.

a. Like what?

5. The DSP TV was not used at all for any purpose.
3. How many DSP TVs are there in your school? ☐ One, ☐ Two, ☐ Three, ☐ Four, ☐ Five, ☐ More.

4. Does the teacher use any other digital devices apart from the TV in DSP class? If yes, what are those? How often do they use it?

Questions on SNP Operations (if the classes have not been conducted in the last three months, use past tense for the questions)

5. Did you attend DSP TV classes in the last three months? (Has been now moved to the box category)

6. Did anyone other than the teacher visit/teach your class using DSP? Can you share details of who is the same?

7. Who runs the DSP TVs? How much time does it take to start? What challenges are faced in the starting?

8. Do students operate the DSP TV during class? What kind of tasks or operations are you comfortable handling independently? Do only boys/girls operate the remote and TV? *(Does't apply to Only Boys or Only Girls schools)*

Perceptions of DSP TV Teaching (if the classes have not been conducted in the last three months, use past tense for the questions)
9. Which do you prefer- DSP TV or Non-DSP TV classes? Give reasons.
(Take vote by show of hands if students give varied answers) ..... / .....students

10. When you last attended the DSP TV class, did you like or enjoy learning in DSP TV classrooms? What exactly did you like in the DSP TV classes?-
☐ Story-based content, ☐ Animated videos, ☐ Real life examples, ☐ Teaching of your teachers TVs, ☐ Others.

11. If you had the choice, would you prefer to have DSP TVs in all your classes? If so, why? (Take vote by show of hands if students give varied answers) ..... / ..... students preferred .....

12. How do you feel about your school having a DSP TV(when using and when not using)?

Classroom Behavior and Practices(if the classes have not been conducted in the last three months, use past tense for the questions)

13. The last time when you attended the DSP-TV class,what did you learn? Which subject? Which topic? What were the major activities you did in the DSP TV classes? Do you see any differences between the DSP and Non-DSP classes, in the activities of your friends(Prompts: asking more or less questions, being more excited, feeling bored etc), or your teachers (Prompts: enjoying teaching with video, only doing it to show to administration etc)?

14. Do you ask questions in DSP TV class? What kind of questions do you ask and can you share how many questions you ask ? Can you share an example of a recent question you asked in a DSP TV class?

15. Do you ask more questions in DSP TV classes than in non-TV classes? If yes, why?

16. Do you take notes during DSP TV classes to capture important information?Does the teacher ask you to take notes? Could you say a few examples you noted in the last class?

17. Do students request your teachers to use the DSP TV during teaching? What does the teacher do in case of such requests?

18. Do you take notes during DSP TV classes to capture important information? Could you say a few examples you noted in the recent past? Were these notes prompted by the teacher or did you make notes on your own?

Content-related Questions (if the classes have not been conducted in the last three months, use past tense for the questions)

19. Can you name two to three lessons-chapters that you have learned using DSP TV in the past?

20. Have you heard the name Tic Tac Learn? What is it?

21. What types of TicTac videos did you see in the class? Can you share examples of these?

22. Do you think DSP TV is useful for your learning? Do you think DSP TV contents are more useful than books? Could you explain how?

23. Which categories of TicTacLearn content/video do you usually see more/have seen in the past?

24. From the types of videos you have seen, what helps you remember well?Can you give an example of such content?

25. From the types of videos you have seen, do you find the videos connected with your daily life? Can you give an example of such content which was related to your daily life?

26. Do you think videos can be helpful for examinations?Give reasons.
(Take vote by show of hands if students give varied answers) ...../..... students

Challenges/Suggestions (if the classes have not been conducted in the last three months, use past tense for the questions?)

27. Do you want to share with us any problems you have experienced with DSP TV classes? Like hard to see, content quality, technical issues, etc.

28. Do you have any suggestions on the better use of DSP TVs? If yes, please tell us.

Peer Collaboration (if the classes have not been conducted in the last three months, use past tense for the questions?)

29. How do you and your friends react/-ed when you learn that DSP TV would be conducted?

30. Do you and your friends engage more(ask questions, share examples, like the videos and teacher discussions) in the DSP class?

31. When you last attended the DSP TV class, did you discuss with your friends the contents being presented on DSP TV? How do these discussions help you?

Agency/Self-directed learning (if the classes have not been conducted in the last three months, use past tense for the questions?)

32. How many of you (not just you, who are present in the class) can start DSP TV by themselves without the help of the teacher or friends?
(Take vote by show of hands if students give varied answers) ..... /..... students

33. Would you like to learn in a DSP TV class without a teacher, on your own?

34. What would you do if you were given access to DSP TV content for extensive usage on your mobile device at home?

Home and Parental support

35. Do you have a TV at home? Do your parents allow you to switch on and watch?

36. Do your parents use any digital device like a smartphone and for what kind of activities?

37. Do your parents know about your DSP TV classes? What are their thoughts about the use of videos for learning in the classroom? Do they want frequent use of TVs for learning or do they feel only teachers should teach? Give reasons.

