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Education Technology in Schools: Locating the Teacher in the Changing Landscape Of Teaching-Learning: A Study In Secondary Schools

Abstract:

Education technology (ed-tech) is globally transforming the way in which school education is being envisaged. With the advent of globalisation and the infiltration of technology and communications, a fast-growing concept of education technology has gained momentum in academic pursuits, whether in school or higher education or for skill-based learning or preparation for competitive exams. It needs to be noted that one of the key players who would need to adapt to this changing environment is the teachers, who primarily form the link between the curriculum and content and the students. Thus, this paper is trying to understand how the teacher is involved in this construction of new-age teaching-learning processes and how their work and interactions with students are faced with changes due to the advent of ed-tech.

Keywords: Education technology, Globalisation, Knowledge Co-creation, Teacher Training

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About the study

This paper is based on data gathered from different government schools and teachers in New Delhi using multilevel cluster sampling. It is basically an explorative qualitative study. This paper addresses the following research questions –

- What is the involvement of the teachers in terms of decision-making regarding education technology, its uses and applications in their work?
- What is the preparedness of teachers in handling the changes that are brought about by the introduction of education technology?
- is the perception of the teachers regarding the need and use of education technology for classroom processes

The study has been confined to the government schools in Delhi, i.e., the schools that administratively fall under the Delhi Directorate of Education. The universe of study, is therefore, the secondary school teachers of the 1027 government schools, spread across the 13 educational districts and 29 zones. Out of these, 6 districts were sampled - North, East, West, South, Southeast and Central, to ensure geographical diversity of data. At the district level, 2 schools were taken at random and within each school, an attempt was made to interview at least one teacher pertaining to each subject, considering that the use of technology in different subjects will be different.

Sample taken for the study		
District	Number of schools	Number of teachers
North	2	14
East	2	13
West	2	13
South	2	11
Southeast	2	11
Central	2	12
Total	12	74

Table 1: Sample taken for the study

The collection of primary data was mainly through personal interviews where semi-structured open-ended questions formed the question schedule and informal conversations with those who were unwilling to give interviews. FGDs, classroom observations, visit to computer labs, stock taking of the available resources and infrastructure related to education technology were also done. The secondary data has been sourced from the various reports and project documents provided online by the Directorate of Education, SCERT and MHRD

Findings and analysis

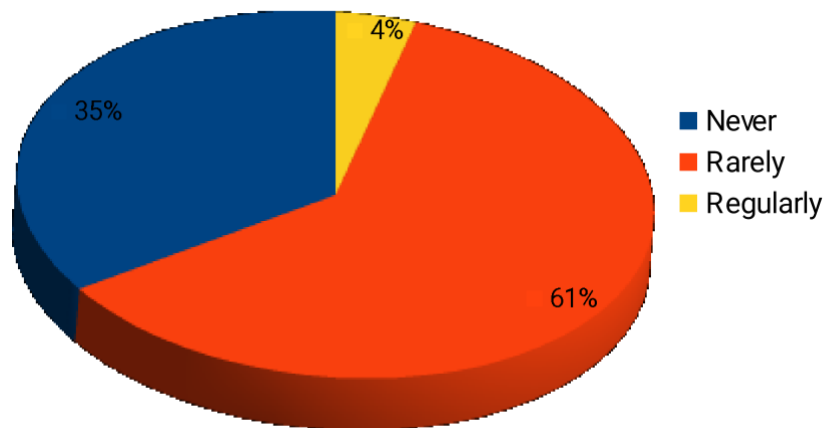
In this study, importance has been given to the narratives of the teachers and the sample that has been taken is to demonstrate the diversity of existing issues. The following are the prominent themes that emerged:

1. Usage of and perceptions regarding education technology
2. Teacher Training
3. Infrastructure vs school demographics; and
4. Work environment and workload

Usage and perceptions regarding education technology

Frequency of usage

Most of these teachers who have not used any ed-tech were language teachers (English, Hindi, Sanskrit, Urdu) though not limited to them. The propensity to use technology was seen more in the districts of Central, West and South. due to infrastructure and demography, explained in the subsequent sections. The category of teachers "Rarely" using any IT tools is generally under special circumstances like revision before the exams, or before starting a new concept. Only 4% of the teachers claimed to regularly use technology and be invested in teaching through ICT.



