TECHNOLOGY INTEGRATION FOR EQUITABLE EDUCATION (TIEE)

Needs Assessment Report

2023

Technology Integration for Equitable Education (TIEE)

Needs Assessment Report

IT for Change

393, 17th Main Road, 35th Cross,
Jayanagar 4th 'T' Block,
Bengaluru, Karnataka – 560041.

This document has been prepared based on the work supported by a grant from Cognizant Foundation as part of the 'Technology Integration for Equitable Education' project.

Table of Contents

Introduction

IT for Change (ITfC) is an NGO that works for innovative and effective use of information and communication technologies (ICT) to promote socio-economic change. ITfC has been working on programs for integrating ICT and education in Government and aided High Schools in Bangalore South since 2010 using free and open source software (FOSS) applications to access, create, and publish open educational resources (OER) in Mathematics, Science, Kannada, English, and other subjects. Through customised subject-specific resources, ITfC has also been working with students to strengthen digital literacy and digitally-enabled learning.

During the 2022-2023 academic year, IT for Change initiated the "Technology Integration for Equitable Education (TIEE)" program aimed to encourage inclusive learning for students in higher primary schools (HPS) in Bengaluru South-3 block. It was noted that students face difficulties in learning due to short attention spans, poor peer interaction skills, weak metacognitive abilities, poor recall, and a greater need for reinforcement. These are some reasons why a lot of students are not "learning at their grade level."

Another key cause is the teachers not being equipped to recognize and address the learning needs of all the children in their classrooms. To be able to do this, teachers' capacities to develop methods and materials that incorporate principles of equitable education need to be built. Integrating digital technology in teaching-learning and adopting diverse pedagogical and content approaches could increase the teaching-learning effectiveness and enable the development of all children. Additionally, teachers’ continuous professional development (CPD) should include the creation of horizontal networking spaces for teacher interaction and sharing and guided peer interaction. For this reason, in its second phase over 2023-25, the “Technology Integration for Equitable Education (TIEE)" program aims to work in middle schools (grades 6-8) by:

1. demonstrating processes of making the classroom an equitable learning space for all children, including through the meaningful integration of digital technologies

2. creating multi-level digital learning modules on select subjects for addressing children with different learning abilities and aptitudes, and
3. capacity building of teachers and teacher educators to support equitable teaching-learning processes through appropriate integration of digital technologies.

The project will also focus on supporting the teachers in accessing and using Open Educational Resources (OER) for their Continuous Professional Development (CPD), for use in equitable teaching-learning as well as enabling students to access digital technologies for learning.

To better implement this program at the block, cluster, and school levels, and as suggested by the Block Education Officer, a *Needs Assessment* of teachers was designed and conducted in July through August 2023. This study aimed to gather inputs from the teachers, and HMs (Headmasters/ Headmistresses) on challenges to teaching of classes 6 to 8 to better design the teacher's workshops and assess the way forward. This report covers findings and analyses from the same.

Objectives

The needs assessment was guided by the following objectives:

- To get teachers' input regarding their expectations on topics, we need to address subject-specific workshops and school-level interactions.
- To get a sense of the technological infrastructure available in schools and how proficient the teachers are in using them.

Study Design and Methodology

The study plan and tools were designed to get a better understanding of teachers' beliefs about teaching and learning, the pedagogical strategies and TLMs (teaching-learning materials) used, the use of ICT tools in the classroom, challenges to teaching as well as the support required by teachers. For this purpose, the ITfC team conducted in-person and telephonic interactions with teachers, along with an online survey. A preliminary workshop was held in July for Mathematics, Language teachers (Kannada, English, and Hindi), Science, and Social Science teachers to

communicate the objectives of the program and to conduct the needs assessment.