Classroom Observation Tool

	Section A: Demographics	Observer's name:
	Date:	Time: Duration:
	School Name:	Category:
		☐ SIP
		☐ SNP Category 1, 2, 3, 4, 5
	Teacher Name:	Subject taught:
	Gender of the teacher:	
	No of students in the class (as per register):	Number of students attending the class:
	Girls: Boys:	Girls: Boys:
	Topic: Did the teacher prepare a lesson plan; ☐ No ☐ Yes If yes, what is the evidence?	Was this class scheduled for research purposes only? Check one: ☐ Yes, for research purposes, otherwise it was not scheduled in the timetable. ☐ No, it was part of the timetable, and not separately scheduled for research purposes.
	Note: Classroom Observation was based on the: - Timetable - Timetable and random selection from the two classes (Math/Science) - Classroom availability - Teacher availability	

Classroom Interaction

Minutes	00:00 to 00:05 DSP TV used? ☐	00:06 to 00:10 DSP TV used? ☐	00:11 to 00:15 DSP TV used? ☐	00:16 to 00:20 DSP TV used? ☐	00:21 to 00:25 DSP TV used? ☐	00:26 to 00:30 DSP TV used? ☐	00:31 to 00:35 DSP TV used? ☐	00:36 to 00:40 DSP TV used? ☐
Teacher activity (Eg. explaining, problem solving, questioning, discussion, doing experiments)								
Student activity (eg, Listening, answering the questions, taking notes, solving the problems in the notebook, watching)								
DSP TV content (TicTacLearn, Youtube, other (mention other))								

The teacher-student interaction (1- Both engage in dialogue (teacher and students ask questions). 2- It focuses on teachers with some student participation (teacher asks questions, students answer). 3-Teacher-driven with minimal student involvement (teacher interacts, students nod).								
Student-content interaction 1- No content interaction. 2-Students respond when prompted by the teacher. 3-Students enthusiastically engage with TV content.								
Student-student interaction No interaction observed. 2-Occasional student interaction. 3-Students collaborate on a problem before the teacher steps in.								
			Running Notes				Running Notes	

B: Observations

B1. The seating arrangement of students:

- In rows, benches
- In rows, on the floor
- On the floor in a scattered manner
- Other, please specify

B2. Seating arrangement as per gender:

- Boys and girls are sitting separately on different benches.
- Boys and girls are sitting together on the same benches.
- Only Girls school
- Only Boys school

B3. Any other seating arrangement :

B4. The seating arrangement enabled all the students to watch the content on the DSP TV clearly:

☐ Yes, the TV content is clearly visible from all corners.
☐ No, the TV content is not clearly visible to all.

B5. The seating arrangement enabled all the students to listen to the content on the Smart TV clearly:

☐ Yes, it is clearly audible to the whole class.
☐ No, it is not clearly audible to the whole class.

B6. Space for any other pertinent observations (Category A: Ergonomics) :

B7. Type of infrastructure facilities in the classroom (tick all that applies):

☐ DSP TV provided by Digital Shaala Project
☐ Internet connection provided to the TV through Dongle provided by the DSP
☐ Internet connection provided to the TV through teachers' personal smartphone
☐ Pen drive, provided by the Digital Shaala Project
Any other digital infrastructure, please specify.

Category C: Digital Infrastructure

C1. How does the teacher start DSP TV class:

☐ Switch on the TV
☐ Connect with the pen drive Connect with the Internet☐ Is able to locate the remote control
☐ Is able to operate/start DSP TV Subject and Chapter

C2. Time elapsed in the preparation before starting the DSP-enabled class: ..... minutes : .....seconds.

C3. Who is navigating the Smart TV:

- Students: ☐ Boys ☐ Girls
- Teacher: ☐ Male ☐ Female
- Both Teachers and Students collaboratively navigating
- Students: ☐ Boys ☐ Girls
- Teacher: ☐ Male ☐ Female

C4. What is the distance of the remote from the DSP TV: (approx. ft.) and the holder of the remote left/right/center of the TV.

☐ Upto 5 feet ☐ 5- 10 feet ☐ 10- 15 feet

C5. Write in detail about the navigation pattern observed (e.g. gender of the students who were navigating, etc.):

C6.. Does the teacher use the internet while using the DSP TV during class?

☐ Yes, the internet has been used from the beginning.
☐ Yes, the internet is being used for some time.
☐ No, the internet is not used at all.

C.6.1. If yes, how is internet access provided?

- The teacher used the school internet connection.
- The teacher used her own smartphone internet.
- The teacher was given a dongle from DSP

C.6.2. If yes, then for what purpose is the Internet being used?

- To provide students with updated content provided in pen drive.
- To access other e-platforms like YouTube or DIKSHA for more clarity on the topic.
- To provide students with advanced knowledge.
- Youtube videos
- Other observations during the class, please specify.

Space for any other pertinent observations (Category B: Infrastructure):

D. Classroom Interaction:

D1. The teacher asked questions to students related to the topic:
☐ Yes, the teacher asks questions frequently.
☐ Yes, the teacher asks questions occasionally.
☐ No, the teacher is not asking questions to students.

D2. How the teacher is helping students to find answers to their questions:
☐ Helping them construct or build on their own responses.
☐ By directly answering their question.
☐ The teacher avoids students' questions.

D3. The total duration of the DSP TV used by the teacher in the class:
☐ 1-2 minutes
☐ 2-5 minutes
☐ 5-8 minutes
☐ More than 8 minutes 10 to 15 minutes
☐ 15 to 20 minutes

D4. How often did the teacher pause the video to explain the topic to students:
☐ After every 1 minute
☐ After every 1- 5 minute
☐ Teacher let the video play for the entire duration

D5. What does teacher do after pausing the video:

D6. Is there any alignment between the content on DSP TV and teaching?
☐ Yes, Teacher explains what the video shows.
☐ Yes, the teacher explains the videos with real-life examples.
☐ No, the teaching was unrelated to what the video showed.

