TEACHING WITH TECHNOLOGY

Early EdTech Adoption by Indian School Teachers
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INTRODUCTION

The integration of technology in education holds promise in bridging learning achievement gaps by increasing access to high-quality content for students and teachers. As the development and adoption of Education Technology (EdTech) in India grows, we aim to research and understand the gaps and opportunities, and share insights with key stakeholders in the ecosystem.

Over the course of the last three years, we met with several civil society and government organisations, private companies and schools to understand the EdTech landscape. Synthesising that knowledge, we have published a report, *The EdTech Promise: Catalysing Quality School Education at Scale*, which analyses the progress made by both public and private sectors in the Education Technology (EdTech) ecosystem. We have also published the *CSF EdTech Map*, a dynamic and interactive online map that captures profiles of existing players.

In light of the centrality of teachers to improving education and the paucity of research on their use of technology, we conducted a survey on early EdTech adoption by Indian school teachers. The purpose of this research is to understand the current availability, usage, adoption drivers and challenges of EdTech among the teacher community. This paper
presents the results of that survey, and makes recommendations for how policymakers and other stakeholders can support teachers in technology integration.

1.1. Survey Objectives

Policymakers are increasingly placing emphasis on making technology widely accessible in schools, and teachers’ and students’ independent access to technology is growing as well. To understand teachers’ use of technology in the context of these trends, this survey focuses on ‘early adopters of technology’. These early adopters include networks operating at the frontier of education technology integration in India, wherein teachers have been afforded greater access to digital devices and may also have received some training to supplement technology use.

Our primary objective was to gauge teacher usage, perception and challenges in a scenario where technology is readily available. As such, our sample is not representative of the status quo; rather it provides insights for where we think the ecosystem is headed as EdTech is improving and becoming more affordable and accessible.

The survey aimed to answer the following broad questions:

- **Availability**: What is the availability of infrastructure and resources with the teachers?
- **Usage**: How are teachers making use of technology in the classroom?
- **Perceptions**: What are the perceived benefits of EdTech amongst teachers?
- **Challenges and Drivers**: What are the current limitations to technology usage in the classroom and how can they be overcome according to teachers?

We launched the survey with over 1,500 teachers in the networks of civil society organisations and school systems described above. The Methodology section outlines the profile of the teacher participants in greater detail.

1.2. Key Takeaways

Amongst the early adopters surveyed, access to technology was reported high, with computers and mobile phones being the most widely available devices, at 94% and 86% respectively. There remains, however, significant potential to leverage existing digital devices available in schools. The key trends that emerged are:

**Teachers’ willingness to learn and use technology is high**: 70% of untrained teachers indicated their need for ICT training. This number was even higher amongst those teachers who had already received ICT training of some sort (80%). Teachers who perceive technology positively were also found to be more likely to make use of technology in various ways on a weekly basis. An average of 93% of teachers who agree that technology aids them reported regularly using technology for lesson planning, communication, sharing best practices and data tracking purposes.

**ICT training of teachers is a critical gap**: Allocating resources to ICT infrastructure without complementary teacher professional development is ineffective. Usage of available
technology, awareness of the various uses of technology, as well as attitudes towards technology utility is higher among teachers trained with ICT. 88% of trained teachers reported making use of available computers as compared to 53% of untrained teachers. Trained teachers were found to be nearly twice as likely to report using technology for communication purposes and for online forum participation.

**Teachers’ understanding of uses of technology remains limited leading to under-utilised technology infrastructure:** While 83% of teachers reported using computers, this reported use is limited primarily to purposes of audio/visual display or student practice. Usage falls significantly for those purposes which demand a greater degree of proficiency, effort and motivation such as lesson planning, tracking student learning levels and peer learning through online forums. 70% teachers use technology for audio/video purposes while merely 41% and 27% use technology for tracking student data and participating in forums respectively. This trend is even more pronounced in the low-fee school segment surveyed. This limited understanding of use of technology leads to underutilisation of infrastructure. For instance, 92% and 67% of the teachers who have access to computers and internet respectively have never made use of online forums.