Scope of Assessment

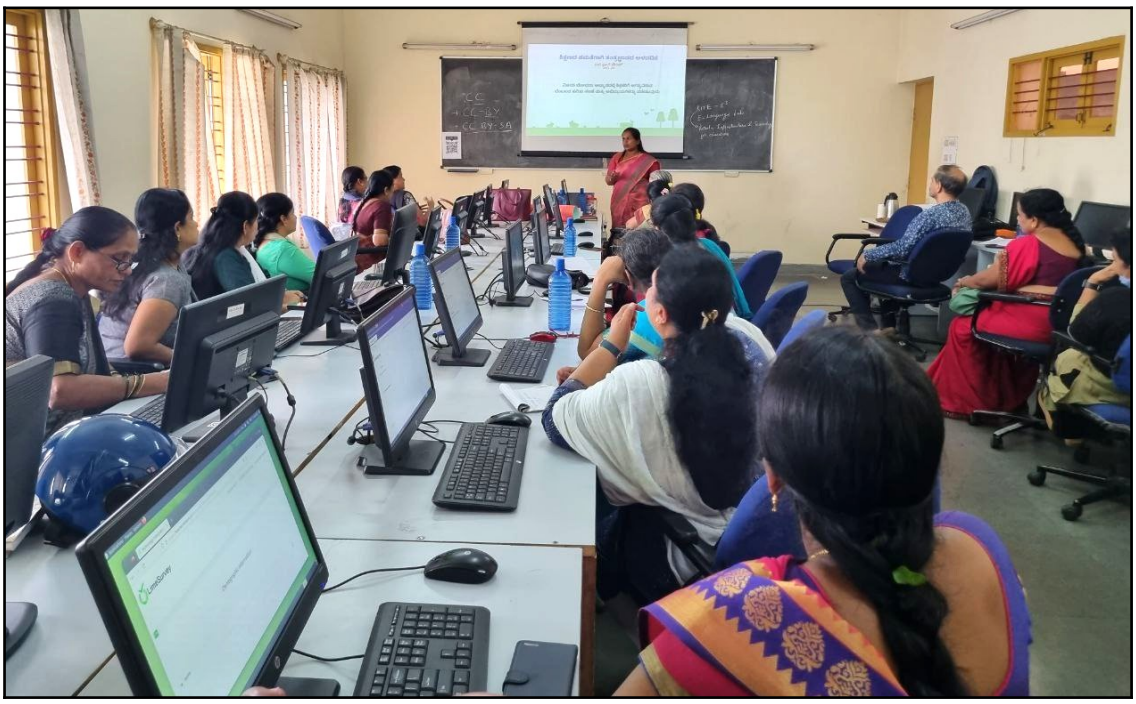
The scope of the Needs Assessment included developing an understanding of:

1. The academic challenges in the teaching-learning process in Languages, Mathematics and Science,
2. Teachers' beliefs about teaching-learning
3. The existing technological infrastructure in schools
4. Understanding the needs, constraints and challenges faced by teachers
5. Identifying areas that may require support and providing recommendations for stakeholders

Sampling

Based on the department's inputs, ITfC selected 8 clusters for teachers' programs and 2 schools for regular student intervention activities in Bengaluru. One teacher from each of the 33 schools teaching class 6 and/or class 7 attended the preliminary needs assessment workshop.

Image 1: Teachers participating in the preliminary workshop for the Needs Assessment (Source: IT for Change)



Data Collection Tools

Specifically for this needs assessment, the following tools were created and administered:

Survey Questionnaire

The types of questions here focused on factors like teachers' demographics, technological infrastructure in schools, use of TLMs in classrooms as well as the support required by teachers. Both general and subject-specific challenges to using ICT resources in schools were covered.

Focus Group Discussion

A focus group discussion involved all teachers, covering a range of subjects including Mathematics, Science, English, Kannada, and Hindi. During these discussions, questions were posed from various perspectives, addressing issues like classroom teaching challenges, teaching strategies, digital and non-digital resources utilisation in the teaching process, and assessment methods. The conversations were meant to collaboratively address these points and collectively work towards making the school more equitable.

Direct Interactions

The questions asked in these interactions focused on more specific TLMs and ICT tools used by teachers as well as subject-specific challenges to using these in the classroom. These were conducted both in person and telephonically as per teachers' availability.

Classroom and School Observations

During the school visits, the number and status of the digital gadgets available in schools were observed. The team also observed how the teachers use the available gadgets in the teaching process.