D7. Speed of the content [select only one]:
☐ Teacher finds it difficult to match the video speed.
☐ Students find it difficult to understand the video
☐ Speed of the content is reasonable for students

D8. Types of question asked by the teacher most of the times:
☐ Closed ended questions
☐ Open-ended questions

D9. Space for any other pertinent observations:

E: Student engagement

E1, Students are asking questions to the teacher to clear their doubts: ☐ Very frequently
☐ Frequently ☐ Occasionally ☐ Not at all

E2. Type of questions asked by the students:
☐ Relating to the content played on the TV.
☐ Relating to the topic but missing in the content.
☐ Relating to the areas of their confusion.
☐ Not related to the topic and content.
☐ None

E3. Gender-wise variations in questioning:
☐ Boys question more than girls.
☐ Girls question more than boys.
☐ Boys and girls question almost equally.
☐ No definable difference in their questioning is noticed. Only boys
☐ Only Girls

E4. Classroom participation scenario among boys and girls:
☐ Boys are more active than girls.
☐ Girls are more active than boys.
☐ Boys and girls appear equally active
☐ No definable difference in their activities is noticed.
☐ Only boys ☐ Only Girls

E5. In what other ways the students were engaging the the DSP TV classroom

E6. Space for any other pertinent observations:

G: Any Special Activities/Games in the Classroom G1. Description of the activities: G2. Who prompts the teacher to conduct the activity? ☐ Mentioned in the textbook ☐ Part of the routine classroom practice. ☐ Self/Extempore G3. Was there any Group activity conducted: ☐ Yes ☐ No G4. Explain the group activities conducted while the DSP was used .... G5. Does the activity involve using Smart TV? ☐ Yes ☐ No G6.How many students are involved in the group activities	

Interview Tool for Teachers (for SIP Schools)

Notes for the Interviewer: Please share the consent form
*DSP=Digital Shala Programme

Date:	Time:
Name:	Subject taught: ● Maths ● Science ● Others
School Name/Code: Category: ● SIP ● SNP	Age (years): ● 20-25 ● 26-30 ● 31-45 ● 46-50 ● 51-55 ● above 55

Gender: ● Male ● Female ● Others	Teaching experience (years): ● 1-5 ● 6-10 ● 11-15 ● 15-20 ● 20-25 ● 25-30 ● above 30
Besides teaching what other administrative position do you hold in the school (this survey is taken in the capacity of a teacher who implements DSP): ● Principal ● Teacher-in-Charge ● Others ● None	

Usage (How often and teaching methods in Smart TV-enabled classrooms)

1. How often do you use the DSP TV in your classes?
☐ Daily More than twice a week ☐ Twice in a week ☐ Once in a week, ☐ Twice in a month, ☐ Once in a month, ☐ Once in two months.

2. Which methods of teaching do you follow in DSP TV classes?
☐ Lectures ☐ Collaborative exercises ☐ Problem based ☐ Project based ☐ Any other, please explain:

.....

.....

3. How often do you use TicTacLaern?
☐ Daily ☐ More than twice a week ☐ Twice in a week ☐ Once in a week, ☐ Twice in a month, ☐ Once in a month, ☐ Once in two months.

3.1. Is it comprehensive or sufficient to teach a given lesson or topic using science or math content on DSP TV?
● No. Why?
.....

.....

● Yes. Why?
.....

.....

3.2. In your view how sensitive is the TictacLearn content on gender? (explain what you mean by sensitive), give examples.

.....

.....

3.3. In your view how sensitive is the tictac learn content for diversity in terms of religion, caste or social classes? Give examples

.....

.....

3.4. What changes would you recommend for the TictacLearn content?

.....

.....

3.5. Have you created or customized any content in your subject area to use on the DSP TV? If yes, please share examples.

.....

.....

4. Do you use any other technology except DSP TVs in the classroom? Please specify.

.....

.....

5. How often do you use other apps?
☐ Daily ☐ More than twice a week ☐ Twice in a week ☐ Once in a week, ☐ Twice in a month, ☐ Once in a month, ☐ Once in two months.

6. How often do you use YouTube?
☐ Daily ☐ More than twice a week ☐ Twice in a week ☐ Once in a week, ☐ Twice in a month, ☐ Once in a month, ☐ Once in two months.

7. Have you created or customized any content in your subject area to use it on the DSP TV? If yes, please share examples.

.....

.....

8. Can you share the lesson plan you created for DSP TV-enabled classroom?

.....

.....

9. How often do you make lesson plans for DSP TV-enabled classrooms?
☐ Daily ☐ More than twice a week ☐ Twice in a week ☐ Once in a week, ☐ Twice in a month, ☐ Once in a month, ☐ Once in two months.

10. Do you use the DSP TV more extensively for specific topics or units in your subject? If so, which ones and why?

.....

.....

Training (Training and capacity building in technology use)

11. Have you received any training on using and integrating DSP TVs into your teaching? Tell us about the training (duration, what was covered, what you learnt overall). Was it helpful?

.....

.....

12. Do you think the training was sufficient? Are there any suggestions you'd like to share?

.....

.....

13. Have you gone through any other training for the use of technology in your teaching? Please explain when and who conducted it, what it entails, was it useful.

.....

.....

Effectiveness (Teachers' overall belief about the use of technology in the classroom)

14. Do you think students learn better with DSP TVs than with regular classes? Please explain.

.....

.....

15. Do you find the contents updated? If not, what is lacking?

.....

.....

16. How has DSP TV affected student engagement and interest in your classes?

.....

.....

17. Have you observed any changes in students' learning achievement levels after using DSP TVs? If yes, please explain.

.....

.....

18. Have you found any difference between boys and girls with respect to engagement and achievement after the DSP TV introduction? If yes, please explain.

.....

.....

19. Do children request that their class be taught using a DSP TV? Why/Why not?

.....

.....

20. What do they ask for/prefer to see DSP TVs?
☐ Curricular (relating subjects & syllabus) ☐ Co-curricular (story books, magazines, etc)
☐ Extracurricular topics (music, dance, etc)

Challenges (Challenges faced in implementing DSP)
21. Do you find any challenges in implementing this DSP TV-based DSP?

.....

.....

22. What technical issues or difficulties have you experienced with DSP TV?

.....

.....

23. How do you address the diverse learning needs of students using DSP TV?

.....

.....

24. Do you get adequate support from the HM/school regarding DSP TV use in the classroom?

.....

.....

25. If you face any problem in handling the device, whom do you contact?

.....

.....

26. Are there any other challenges that you'd like to talk about?

.....

.....

Community of Practice (Group initiatives for enhanced use of DSP)
27. Are you a member of any WhatsApp group created by Muskaan Dreams?