**Tablet penetration is low and smart boards are restricted to high-fee schools:** Our survey finds low penetration of tablets, even amongst the early adopters and high-fee schools, despite prominent efforts to sponsor or subsidise digital tools. Only 14% of teachers surveyed reported access to tablets, with the proportion of government schools being negligible. Devices such as smart boards are reported to be minimally present in no-fee schools (2%) and low-fee schools (7%) while being significantly present in high-fee schools (74%).

**Infrastructure challenges such as poor electricity and hardware deter usage:** Although, reported availability of some technology platforms is high, usage is beset by problems of electricity and maintenance, bringing into question the actual access to functional technology tools. Of those teachers who had access to computers in schools, close to half reported facing electricity and hardware challenges (51% and 45% respectively). These challenges were particularly compounded for schools in rural areas as well as for no-fee and affordable private schools. 54% of teachers in no-fee schools reported electricity challenges as compared to 6% of those in high-fee schools.

### 1.3. Organisation of the Study

The next section outlines our methodology in designing, conducting and analysing the survey and profiles survey participants. The section that follows lays out the findings along the four broad questions described earlier. The study concludes by presenting recommendations based on the survey results.
METHODOLOGY

This section covers information about the three-step procedure of conducting the survey which includes the survey design, data collection, profile of the dataset and data analysis. It also briefly describes the profiles of the survey participants.

2.1. Survey Design

The survey comprised of three main sections:

- **Teacher profile:** Questions on topics such as teachers’ experience level, qualification and class assignment
- **School profile:** Questions on topics such as school fees, total strength of students and teachers and affiliation with the board
- **ICT usage:** Questions designed to gauge access, current usage, perceptions of technology, and challenges and potential drivers in use of technology

After conceptualising and designing the survey, we conducted a pilot survey with 10-15 teachers in two municipal corporation schools (one primary and one secondary) in Delhi and used learning from this pilot to refine the questions and structure of the survey. The survey was then translated into seven Indian languages.

2.2. Data Collection

While collecting data, we approached several education organisations working with teachers, teacher education groups, online teacher forums and schools. These organisations can be classified into following sets:

- Teacher training organisations which train teachers in the use of technology or train teachers already using technology. For example, American India Foundation (AIF) trains teachers in use of technology through its Digital Equalizer programme, and Google Educators Group and Beyond Teaching facilitate online learning groups of teachers.
- Teacher training organisations which use limited component of technology in/for their trainings, for example, Hemendra Kothari Foundation, STiR
- Organisations which do not directly work with but have access to a network of in-service teachers from government and the low-fee private school segment, for example, Teach For India
- Other networks of schools including Bharti Schools, NIIT, Akanksha Foundation, and high-fee schools
Through these partner organisations, the survey recorded over 1,500 responses (both online and offline responses) over a period of three months. The offline responses were entered online by the partner organisations or volunteers.

2.3. Profile of the Dataset

The participants of the survey can be categorised based on their location (rural or urban), fee range of the school where they teach, exposure to training in ICT, medium of instruction, teaching experience and the classes they teach (primary or secondary). The following charts depict the number of participants based on the above mentioned categories.

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**Chart 1: Location**

- 37% Rural
- 63% Urban

**Chart 2: Fee range of the schools**

- 71% No-fee schools: Schools charging no fee from students
- 14% Low-fee schools: Schools charging fee in the range of Rs. 0 - 12,000 per annum
- 9% Middle-fee schools: Schools charging fee in the range of Rs. 12,000 - 40,000 per annum
- 6% High-fee schools: Schools charging fee more than Rs. 40,000 per annum

**Chart 3: Training**

- 68% Trained Teachers
- 16% Self-Trained Teachers
- 16% Untrained Teachers

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1 The no-fee schools comprise of mainly government schools and some NGO-funded schools. The low-fee range schools have also been referred to as affordable private schools (APS) in this study.
This includes any ICT training that the teachers may have received through government or NGOs.

The duration of training received by these teachers ranges from less than half a day to more than a week.

Our findings also revealed that a small percentage of teachers reported to be self-trained, i.e., to have taught themselves to use technology. The survey did not explore the extent to which these teachers had to use technology.