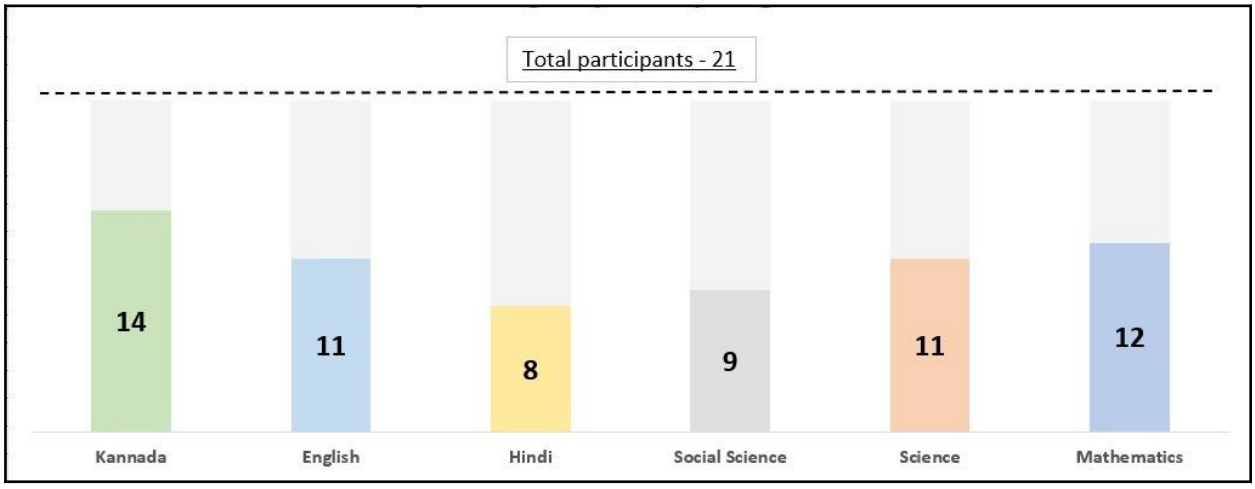
Findings

The following observations were made during the Needs Assessment through the various data collection tools:

1. **Teachers' demographic**

   It was found that 57% of the participants have over 20 years of teaching experience. Most of the participating teachers know 2–3 languages (at 29% each), with a majority of the participants knowing Kannada (90%) and English (81%). It was noted that all the participating teachers have been teaching a minimum of two subjects at their respective schools, with varying subject combinations between Kannada, English, Hindi, Science, Social Science, and Mathematics. All teachers teach a minimum of one language with several teachers teaching as many as 4-5 different subjects.

Graphic 1: Subjects taught by participating teachers, with each teacher teaching between 2-5 different subjects



Source: IT for Change

2. **ICT infrastructure in school**

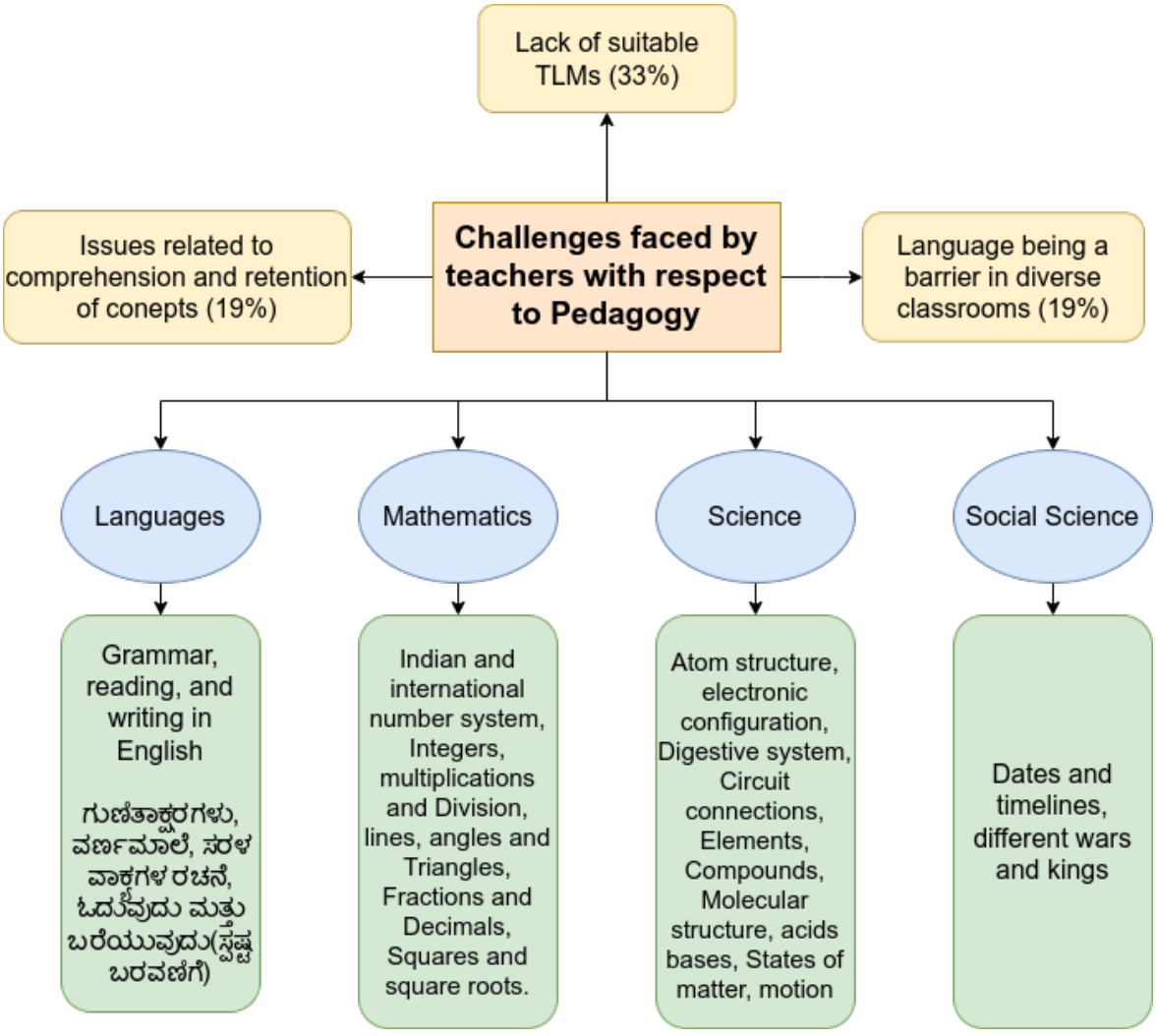
   Although all the schools in the survey have computers/ laptops, 14% of teachers are unable to use these laptops. Projectors are present in about half of the schools, while Tablets (Tabs) and Smart-Class technology is less commonly available, with 24% and 10% of schools having access to these, respectively. Although computer labs are present in 7 of the 21 schools (with