.....

.....

28. Do you post images and videos of your session in the group? If yes, how often?
☐ Daily ☐ More than twice a week ☐ Twice in a week ☐ Once in a week, ☐ Twice in a month, ☐ Once in a month, ☐ Once in two months.

29. Do you post about the technical difficulties regarding DSP TV? If yes, how often?
☐ Daily ☐ More than twice a week ☐ Twice in a week ☐ Once in a week, ☐ Twice in a month, ☐ Once in a month, ☐ Once in two months.

30. Are you a member of any other digital messaging group related to teaching? Pls explain.

.....

.....

Feedback (Suggestions for DSP improvement)
31. What improvements would you suggest regarding DSP training, Smart TVs, content, or technical support?

.....

.....

32. What improvements do you suggest for your specific subject content?

.....

.....

Interview Tool for Teachers (for SNP Schools)

Notes for the Interviewer: Please share the consent form
*DSP=Digital Shala Programme

Date:	**Time:**
Name:	Subject taught: ● Maths ● Science ● Others
School Name/Code: Category: ● SIP ● SNP	Age (years): ● 20-25 ● 26-30 ● 31-45 ● 46-50 ● 51-55 ● above 55
Gender: ● Male ● Female ● Others	Teaching experience (years): ● 1-5 ● 6-10 ● 11-15 ● 15-20 ● 20-25 ● 25-30 ● above 30

Besides teaching what other administrative position do you hold in the school (this survey is taken in the capacity of a teacher who implements DSP): ● Principal ● Teacher-in-Charge ● Others ● None	

Questions on SNP Operations (Standalone Practices)

1. Is the Digital Shaala Programme (DSP) running in your school? ☐ Yes ☐ No
i. Why?

.....

.....

ii. When did it stop?

.....

.....

iii. What did you do to solve the problem?

.....

.....

iv. Were you able to solve the problem and start DSP?

.....

.....

Usage rating:
Researchers' interpretation based on the answers on usage: the teacher belongs to the following category:

1. *The DSP TV is used in the last 3 months for TicTacLearn.*
2. *The DSP TV was used in the last 3 months for TicTacLearn and other applications for teaching.*
3. *The DSP TV was used in the last 3 months for teaching but using other application other than TicTacLearn*
4. *The DSP TV was used for non-teaching purposes in the last 3 months.*
5. *a. Like what?*
6. *The DSP TV is not used at all for any purpose.*

Training (Training and capacity building in technology use)

2. Have you received any training (in school and group training) on using and integrating DSP TVs into your teaching? Tell us about the training (who conducted, duration, what was covered, what you learnt overall). Was it helpful?

.....

.....

3. Do you think the training was sufficient? Are there any suggestions you'd like to share?

.....

.....

4. Have you gone through any other training for the use of technology in your teaching? Please explain when and who conducted it, what it entails, was it useful.

.....

.....

x—-----Note for the researcher: If Usage Rating = 5, please conclude the interviewx

5. Current challenges in using for non-teaching purposes [Only For Usage Rating = 4]

.....

.....

x—-----Note for the researcher: If Usage Rating = 4, please conclude the interviewx
Note for the researcher: Please continue with this section only if the User Ratings is 1, 2 or 3:

6. How many years DSP was used in schools and in your class?

7. If it is running, what changes do you find in the DSP?

.....

.....

☐ Changes:	☐ Reason:
☐ More classrooms covered now (than earlier)	.....
	.....
☐ Less classrooms covered now (than earlier)	.....
	.....
☐ Number of TVs increased than earlier	.....
	.....
☐ Number of TVs reduced (than earlier)	.....
	.....

☐ Any other changes in classes and DSP TV running .....

.....

7.1. (If DSP is still running) What factors have made it continue to run?

.....

.....

7.2. (If yes) How many months or years, have the Muskaan Dreams personnel stopped coming?

.....

.....

7.3. What support did you earlier receive from MD? Was it adequate to run DSP?

.....

.....

7.4. In what ways has MD stopped their support now? What support is still continuous?

.....

.....

7.5. What type of difficulties are you facing after Muskaan Dreams stopped their support? Could you please specify?

.....

.....

7.6. Do you need more support regarding the DSP TV operations from Muskaan Dreams?

.....

.....

7.7. Do you get support from Muskaan Dreams when you approach them regarding the DSP TVs? Explain in detail.

.....

.....

7.8. What other support (other than MD) do you need to continue DSP?

.....

.....

Usage
(How often and teaching methods in DSP TV-enabled classrooms)

8. How often do you use the DSP TV in your classes?
☐ Daily ☐ More than twice a week ☐ Twice in a week ☐ Once in a week, ☐ Twice in a month, ☐ Once in a month, ☐ Once in two months.

9. Which methods of teaching do you follow when using DSP TV classes? (Tick single or multiple, prompt only if required)
☐ Lectures or explanation by teacher ☐ Using blackboard or white board to explain to the class. ☐ Questioning, ☐ Discussions ☐ Call students to solve some problems on the board ☐ Ask students to solve some problems in their note books ☐ Learning by doing ☐ Project based ☐ Problem solving, explain other than calling students to solve problem on the board or in their notebooks ☐ Any other, please explain:

10. Which program or app on the DSP TV has science and math content provided by MD?

.....

.....

11. If the teacher is unable to name TicTac Learn, have you heard of TicTac Learn on DSP TV?

.....

.....

12. Explain TicTacLearn if the teacher says no to the above question:

.....

.....

13. How often do you use TicTacLaern?
☐ Daily ☐ More than twice a week ☐ Twice in a week ☐ Once in a week, ☐ Twice in a month, ☐ Once in a month, ☐ Once in two months.

14. Other than TicTac Learn, what other apps and programs do you use on the DSP TV?
.....

.....