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**Chart 4: Medium of instruction**

- English: 397
- Hindi: 217
- Regional: 406

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**Chart 5: Teaching experience**

- 0-10 years: 12%
- 10-20 years: 23%
- 20+ years: 65%

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**Chart 6: Primary and secondary school teachers**

- K-8th (Primary): 955
- 9th-12th (Secondary): 685

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2 There is an overlap in medium of instruction, with some teachers teaching in more than one medium.

3 There is an overlap between grades taught, with some teachers teaching multiple classes across primary and secondary grades.
2.4. Data Analysis

We recorded responses from more than 1,500 teachers. The final sample was filtered to 1,110 teachers, based upon response rates and skewed rural urban split from one organisation. The final sample of 1,110 teachers was used for the data analysis. The breakdown of this sample is detailed in the following section. To understand the main features of our data and interpret some of the trends that emerged, analysis for this study primarily involved descriptive statistical measures.

2.5. Limitations

Findings from the study are necessarily limited by the nature of a survey. Response options may not have captured the universe of possible answers with respect to technology-specific usage, perceptions and challenges. Teacher respondents may also have misinterpreted certain questions and terms, and may have over- or underestimated certain behaviours.

- **Self-reported and self-monitored responses:** We approached several organisations which are working with teachers for conducting the survey. Although, broad process outlines were mentioned in the guidelines, the organisations were asked to self-monitor data collection processes.
- **Effectiveness of use:** While inquiring about the use of technology, the questions focused on the types of devices used by teachers and the nature of this use. The survey did not delve into the effectiveness of this technology use.
- **Training:** While there were specific questions on the provision and duration of ICT training, we did not explore details about the nature and provider of this training and its usefulness.
ANALYSIS

We analysed results from the survey along the following factors:

- **Access to technology**: Type of technology platforms available in classrooms and schools
- **Usage of technology**: Technology usage trends indicated by teachers in terms of how frequently and for what purposes they make use of technology tools
- **Perceptions of technology utility**: Teachers’ views on the value of education technology in their classrooms
- **Challenges and drivers to using technology**: Key bottlenecks teachers encounter to the adoption of technology in classrooms and factors that encourage use of technology

3.1. Access to Technology

The first objective of the survey was to understand technology access amongst these early adopters. To that end, we analysed reported availability of different digital devices (see Chart 7) as well as any evident gaps between access to technology tools, as reported, and actual usage (see Box 1).

This section further analyses technology access reported by teachers in terms of:

- **School location**: the penetration of digital devices in schools in rural and urban localities
- **School type**: the extent to which technology availability differs across fee types of schools, i.e. from government schools to high-fee range schools

3.1.1. Access to Technology by School Location

Our findings reveal the extent to which technology devices, notably computers, mobile phones and educational software, are beginning to permeate teaching activities across urban and rural schools in India (see Table 7).

Computers and internet are the most widely used digital tools among these early adopters. Over 80% of all teachers surveyed said they make use of computers in their schools.\(^4\)

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\(^4\) In this regard, it may be important to reiterate that the survey covered early adopters of instructional technology for teaching and learning. To contextualise these findings, DISE 2013-14 revealed that only 23.3% of all schools have access to computers, SEMIS 2013-14 indicating 60.58% of secondary schools have access to computers with 32.59% of secondary schools having computers and internet.
Teachers also report high usage of mobile phones with 68% of teachers having access to and using mobile phones. This presents opportunities for on-demand access to learning resources and allows for collaboration with peers and teacher educators, planning lessons and sharing classroom practices.

Smart boards, tablets and TVs still represent under-penetrated digital devices in schools. In particular, only 12% of all teachers surveyed report having access to tablets. Further analysis below reveals that these are predominantly high-fee school teachers in urban areas.

Chart 7: Access to technology by school location

5 With respect to our rural availability numbers, ~87% of our rural sample is from AIF's Digital Equalizer programme.
Operational Use – Access to Functional Computers

While access among teachers surveyed is high, particularly that to computers and internet, a closer look at this reported availability and usage highlights the clear gaps in ICT implementation.

Of all the teachers who reported having access to and using computers, nearly three-fourth reported facing both electricity and hardware challenges, bringing into question the actual efficacy of this reported use. This trend is particularly striking among teachers in rural areas – with only 12% of those teachers who report using technology not facing any electricity and hardware challenges.