around 9-12 computers), all the participants stated that lack of appropriate ICT-based TLMs rules out using this existing digital infrastructure. Additionally, not all these devices are in a working condition. Internet connectivity is limited, with only 14% of schools being able to access online resources.

3. Challenges faced by teachers

a. In terms of content and pedagogy

Graphic 2: Challenges faced by teachers with respect to Pedagogy (Source: IT for Change)



In terms of content-related challenges (graphic 2), 33% of teachers highlighted the lack of activities and resources available, and the need for more engaging teaching materials and resources (TLMs). Additionally, 19% of teachers mentioned language being a barrier to teaching in diverse classrooms. Another 19% of teachers expressed difficulties in ensuring that students understand and retain what is taught, emphasising the need for strategies to enhance comprehension and retention.

i. In Language teaching, the challenge arises when content is not relatable to local or Indian contexts (29%). Issues related to grammar (29%), *Kannada Varnamala*, and phonetic symbols present additional hurdles for teachers.
ii. In Mathematics, topics such as division, integers, lines and angles, and multiplication pose challenges.
iii. In Science, educators grapple with teaching topics like molecular structure in states of matter, experimental aspects, fabrics, motion, and even complex concepts like molecular structures in states of matter.
iv. In Social science, topics involving ancient civilizations, historical facts such as dates of wars, and the reign of kings present teaching challenges.
v. It was noted that teachers expressed that they face no problems in teaching Hindi and do not find any topics challenging to teach.

b. In terms of teaching resources and teaching-learning materials (TLMs) A substantial 86% of teachers struggled due to the lack of adequate teaching materials. Additionally, 19% of teachers faced challenges associated with the lack of technological resources. 33% of teachers expressed the need to upgrade their teaching methods and 24% wished to learn how to effectively integrate technology into their classrooms. Concerns about the low exposure to English, and identifying students' learning levels were also raised.
c. In terms of assessment challenges, 29% of teachers indicated that

conducting individual assessments in multilevel classrooms is difficult. Furthermore, 19% of teachers sought different types of assessment tools beyond traditional score-based evaluations.

d. In terms of classroom management and other challenges 29% of teachers found it challenging to engage combined classes, while 24% expressed difficulties in managing multi-level students within the same class. Teachers also spoke about the desire to stay updated with technological advancements in education, the challenge of balancing administrative work with teaching, teacher shortages, student absenteeism, and the impact of the COVID-19 pandemic.