15. How often do you use other apps on DSP TV?
☐ Daily ☐ More than twice a week ☐ Twice in a week ☐ Once in a week ☐ Twice in a month ☐ Once in a month ☐ Once in two months ☐ Not at all

16. How often do you use YouTube?
☐ Daily ☐ More than twice a week ☐ Twice in a week ☐ Once in a week, ☐ Twice in a month, ☐ Once in a month, ☐ Once in two months. ☐ Not at all

17. Do you use the DSP TV more extensively for specific topics or units in your subject? If so, which ones and why?

.....

.....

18. According to you, what is the value or benefit/advantage of using DSP-TV in teaching?

.....

.....

19. According to you, what are the disadvantages of using DSP-TV in teaching?

.....

.....

20. Give your views on the tic-tac/math and science content on DSP-TV? In what ways is it beneficial?

.....

.....

TicTacLearn Content

21. Is it comprehensive or sufficient to teach a given lesson or topic using science or math content on DSP TV?
☐ No. Why?

.....

.....

☐ Yes. Why?

.....

.....

22. In your view how sensitive is the TictacLearn content on gender? (explain what you mean by sensitive), give examples.

.....

.....

23. In your view how sensitive is the tictac learn content for diversity in terms of religion, caste or social classes? Give examples

.....

.....

24. What changes would you recommend for the TictacLearn content?

.....

.....

25. Have you created or customized any content in your subject area to use it on the DSP TV? If yes, please share examples.

☐ No ☐ Yes. Please share examples:

.....

.....

Effectiveness (Teachers' overall belief about the use of technology in the classroom)

26. Do you think students learn better with DSP TVs than with regular classes? Please explain.

☐ No. Why?

.....

.....

☐ Yes. Why?

.....

.....

27. Do you find the contents updated? If not, what is lacking?

.....

.....

28. How has DSP TV affected student engagement and interest in your classes?

.....

.....

29. Have you observed any changes in students' learning achievement levels after using DSP TVs? If yes, please explain.

.....

.....

30. Have you found any difference between boys and girls with respect to engagement and achievement after the DSP TV introduction? If yes, please explain.

.....

.....

31. Do children request that their class be taught using a smart TV? Why/Why not?

.....

.....

32. What do they ask for/prefer to see DSP TVs?

☐ Curricular (relating subjects & syllabus), ☐ Co-curricular (story books, magazines, etc),

☐ Extracurricular topics (music, dance, etc).

33. Which technologies other than DSP TV do you use in your teaching

.....

.....

34. Do you use any other technology except DSP TVs in the classroom? Please specify.

.....

.....

Lesson Plan for non-DSP

35. Do you make any lesson plans for your regular lessons taught without using DSP?

☐ Yes

For which lesson?:

.....

.....

How often?

☐ Daily ☐ More than twice a week ☐ Twice in a week ☐ Once in a week, ☐ Twice in a month, ☐ Once in a month, ☐ Once in two months. ☐ No

If not, what preparations do you take before the class where DSP is to be used?

.....

.....

35.1. Can you share the lesson plan you created for the DSP TV-enabled classroom?

☐ Yes (if yes, collect it if available) ☐ No

Challenges *(Challenges faced in implementing DSP)*

Now that the MD is not supporting your school: how do you address the following challenges:

36. Do you find any challenges in implementing this DSP TV-based DSP?

.....

.....

37. What technical issues or difficulties have you experienced with DSP TV?

.....

.....

38. How do you address the diverse learning needs of students using DSP TV?

.....

.....

39. Do you get adequate support from the HM/school regarding DSP TV use in the classroom?

.....

.....

40. If you face any problem in handling the device, whom do you contact?

.....

.....

41. Are there any other challenges that you'd like to talk about?

.....

.....

Community of Practice *(Group initiatives for enhanced use of DSP)*

42. Are you a current member of any WhatsApp group created by Muskaan Dreams?
☐ Yes
If Yes, ask-

a. Do you post images and videos of your session in the group? If yes, how often?
☐ Daily ☐ Weekly ☐ Twice in a month ☐ Once in a month ☐ Once in two months ☐ No

b. Do you post about the technical difficulties regarding DSP TV? If yes, how often?
☐ Daily ☐ Weekly ☐ Twice in a month ☐ Once in a month ☐ Once in two months

42.1. Who else is the current member in your school?

.....

.....

43. Are you a member of any other digital messaging group related to teaching? Pls explain.

.....

.....

Feedback *(Suggestions for DSP improvement)*

44. What improvements would you suggest regarding DSP training, DSP TVs, content, or technical support?

.....

.....

Interview Tool for School Heads

Notes for the Interviewer: Please share the consent form

Date:	Time:	Duration:
Name:	Age:	
Gender: ☐ Male ☐ Female ☐ Others	School Name/Code:	
Category: ☐ SIP ☐ SNP	Level: ☐ Primary ☐ Secondary	
Location: ☐ Rural ☐ Urban	Interviewer name:	

Implementation

1. How long is the DSP TV classroom programme being implemented in your school?

.....

.....

2. How many classrooms currently have DSP TV installed? Is the rollout complete?

.....

.....

3. How was the decision made in terms of which classrooms/subjects will receive DSP TV?

.....

.....

4. How was the procurement and installation process? Any major challenges or learnings?

.....

.....

5. Are the teachers trained in integrating and using the new DSP TVs? How many trainings have been completed?

.....

.....

6. Does the school provide any support to teachers working on DSP as encouragement, rewards, recognition etc.?

.....

.....

7. Do you think parents of students attending DSP support digital learning? Yes/No.Please give reasons?

.....

.....

Technical Specifications

8. What type of technical maintenance and support is provided for the DSP TV?

.....

.....

9. Who is responsible for basic upkeep and troubleshooting of the DSP TV?

.....

.....

10. Have you experienced any technical problems with DSP TVs so far? If so, what? Who covers these costs?

.....

.....