<table>
<thead>
<tr>
<th></th>
<th>Rural</th>
<th>Urban</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reported access to computers</td>
<td>96%</td>
<td>92%</td>
<td>94%</td>
</tr>
<tr>
<td>Access to functional computers (no electricity or hardware challenges reported)</td>
<td>11%</td>
<td>34%</td>
<td>25%</td>
</tr>
</tbody>
</table>

These challenges are analysed in further detail in the following sections (see Section 4.4 - Challenges and Drivers to using technology).

3.1.2. Access to Technology by School Type

Studies in varied contexts emphasise the digital divide that emerges across fee levels of schools. Teachers in low-fee schools tend to face greater challenges in terms of access to devices, effective use of education technology and support for incorporating technology into their teaching.6 Our survey analysis also revealed comparable trends in terms of reach, type of usage and problems in adoption (see Chart 8).

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Despite focusing on early education technology adopters, we observed a significant gap in technology access between government and affordable private schools, and middle and high-fee schools.

While reported smart board availability in the government and APS segment is minimal (at 12% and 7% respectively), this increases to 74% of teachers surveyed in high-fee schools.

Moreover, less than 10% of government school teachers reported having access to tablets, despite increased emphasis on affordable digital learning through tablets. An average gap of 22% is observed between tablet and internet usage in high-fee schools as compared to government schools.

### 3.2. Usage of Technology

Through this survey, we analysed what teachers meant by ‘technology usage’, i.e., how frequently and for what purposes teachers appear to use technology in their classrooms. This section analyses types of technology usage as reported by teachers primarily in terms of:

- **Purpose and frequency of usage**: the purposes for which teachers use technology and frequency
- **Unused ICT infrastructure**: the manner in which available technology infrastructure remains underutilised in schools
- **Teacher training**: the variations in types of technology usage reported by teachers who are either untrained, self-trained or trained in ICT
- **School type**: the extent to which technology usage differs across fee types of schools, i.e. from no-fee schools to high-fee range schools

#### 3.2.1. Purpose and Frequency of Technology Usage

The survey measured the following purposes of technology usage:

- **Student engagement**: showing audio-video lessons to students, getting students to practice on computer/tablet
- **Planning and assessment**: preparing lessons including assessments, conducting/grading assessments, tracking student learning data
- **Communication and professional development**: communicating with others (e.g., using email), participating in online teacher forums and other forms of professional learning opportunities

The data reveals clear patterns in computer usage (see table 1 and chart 9). Of teachers who report using computers, usage is noticeably more for audio-visual purpose and student practice. Usage of computers falls significantly for purposes that require greater technical proficiency such as grading assessments and tracking data.

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While 70% of teachers reported using digital devices for audio and video in the classroom, only 37% teachers reported tracking student data. Additionally, teacher use of learning platforms such as online forums remains low, with merely 23% teachers indicating participation in forums.

### Table 1: Reported technology use by purpose of usage

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Reported teacher usage on a weekly basis</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Student Engagement</strong></td>
<td>Audio/Video 70%</td>
</tr>
<tr>
<td></td>
<td>Student Practice 58%</td>
</tr>
<tr>
<td><strong>Planning and Assessment</strong></td>
<td>Lesson Planning 40%</td>
</tr>
<tr>
<td></td>
<td>Grading Assessments 36%</td>
</tr>
<tr>
<td></td>
<td>Tracking Student Data 37%</td>
</tr>
<tr>
<td><strong>Communication and Professional Development</strong></td>
<td>Communication Purposes 52%</td>
</tr>
<tr>
<td></td>
<td>Participating in Forums 22%</td>
</tr>
</tbody>
</table>

### Chart 9: Frequency of technology usage

*Never*, *Monthly*, *Weekly*

Unused ICT Infrastructure

Schools’ implementation of technology has focused primarily on developing infrastructure. However, practices comprising of investing in hardware, wiring schools and distributing these devices rarely result in effective use by teachers and improved teaching and learning. Our survey finds that despite moderately high access to digital devices, a large

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8 Survey of ICTs for Education in India and South Asia (infoDev/PwC, 2010).
proportion of teachers underutilise them (see Chart 10). The absence of consistent support and training appears to lead to a substantial proportion of idle infrastructure.