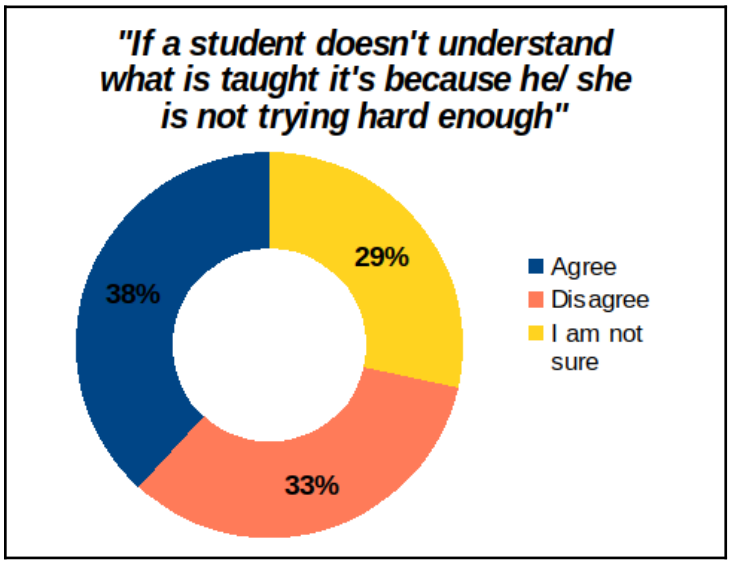
4. Teachers' beliefs about teaching-learning

When asked whether their students are aware of the lesson goals, 48% responded positively (Yes), while 52% indicated that this awareness occurs only sometimes. In terms of communicating lesson goals to students, 86% stated that they consistently do so (Yes), while 14% mentioned that they do it only sometimes. When asked if they believe students can express or demonstrate their learning in multiple ways, 10% were uncertain (I am not sure), 29% said this happens sometimes. Regarding connecting lessons to students' prior knowledge, 29% mentioned that this connection happens only sometimes, while 71% believed that it is possible to connect the lesson to most students' prior knowledge. In terms of the frequency of connecting lessons to students' prior knowledge, 33% stated that they always make this connection, while 67% reported that they do it only sometimes. Finally, concerning giving students opportunities to express their learning in different ways, 14% indicated that they do this only sometimes, while 86% consistently provide these opportunities.

5. Teachers' beliefs about learning concerning UDL principles

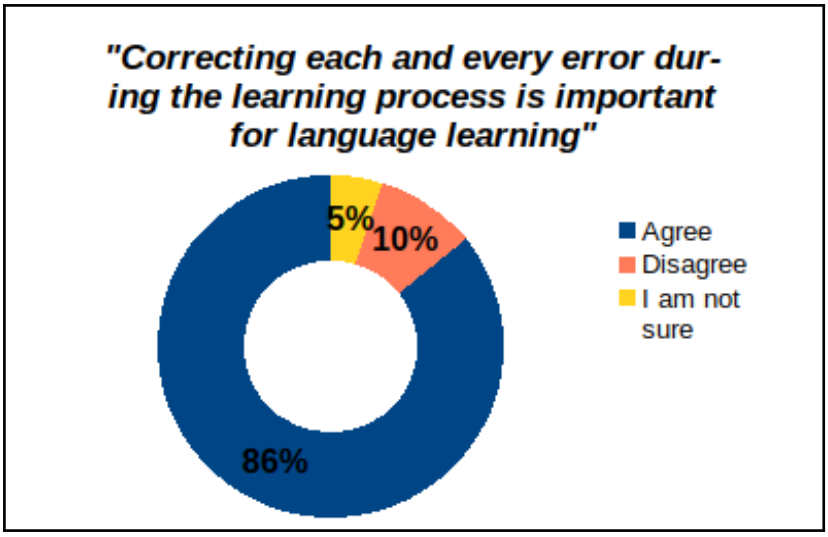
Universal design for learning (UDL) is a teaching approach that works to accommodate the needs and abilities of all learners and eliminates unnecessary hurdles in the learning process. Teachers' beliefs about learning based on UDL principles - *engagement, representation, and action and expression,* were examined through some of the questions.