Benefits

11. From your perspective, what are the biggest benefits of the DSP TVs so far?

.....

.....

12. Have you seen measurable impacts on students' metrics like test scores, engagement, classroom participation since the DSP TV rollout?

.....

.....

Usage by Subject

13.Are there teachers other than math and science who use DSP TV?

.....

.....

14. Which subjects have you found DSP TV to be more useful, and in what ways?

.....

.....

Evaluation

15. Do you meet teachers regularly on the best possible use of these DSP TV?

.....

.....

16. Do you plan to purchase additional DSP TV or other educational technology in the future? Why or why not?

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17. Overall, do you think the investment and implementation have been successful so far? How can it be improved?

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Teacher Engagement Survey for DSP TV Classroom

Notes for the Interviewer:

- *Please share the consent form*
- *Administer this tool after interviewing the teacher*

Date: _____	Time: _____
Name: _____	Subject taught: • Maths • Science • Others
School Name/Code: _____ UDISE code: _____ Category: • SIP • SNP	Age (years): आयु (वर्षों में): • 20-25 • 26-30 • 31-45 • 46-50 • 51-55 • 56 and above
Gende/लिंगr: • Male/पुरुष • Female/महिला • Others/अन्य Employment status: • Permanent • Temporary/Contract	Teaching experience (years): शिक्षण अनुभव (वर्षों में): • 1-5 • 6-10 • 11-15 • 16-20 • 21-25 • 26 and above
Teaching Level: शिक्षण स्तर • Elementary/प्राथमिक • Secondary/माध्यमिक • Higher Secondary	Besides teaching what other administrative position do you hold in the school (this survey is taken in the capacity of a teacher who implements DSP): • Principal • Teacher-in-Charge • Others • None

Direction: This research tool will help us understand the teachers' engagement level in the DSP (Digital Shala Programme) TV-enabled classrooms. You all know that DSP is an ambitious initiative to provide quality education to government school students using Smart TVs and you are a pivotal part of the initiative.

In this tool, you will find 32 questions to be answered on a 5-point Likert scale (scale used to measure opinions, attitudes, or behaviors). Please indicate your opinion about each of the question item below as per the response format: (Strongly disagree =1), (Disagree =2), (Undecided =3), (Agree =4), (Strongly agree =5) by putting a Tick (✓) for the appropriate choice/checkbox. Your answers will be confidential and will be used only for this research purpose.

This survey will be administered among teachers to collect their self-evaluation reports. One copy of this questionnaire will be distributed to each selected teacher who will answer as per his/her preferred time and place, with a request to return as soon as possible. The researchers will help teachers explain the meaning of the question items, if any, so asked for by any teacher.

No	Items	Scale				
1	डीएसपी टीवी ने मेरी शिक्षण में सुधार किया है। DSP TV has improved my teaching	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
	डीएसपी टीवी ने मेरी कक्षा भागीदारी में सुधार किया है। DSP TV has improved my classroom teaching	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
2	डीएसपी टीवी अधिक दृश्य निर्देशों के साथ शिक्षण के लिए सहायक है। DSP TV is helpful for teaching with more visual instructions.	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
3	.जब मैं अपने शिक्षण में डीएसपी टीवी का उपयोग करता हूं तो मैं अपने शिक्षण पर अधिक ध्यान देती/देता हूँ। I pay more attention to my teaching when I use DSP TV in my teaching.	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
4	My present technological knowledge is sufficient to:					
	4A. Inserting a pen drive in the TV/टीवी में पेन ड्राइव लगाना	Totally Insufficient (1) □/पूरी तरह अपर्याप्त (1) □	Insufficient (2) □/अपर्याप्त (2) □	Neutral (3) □/अनिर्णय (3) □	Sufficient (4) □/पर्याप्त (4) □	Totally sufficient (5) □/पूरी तरह पर्याप्त (5) □
	4B. Navigating across contents/विषय-सूची का संचालन करना	Totally Insufficient (1) □/पूरी तरह अपर्याप्त (1) □	Insufficient (2) □/अपर्याप्त (2) □	Neutral (3) □/अनिर्णय (3) □	Sufficient (4) □/पर्याप्त (4) □	Totally sufficient (5) □/पूरी तरह पर्याप्त (5) □

	4C. Operating the remote to pause, rewind, forward contents/वीडियो को रोकने, रिवाइंड करने, आगे बढ़ाने के लिए रिमोट का संचालन	Totally Insufficient (1) □/पूरी तरह अपर्याप्त (1) □	Insufficient (2) □/अपर्याप्त (2) □	Neutral (3) □/अनिर्णय (3) □	Sufficient (4) □/पर्याप्त (4) □	Totally sufficient (5) □/पूरी तरह पर्याप्त (5) □
	4D. Connecting the TV using Bluetooth or Wi-Fi connection/ब्लूटूथ या वाई-फ़ाई कनेक्शन का उपयोग करके टीवी कनेक्ट करना	Totally Insufficient (1) □/पूरी तरह अपर्याप्त (1) □	Insufficient (2) □/अपर्याप्त (2) □	Neutral (3) □/अनिर्णय (3) □	Sufficient (4) □/पर्याप्त (4) □	Totally sufficient (5) □/पूरी तरह पर्याप्त (5) □
	4E. Using other apps on the TV./टीवी पर अन्य ऐप्स का उपयोग करना।	Totally Insufficient (1) □/पूरी तरह अपर्याप्त (1) □	Insufficient (2) □/अपर्याप्त (2) □	Neutral (3) □/अनिर्णय (3) □	Sufficient (4) □/पर्याप्त (4) □	Totally sufficient (5) □/पूरी तरह पर्याप्त (5) □