More than 8 in 10 teachers report never using technology for student practice despite having access to computer labs and computers in their schools. Similarly, of those teachers who have never used technology to participate in online forums, more than 90% have access to computers and 67% have internet access.

### Unused ICT Infrastructure

- Of those who report never using technology for lesson planning, 87% have access to computers and 55% have internet access.
- Of those who report never using technology for audio-video purposes, 47% have access to TVs, 53% have access to projectors, 82% have access to computers.
- Of those who report never using technology for student practice, 88% have computer labs in their schools, 86% have access to computers, 60% have access to internet.
- Of those who report never using technology for communication purposes, 55% have internet access, 79% have mobile phones.
- Of those who report never using technology for participating in online forums, 92% have access to computers and 67% have internet access.

As access to technology grows, there is significant need to support teachers to use technology effectively. Successful implementation requires not only procurement and provision of hardware, but also adequate training and support. Our data shows that training does appear to address issues of unused infrastructure. The proportion of teachers who report not using computers despite having access drops by 22.7% when trained.

### 3.2.2. Usage of Technology by Teacher Training

The success of any ICT initiative depends upon effective teacher and principal training programmes in the application of this technology. Data from the survey suggests a need to reconsider the practice of providing technology without training teachers to effectively use these tools in their classrooms. There is an average gap of nearly 31 percentage points between trained and untrained teachers in terms of reported computer and internet usage (see Chart 10).
A notable learning emerging from these findings is that a small proportion of teachers do appear to be making use of digital devices in their classrooms or schools despite not having formal training. The average usage of technology among untrained teachers for different purposes is around 32%. It must be noted, however, that the efficacy of this use is uncertain. Moreover, over 60% of these untrained teachers report having access to an ICT teacher in their schools – this may have been a factor behind their reported usage.
3.2.3. Usage of Technology by School Type

The degree of technology usage also shows significant variation across the types of schools surveyed.

![Chart 12: Purpose of technology usage by school type](image)

Teachers in high-fee schools were nearly twice as likely to report making use of technology tools to plan lessons and communicate with others as compared to a teacher in a government school (see Chart 12). Technology use for purposes of creating assessments, tracking student data and lesson planning are predominantly reported by teachers from middle and high-fee schools and NGO networks.

3.3. Perceptions of Technology Utility

An important component of the survey was to discern teacher attitudes towards EdTech. This comprised of:

- Awareness among teachers of technology utility
- Belief among teachers of the value of technology in the classroom

Our findings provide a comprehensive view of teacher interests and attitudes towards integrating devices, software and tools into their classroom practices. They also provide a stronger sense of teachers’ requirements to effectively integrate technology in their classrooms.

Teachers’ awareness of the value of technology contributes to successful classroom technology practices. The proportion of teachers aware of the various uses of technology tools varied by training received.
Teacher perceptions on the utility of technology – for engaging students, improving content knowledge, tracking student learning, communication, peer learning – were higher among trained teachers. As seen in chart 13, in terms of these perceptions, there is an average increase of 13% amongst teachers who had received some form of ICT training as compared to those who were untrained.

Teachers who perceive technology positively were also more likely to report making use of technology in various ways on a weekly basis. An average of 93% of teachers who agree that technology aids them in various ways regularly use technology for lesson planning, communication, sharing best practices and data tracking purposes.

### 3.4. Challenges and Drivers to Using Technology

Teachers identified their biggest challenges to adopting technology as hardware and electricity problems, training, and issues of inadequate time due to additional responsibilities and the extent of curriculum to be covered.
3.4.1. Infrastructural Challenges

Hardware and electricity were seen as the top two barriers to incorporating technology. While reported availability of technology platforms is high, usage is plagued by problems of electricity and maintenance. Of those teachers who had access to computers in schools, close to half reported facing electricity and hardware challenges (51% and 45% respectively). Yet, nearly 90% of teachers who indicate that electricity and hardware problems indicate that better access to internet would help them use technology more effectively.