Graphic 3: Teacher's beliefs about teaching and learning based on UDL principles. (Source: IT for Change)



The majority (95%) of the participants agreed that working together in the classroom is necessary and important for students' learning. When it came to the belief that each student has a certain learning ability that cannot be changed, opinions were more varied, with 38% agreeing, 43% disagreeing, and 19% being uncertain. Regarding the notion that if a student doesn't understand what is taught, it's because they are not trying hard enough (graphic 3), 38% of the teachers agreed, 33% disagreed, and 29% were unsure. On the question of whether using Kannada exclusively when the majority of students understand it is sufficient for teaching, 38% agreed, and 62% disagreed. Regarding the belief that British/American English is the only correct version of English, the majority (57%) disagreed, while 10% agreed, and 33% were uncertain. When it comes to the importance of correcting each error during the learning process for language learning (graphic 4), the majority (86%) agreed. Lastly, regarding the belief in written examinations as the best tools to determine if children have learned, 86% of the participants disagreed.

Graphic 4: Teacher's beliefs about teaching and learning based on UDL principles. (Source: IT for Change)



6. Teachers' use of TLMs and ICT resources

The majority (76%) of teachers reported that they sometimes use such materials, while 14% rarely use them, and 5% never use them. Most teachers attributed this to inadequate ICT infrastructure and a shortage of suitable TLMs. The teachers attributed this to lack of time to plan. 38% of the teachers frequently incorporate videos into their teaching, followed by charts (19%) and models (14%). Furthermore, regarding ICT and digital technology tools, a vast majority (81%) reported using them sometimes, while 9% always used them. When deciding which resources to use and at what point in the lesson, 81% of the teachers mentioned that they base their decision on the nature of the content, and 71% consider subject-specific teaching strategies. A significant portion (48%) also take students' prior knowledge into account. However, the availability of adequate teaching resources for their subjects was somewhat uncertain, as 62% indicated they were unsure or found the resources somewhat supportive, while 38% felt that the resources provided adequate support.

7. Support required by teachers

Among the participating teachers, 24% seek more hands-on activities, 19% want assistance with technology integration, 14% require additional teaching

resources, and 10% request more visual examples. Additionally, 5% each expressed a need for video resources, IT tools, and a laboratory. Multilingual teaching strategies are desired by 5% of teachers, while 10% remain uncertain about their requirements. The teachers also raised a few additional concerns and needs, including the requirement for equipment for science experiments and teaching materials for social science, the desire for more materials and support for teaching English, and the need for computer knowledge and technology training. They also expressed the need for resources to support learners who are struggling to learn some topics or concepts and sought simple teaching techniques and activities.

The findings from the FGD and direct interactions reveal a wide range of challenges faced by teachers, including pedagogical, linguistic, and resource-related difficulties. Teachers stated that students in Bangalore face foundational problems in language due to differences in their mother tongue and the medium of instruction. Some students can speak but struggle with writing. This challenge is exacerbated by factors such as the diverse backgrounds of students, making communication difficult. When students transition to a different medium of instruction, even teaching basic concepts like the alphabet becomes challenging, requiring a restart from scratch.

Moreover, the students' academic levels in the classroom often do not align with their grade levels. For instance, in 6th and 7th grades, certain topics and concepts should have been learned, but some students are either unfamiliar or have not been able to retain their learning of these concepts. The curriculum can sometimes become overwhelming for them. Consequently, educators must employ group activities and various strategies to accommodate these differing levels of learning.

According to teachers, another hurdle is the issue of homework. Many students fail to return completed assignments, making assessment and feedback a significant challenge. The shortage of teachers compounds this problem, with one teacher often responsible for teaching 2 to 4 subjects. Additionally, a lack of teaching-learning resources, including ICT tools and equipment in science labs, further hinders effective teaching-learning processes.

Lastly, the COVID-19 pandemic has increased absenteeism and reduced students' attention spans and interest in learning. Certain topics or concepts being too advanced for younger children has exacerbated this decline in motivation. Combining multi-level, multilingual, multimodal, and multisensory resources along with diverse and learner-centric pedagogies is perhaps necessary for facilitating the education of students at different levels of engagement and understanding.

The school visits and classroom observations also revealed that although some schools have the necessary electronic equipment that can be used for classroom teaching, teachers are unsure about how to use it, and few are afraid to use it for fear of causing damage. In other schools, the existing electronic devices lack the necessary accessories to function properly (such as HDMI cables, HDMI connectors etc.). Teachers are not aware of this and thus the devices have not been utilised. This lack of basic digital literacy has made teachers view the use of ICT as a complicated task, beyond their abilities.