5	Questions on TicTacLearn contents. To what extent do you agree/disagree with the following:/TicTacLearnकन्टेन्ट् पर प्रश्न। आप निम्नलिखित वाक्य से किस हद तक सहमत/असहमत हैं:	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
	I find DSP TV content useful for getting students' attention./मुझे छात्रों का ध्यान आकर्षित करने के लिए डीएसपी टीवी कन्टेन्ट् उपयोगी लगता/ लगती है	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
	I find DSP TV content useful for informing the students of the lesson Totally objectives./मुझे छात्रों को पाठ के उद्देश्यों के बारे में सूचित करने के लिए डीएसपी टीवी कन्टेन्ट् उपयोगी लगता / लगती है।	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
	I find DSP TV content useful in stimulating their prior learning/मुझे डीएसपी टीवी कन्टेन्ट् बच्चों की पूर्व शिक्षा को प्रोत्साहित करने में उपयोगी लगता/ लगती है	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
	I find DSP TV content useful in providing them with learning guidance./मुझे डीएसपी टीवी कन्टेन्ट् सीखने के मार्गदर्शन प्रदान करने में उपयोगी है।.	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
6	It is easier for me to guage if the students have understood what i am teaching when i ue DSP than when I use without DSP. मैं जब डीएसपी का उपयोग	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □

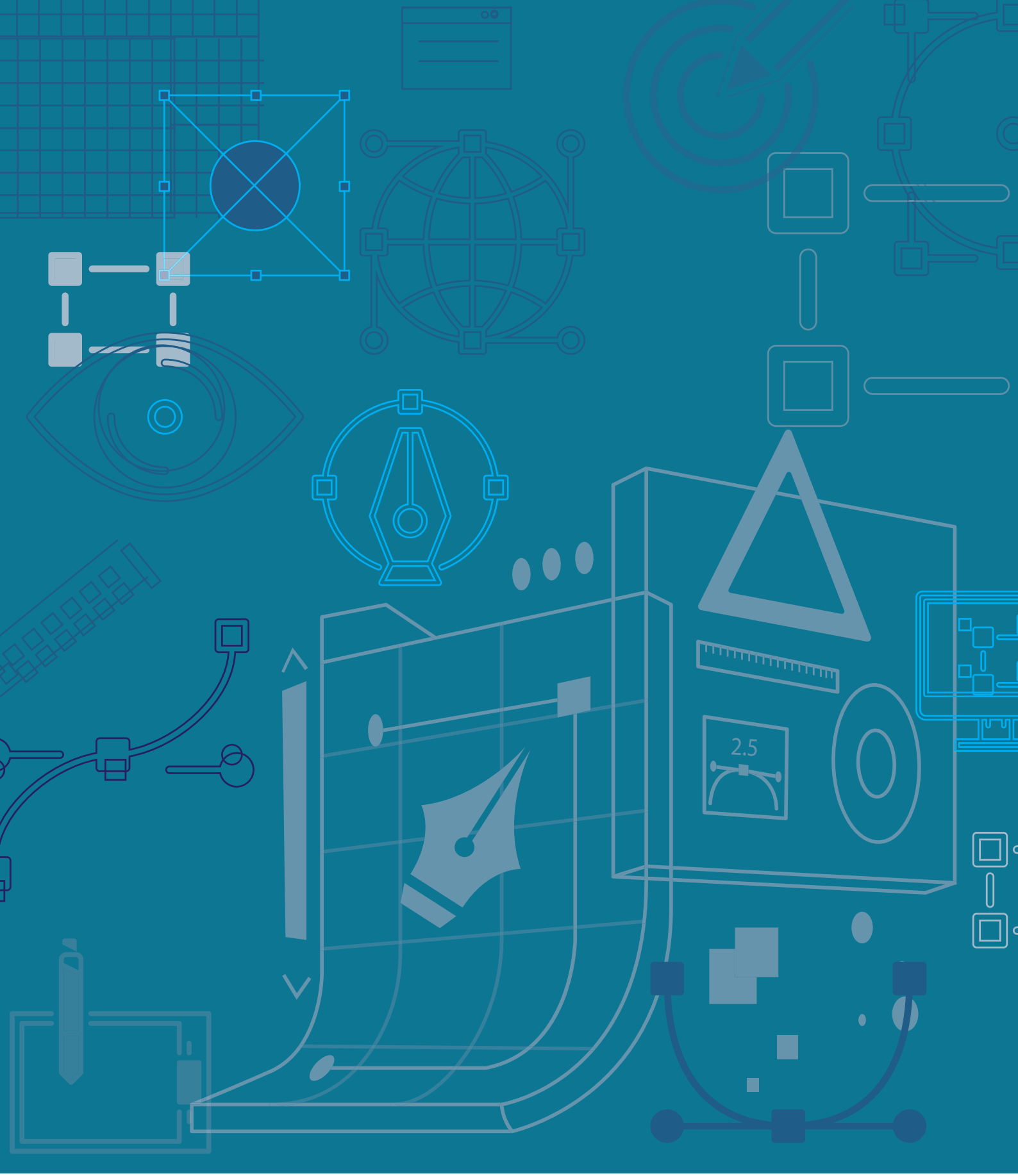
	करती/ करता हूं तो मेरे लिए यह आकलन करना आसान है कि छात्र समझ गए हैं कि मैं क्या पढ़ा रहा हूं, न कि जब मैं डीएसपी के बिना पढ़ाती/ पढ़ता हूँ					
7	I enjoy my teaching using the DSP TV. मैं डीएसपी टीवी का उपयोग अपने शिक्षण मे करने मे आनंद मिलती/ मिलता है।	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
8	I would like to have every classroom equipped with a DSP TV. मैं चाहूँगी/चाहूँगाकि हर कक्षा में एकडीएसपी टीवी हो।	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
9	I eagerly wait for the day's next DSP TV-enabled class. मैं अगली डीएसपी टीवी-सक्षम कक्षा का उत्सुकता से इंतजार करती/ करता हूं।	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
10	My interest in teaching has increased after the introduction of the DSP TV. डीएसपी टीवी की शुरुआत के बाद शिक्षण में मेरी रुचि बढ़ गई है	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
11	I feel excited when students interact with the DSP TV content. जब छात्र डीएसपी टीवी कंटेंट की मदद से साथ संवाद करते हैं, तो मुझे बहुत खुशी होती है।	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
12	While teaching in a DSP TV-enabled class I tend to ask more questions to students than when I am not using the TV. डीएसपी टीवी-सक्षम कक्षा में पढ़ाते समय मैं टीवी का	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □

	उपयोग नहीं करने की तुलना में छात्रों से अधिक प्रश्न पूछती/पूछता हूं।					
13	I run the DSP TV content backwards and forward several times while teaching until students understand. मैं पढ़ाते समय डीएसपी टीवी कंटेन्ट को कई बार आगे-पीछे चलाता हूं जब तक कि छात्र समझ न जाएं।	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
14	I collect good content using other apps (like YouTube, outside TicTacLearn) and run it on the DSP TV. मैं अन्य ऐप्स (TicTacLearn के बाहर) का उपयोग करके अच्छी कंटेन्ट एकत्र करता हूं और इसे डीएसपी टीवी पर चलाती/चलाता हूँ।	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
15	I develop my own lesson plans to teach in the Smart TV-enabled classes. मैं डीएसपी -सक्षम कक्षाओं में पढ़ाने के लिए अपनी स्वयं की लेसन प्लान विकसित करती/ करता हूँ	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
16	I encourage students to interact among themselves and discuss on a topic in my DSP TV-enabled classes. मेरी डीएसपी टीवी-सक्षम कक्षाओं में छात्रों को आपस में बातचीत करने और विषयों पर चर्चा करने के लिए प्रोत्साहित करती/ करता हूँ ।	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
17	I tend to engage with students more in DSP TV class than the regular class. मैं नियमित कक्षाओं की तुलना में (जहां मैं टीवी का उपयोग नहीं करती/ करता हूं।)	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □

	डीएसपी टीवी कक्षा में छात्रों के साथ अधिक जुड़ती/ जुड़ता हूँ।					
18	I remain aware of my students' feelings while using the DSP TV in the classroom. मैं कक्षा में डीएसपी टीवी का उपयोग करते समय अपने छात्रों की भावनाओं से अवगत रहती/रहता हूँ।	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
19	I am able to build discussion with students in a DSP TV-enabled classroom. मैं डीएसपी सक्षम -(एनेबल्ड) टीवी का उपयोग करके कक्षा में छात्रों के साथ चर्चा करने में सक्षम हूँ।	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
20	I take the help of my students whenever I face problems with the DSP TV operation. जब भी मुझे डीएसपी टीवी संचालन में समस्या आती है तो मैं अपने छात्रों की मदद लेती/लेता हूँ।	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
21	I often allow students to operate the remote and TV as per their needs during sessions मैं अक्सर छात्रों को सत्र के दौरान उनकी आवश्यकताओं के अनुसार रिमोट और टीवी संचालित करने की अनुमति देती/देता हूँ।	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
22	I try different ways to involve students to take active participation in class when I am using DSP TV. मैं जब डीएसपी टीवी का उपयोग कर रहा/रही होता/होती हूं तो मैं छात्रों को कक्षा में सक्रिय भागीदारी के लिए के	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □

	लिए विभिन्न तरीके आजमाती/आजमाता हूँ					
23	I discuss and share my experiences of DSP TV classes with my colleagues. मैं अपने सहकर्मियों के साथ डीएसपी टीवी कक्षाओं के बारे में चर्चा करता हूं और अपने अनुभव साझा करती/ करता हूँ।	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
24	I help my colleagues and attend to their problems regarding DSP TV-enabled teaching. मैं अपने सहकर्मियों की मदद करता हूँ और डीएसपी टीवी शिक्षण के संबंध में उनकी समस्याओं पर ध्यान देती/देता हूँ।	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
25	I seek help from my colleagues when I face a problem with the DSP TV. मैं जब डीएसपी टीवी के साथ किसी समस्या का सामना करता हूं तो मैं अपने सहकर्मियों से मदद लेती/लेता हूँ।	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
26	I can contact the concerned experts on any software or hardware issues with the DSP TV. मैं डीएसपी टीवी के साथ किसी भी सॉफ्टवेयर या हार्डवेयर मुद्दे पर संबंधित विशेषज्ञों से संपर्क कर सकती/ सकता हूँ।	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
27	I attend discussions, seminars, and training over the DSP TV-enabled pedagogy. मैं डीएसपी टीवी-सक्षम चर्चा, सेमिनार और प्रशिक्षण में भाग लेती/लेता हूं।	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □

28	I contact the program associates (from Muskaan Dreams) for any problem regarding TV content and technical support. मैं टीवी सामग्री और तकनीकी सहायता से संबंधित किसी भी समस्या के लिए कार्यक्रम सहयोगियों (मुस्कान ड्रीम्स से) से संपर्क करती/करता हूँ।	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
29	I can decide when to use DSP TV in my lesson.मैं निर्णय ले सकती/ सकता हूं कि अपने पाठ में डीएसपी टीवी का उपयोग कब करना है।	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
30	I can decide how to teach with the DSP TVs. मैं तय कर सकती/ सकता हूं कि डीएसपी टीवी के साथ कैसे पढ़ाना है।	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □
31	I can design and plan how to integrate DSP in my teaching. मैं अपने शिक्षण में डीएसपी को कैसे एकीकरण करूं, इसकी योजना और डिजाइन तैयार कर सकती/ सकता हूँ।	Strongly Disagree (1) □/पूरी तरह असहमत (1) □	Disagree (2) □/ असहमत (2) □	Undecided (3) □/ अनिर्णय (3) □	Agree (4) □/सहमत (4) □	Strongly Agree (5) □/पूरी तरह सहमत (5) □



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