3.4.1.1. Infrastructural challenges by school location

These challenges of infrastructure were significantly more pronounced in rural areas. As seen below, despite almost equal levels of access, teachers in rural schools were twice as likely to face such challenges as compared to teachers in urban schools.

![Chart 14: Infrastructural challenges by location](image)

3.4.1.2. Infrastructural challenges by school type

There was a marked difference observed in infrastructural challenges faced across school types. Our survey responses revealed that a teacher in a government or affordable private school was nearly nine times as likely to report challenges in accessing electricity as compared to a high-fee school teacher. Similarly, hardware challenges were more than four times likely to be reported by government/APS teachers than high-fee school teachers.
### 3.4.2. Lack of Digital Literacy

Teachers did not widely report the inability to operate a computer or the internet as an inhibiting factor in using it. However, digital illiteracy did appear to vary across school types with a gap of 14% between government school teachers and high-fee school teachers facing this challenge.

More than two-thirds (70%) of untrained teachers expressed that receiving ICT training would enable them to adopt technology. This number was even higher among those teachers who had already received ICT training of some sort (80%).

### 3.4.3. Insufficient Time and Content

Teachers reported constraints on their time as a significant deterrent to their use of ICT. The major constraints included non-teaching responsibilities as well as pressure to complete textbook curriculum.

60% of all teachers indicated challenges of time due to other responsibilities and 48% due to the need to cover textbook syllabus. This challenge was reported irrespective of any ICT training a teacher may have received. However, nearly half the teachers surveyed in government schools reported this challenge as compared to less than 20% of teachers surveyed in high-fee schools, reiterating the importance of a school culture that promotes effective ICT usage.

Interestingly, more than 75% of teachers who found pressure to complete textbook syllabus a barrier to adopting technology indicated that increased availability of curriculum-aligned resources would enable them to use technology more. Additionally, 83% of teachers surveyed in vernacular medium schools asked for increased availability of resources in the vernacular medium.
The increased policy emphasis on technology as well as expansion in access to infrastructure has created an enabling ICT environment. Awareness of the potential of education technology and technology adoption are also on the rise.

However, several factors need to be addressed for ICT to be leveraged most effectively within classrooms and schools. Our findings generate a set of recommendations that view successful teacher adoption of technology across three complementary parameters:

- **Infrastructure**: Leverage available infrastructure and ensure better access for resource-constrained environments
- **Teacher training**: Build teacher capacity to utilise education technology, both at pre-service and in-service levels
- **Resources**: Contextualise teacher and student resources to serve the Indian school education segment
4.1. Infrastructure

With the government encouraging the use of digital technology, access to technology is growing. Our findings, however, emphasise the need to address issues of poor connectivity, technical challenges and upkeep. Nearly half of the teachers surveyed have reported lack of hardware and electricity as major challenges in using technology (45% and 50% respectively), indicating that capacity to effectively procure, deploy and maintain infrastructure remains limited.

In this context, developing offline models (by offering content on USB drives, SD cards or CD roms) would allow entrepreneurs to overcome the current barrier of limited internet accessibility and reach a much larger number of students and teachers.

Also, while wear and tear of hardware components is inevitable, we should look at new low maintenance and more durable hardware products. For instance, school servers instead of Wi-Fi connections, tablets/laptops in place of desktops.

Furthermore, our data reveals the extent to which mobile phones have penetrated device usage (at 86%). This increasing mobile infrastructure offers the opportunity of anytime anywhere access for teachers, allowing them to build pedagogical skills and connect with peers. Entrepreneurs can create mobile-based resources which will be easy for teachers to access and use. Mobiles can also catalyse online groups and forums where teachers can share ideas and resources and contribute to each other’s professional development.

This growing computer, mobile and internet access will also allow online forums to be catalysed as a tool for teacher professional dialogue and peer learning. Online forums afford a great number of possibilities and can be used both for learning resources and a medium for learning. Such platforms offer teachers opportunities for continuing professional development (CPD) through sharing personal experiences, resources and positive feedback, and promoting collaborative knowledge.