Reflections

Informing the TPD program and school engagement design

Based on the teachers' responses in the interactions, school visits, and classroom observations, the following needs to be kept in mind while designing and planning for teacher workshops and school engagement:

1. **Based on teacher demographics**
    a. Recognizing the varying levels of linguistic proficiency, the TPD program should offer customised multilingual training modules. Teachers who are multilingual may benefit from sessions on effectively leveraging their language skills, while monolingual teachers may require support and professional development to enhance their linguistic skills or strategies for accommodating students from diverse linguistic backgrounds.
        i. Integration of multilingual teaching approaches and strategies within the curriculum should be encouraged to create a more equitable classroom space.

ii. The workshops can also focus on the development and sharing of multilingual teaching materials and resources that can be used to support migrant students or those who speak other languages.

b. Experienced teachers can be encouraged to share their knowledge and insights with the group, fostering a collaborative learning environment, perhaps through a professional learning community set-up or communities of practice (COP). Additionally, since participants at different experience levels may have varying learning preferences, offering a mix of instructional methods, including workshops, discussions, and hands-on activities, to cater to diverse learning styles can be beneficial.

c. Given the diverse subject areas, it will be helpful to offer customised content and sessions tailored to the specific needs and challenges associated with each subject/topic/ concept.

i. Encouraging opportunities for interdisciplinary collaboration and knowledge exchange among teachers can foster innovative teaching approaches and cross-subject integration.

ii. Opportunities for peer learning and mentoring among teachers from various subjects can enhance the overall learning experience and help participants apply new insights to their respective subjects.

iii. Combining sessions or workshops for different subjects can be considered since most teachers teach more than one subject.

2. Based on ICT infrastructure in school

a. To support teachers, it is key to take into account the available ICT resources in respective schools. Customised resources and training modules can be developed to help teachers make the most of the resources at their disposal. Individual school visits to provide support might be helpful here.

b. Sessions on basic digital literacy training might prove helpful for teachers and school staff. Creating instructional videos that demonstrate and explain how to use the electric devices that are

currently used in the classroom (such as connecting a system to a projector, a system to a TV, a system to a mobile device etc.) can be created and shared with the schools.

c. It can be fruitful to encourage teachers from schools with similar computer resource levels to share their experiences, and best practices and collaborate on innovative teaching methods using available technology.

3. **To address the challenges faced by teachers**

It will be crucial to design sessions that address identified challenges, and tailor sessions to provide suitable strategies and resources.

a. The support provided should include training in effective pedagogical approaches, including strategies for enhancing student engagement, teaching language skills, and subject-specific methodologies.
b. To relieve the burden on teachers, multilevel self-learning resources entirely directed towards children, including activity-based story resources, and self-learning tools and apps should be created and shared with teachers.
c. Guidance on developing and sourcing activities and teaching aids (TLMs) to address the lack of activities and resource challenges can also be helpful.
d. It will be useful to work with teachers on developing a variety of assessment tools and methods that go beyond score-based assessments, including activity-based and performance-based assessments. Development of assessments that assess a broader range of skills and understanding, ensuring a holistic evaluation should be encouraged.
e. Encouraging teachers to share successful strategies for addressing common challenges, can help foster peer learning and collaboration.

4. Teachers' beliefs about teaching and learning

The responses from participating teachers suggest that there is some disconnect regarding teachers' understanding of how students learn and what makes the classroom environment more conducive to learning. This

indicates a need for a teacher professional development program that revisits the aims of education and encourages consistent communication of lesson goals, the use of multimodal and multilevel resources, and strategies for connecting lessons to prior knowledge in the classroom. The challenge here is to make this an experiential learning process for teachers, as simply lecturing them (talking 'to them') may not result in understanding. Use of authority can create compliance with orders, but this is unlikely to build commitment.

5. Teachers' beliefs concerning UDL principles

The insights and strategies highlight the importance of addressing teachers' beliefs and practices to align more closely with UDL principles.

a. Promoting Collaboration: The overwhelming consensus (95%) on the importance of collaborative learning signifies that teachers value peer-to-peer interaction. The teacher professional development program can further encourage collaborative teaching practices, where educators work together to create a more inclusive and diverse learning environment. Strategies can include co-teaching, peer evaluations, and joint lesson planning.
b. Addressing Fixed Mindsets: 38% of teachers believe that each student's learning ability is fixed and unchangeable. It is crucial to address such fixed mindsets. Professional development should focus on fostering a growth mindset among educators. Strategies may include workshops on differentiated instruction to empower teachers to address students' diverse needs effectively.
c. Emphasising Effort Over Ability: The fact that 38% of teachers believe students may not understand because they aren't trying hard enough suggests a need to shift focus from attributing learning difficulties to student effort. It is crucial to include strategies to identify and address learning barriers and promote a more empathetic and effective approach.
d. Balancing Error Correction: The majority (86%) expressed that correcting every error is essential for language learning. While error correction is important, a professional development program should help teachers balance correction with encouraging creativity and self-

expression. Strategies can include workshops on constructive feedback, peer editing, and targeted error correction.

e. Evaluating Assessment Practices: Since 86% of participants disagree that written exams are the best tools for assessing learning, teacher professional development can focus on alternative assessment methods. Strategies may include training on formative assessment, project-based evaluations, and providing constructive feedback and positive reinforcement to motivate and support students.

6. **Teachers' use of TLMs and ICT resources**

Teachers are open to diversifying their teaching methods by using various resources and activities beyond textbooks. The widespread use of digital technology tools also indicates that teachers are, to some extent, comfortable with using technology in the classroom. This is an opportunity to further enhance their digital literacy skills and explore more ICT resources in classrooms.

a. Subject-specific strategies for integrating multimedia resources, particularly simulations, videos, and audio recordings, into lessons should be shared to make learning more engaging and effective.
b. Promoting a student-centric approach by emphasising the importance of considering students' interests, prior knowledge, learning styles, and demographics when selecting resources will be helpful. Story-based resources are one example of this approach.
c. Given the high percentage (81%) of teachers who use ICT and digital technology tools, the professional development program should focus on enhancing teachers' digital literacy. This includes training on using educational software, online platforms, and digital resources effectively.
d. Given the prevalent use of digital technology, the workshops/ sessions can also offer training in advanced digital tools and methods, empowering teachers to create and implement digital content. Training on resource creation can also be provided if needed to help teachers develop custom materials to address specific learning objectives. This includes guidance on content creation and lesson planning.

e. Teachers should be encouraged to share successful resource usage practices and materials with their peers, creating a collaborative environment where effective teaching methods are exchanged and refined. This can foster a culture of continuous improvement.

7. **Support required by teachers**

   Apart from the recommendations provided above, additional support to teachers can be provided through:

   a. Creating, sharing, and helping implement hands-on activities, fostering an interactive and engaging classroom environment.
   b. Providing alternatives to hands-on science education in the absence of well-equipped science labs (such as simulations) or guidance on conducting experiments with limited resources.
   c. Given that some teachers are unsure about their specific requirements, the program should include an individualised assessment component. Teachers can identify their unique needs, and the program can provide tailored guidance and resources accordingly.
   d. Facilitating collaborative platforms where educators can exchange successful strategies and materials for teaching challenging topics, fostering continuous improvement and mutual support.

Academic support persons (CRPs / BRPs / DIET faculty) also need to be made familiar with concepts and practices relating to equitable education including UDL principles, and digital technologies to access resources so that they can provide the necessary support to teachers in using and integrating technology in their classrooms for equitable education. The team suggests that regular workshops be planned and conducted for the same as well.

Larger systemic reflections

1. The current configuration of providing teachers based on the number of students in the school results in teachers having to teach many subjects which would normally be considered unreasonable. This can affect the quality of teaching as it is difficult for one teacher to have expertise in too many subjects.

2. Lack of provision for security, administration support to HPS adds to the teachers' workload
3. Teachers are required to enter data into IT systems which have no direct benefit for them. This needs a careful study by educators to assess if there are alternatives that can allow more 'time to (teaching) task'
4. Current Assessment systems (largely based on written examinations) force a culture where rote memorization is seen as the best approach, this compromises both learning and desire for learning in students.
5. Current parent engagement tends to be ritualistic in the urban context, where parents are unable to collaborate with teachers to strengthen the school.

Annexure

1. The findings from the Needs Assessment Survey questionnaire can be found here.
2. The study tools can be found here:
    a. Focus group discussion questions
    b. Direct Interview questions
    c. Survey questionnaire