4.2. Teacher Training

Given high positive perception of teachers towards technology usage, providing targeted training to teachers is critical for optimal usage of the existing infrastructure. Teacher training, through sustained technical as well as pedagogical support, needs to be the foundation of any investment in education technology. Results from our survey illustrate this need to shift focus from ICT skills alone towards the effective integration of technology in classrooms.

4.2.1. Pre-Service

The current pre-service curriculum offers a very small, often optional, element of ICT training. A minimal percentage of teachers (0.45%) reported learning about ICT in education during their pre-service training. The pre-service teacher training should be considered a platform to increase digital literacy among teachers and further train them in integrating ICT into teaching. Such training must not only address basic digital literacy
for operating different devices, but also the needs of their own subject teaching in terms of pedagogical applications for teaching in a technology-mediated multi-modal environment.

4.2.2. In-Service

The extent to which teachers surveyed incorporate digital technologies into classroom pedagogy shows significant variation based on the training received. Computer usage, for instance, goes up by an average of 26% among trained teachers. The adoption of technology by teachers is also seen to be associated with the duration of training received.

Most existing training programmes have focused on providing digital literacy—for instance, operation of devices or software—rather than on pedagogical applications. A large number of teachers have not received training in integration of technology in classroom practice. Creating a personalised training framework would enable teachers to receive training based on what they already know and what they need to know.

A revealing trend in our survey responses was the limited use of technology for more advanced, digitally-enhanced possibilities in the classroom. More than 70% teachers reported using technology for audio-video purposes while only 39% reported using technology for grading assessments and tracking student data. Provision of infrastructure must complement training teachers to integrate technology in classroom delivery and use it to improve learning outcomes. Furthermore, only imparting technical skills in the use of technology is insufficient. Along with becoming proficient in the use of computers, teachers must also be provided professional development with respect to the instructional application of such skills.

4.3. Development and Provision of Contextualised Resources

Even though the education technology market in India is expanding, our findings reveal a number of areas where resources are not meeting practitioners’ needs. Teachers expressed particular need for high-quality contextualised products, i.e. curriculum-aligned resources in the vernacular medium. Access can be increased by providing open educational resources that can be repurposed in different language and curriculum contexts and made available free or at a low cost. There is, in fact, growing evidence that ICT uses appropriate to local needs and in local languages can make significant contributions to education in less developed countries.9

48% of teachers who do not currently use technology indicate challenges of time constraints due to pressure of completing textbook curriculum. 79% of these teachers who reported pressure to complete the textbook syllabus indicated that increased availability of curriculum-aligned digital resources would enable them to use technology more. The creation of resources that are aligned to grade-level content standards would allow teachers to use technology more effectively.

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Additionally, more than 80% of teachers in vernacular medium schools indicated that access to regional resources language would enable them to adopt technology in their classrooms. The majority of available technology products currently cater to students in private, unaided, English-medium schools. There is a clear need for producing and translating quality content in vernacular languages to address these large gaps in available learning products.

Moreover, 60% of teachers reported a lack of time as well as the burden of extra responsibilities as obstacles to using technology. At the same time, only a few number of teachers use technology for assessments and tracking data. Teachers have to spend a lot of time grading assessments and tracking student learning data (for example, filling in registers for Continuous and Comprehensive Evaluation). In such scenarios, creating easy-to-use software, which can help teachers in conducting, grading and analysing assessments would be ideal.

4.4. Further Research

This study sought to understand education technology in India in terms of access-related indicators and issues pertaining to the frequency and purpose of technology usage. Going forward, research on the nature of this use and questions related to quality and effectiveness will be highly relevant. While there is a significant evidence base on the impact of education technology in higher-income countries, there are few efforts explicitly designed to be relevant to developing country contexts.10

As technology platforms in India become widely available, further research and development efforts should focus on evaluating the effectiveness of such use, in terms of how teachers use and integrate technology in classrooms and for their own professional development as well as gaps in existing training and support structures.

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Central Square Foundation (CSF) is a venture philanthropy fund and policy think tank focused on improving quality of school education and learning outcomes of children from low-income communities in India. Our work involves supporting social entrepreneurs, building networks towards common education goals and developing insights for informing public policy.

In specific, we support initiatives in four areas-

- Governance
- Educators
- School Systems
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