Teacher perceptions about education technology

All teachers are not equally inclined to use technology freely in their workspaces. While gadgets like laptops and personal computers are commonplace, especially smartphones, not everyone is keen to understand how a particular gadget can be used in multiple ways or can be used to teach. From this study, it cannot be said if the age or gender of the teacher was a marker to explain the perceptions towards educational technology.

The decision to introduce education technology and the manner in which it came to the teachers was by a top-down method. Ed-tech came to schools through government circulars– which are more of instructions that need to be followed. Hence, the ownership of teachers to invest themselves in education technology also gets affected.

It was found that most of the teachers perceived that the use of IT in classrooms was about using multimedia to explain particular difficult topics that would need visual aids. However, Science teachers were very clear that ICT cannot provide for the learning that is attained through hands-on practical work in science laboratories. History and English teachers used videos that summarized the plots and progression of stories, to reduce the chapter to the basic facts and quickly commit them to the memory of the students.

No concrete evidence was found with regard to the use of ICT in the manner that it is being used currently, translated into tangible learning outcomes or improved results. Very few teachers saw ICT as a part of constructivist pedagogy, something to be engaged in for a long term on a regular basis, something that would

facilitate co-creation of knowledge and thereby having an inherent multi-faceted learning component. The understanding of the teachers regarding technology is fairly narrow. It stems from many reasons as discussed ahead.

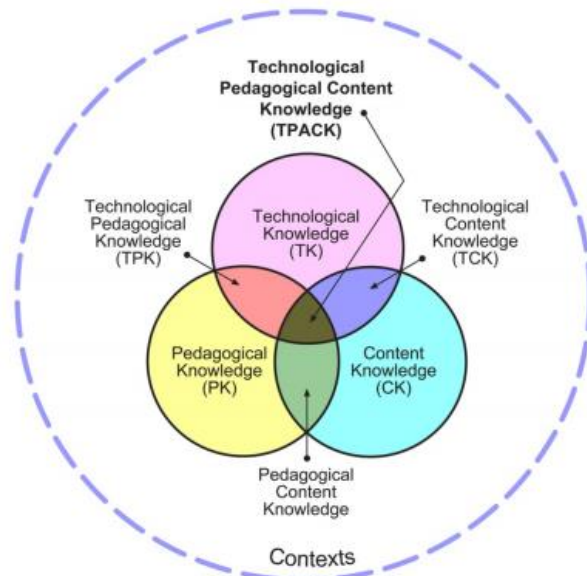
Teacher Training: Pre-Service and In-Service

Pre-service teacher training

The basic qualification required for government school teachers at a secondary level is B.Ed or Bachelors in Education. This course equips student-teachers with concepts of pedagogy, child psychology, teaching methods etc. Most of the teachers felt that the pre-service training only introduced the idea of ICT but did not really equip them to use it in the teaching-learning processes, i.e., how technology can be infused into teaching specific concepts in their subject area, or to build their own teaching styles. The notion that, if student-teachers are "computer savvy" or "mobile-friendly", it would automatically translate into teachers using education technology in classrooms just with this limited training on ICT, is ill-founded.

In-service teacher training

This mainly is aimed to update the skills of existing teachers to perform better, align with changing policies or standards of education. The SCERT organises various compulsory and voluntary professional development in the form of courses/seminars/workshops for the benefit of the government schoolteachers. It was found that there was widespread dissatisfaction as they never introduced teaching methodologies with the use of technology, as reported by teachers across 6 districts unanimously.



In late 2018, the Directorate of Education passed a circular that directed the government schools to hold in-house 10 hours training in basic technology for the teachers. The newly recruited computer teachers were facilitating the process and the training consisted of basic computer literacy. However, the training was not for capacitating them for classroom teaching processes, but more for the plethora of administrative work that all government teachers were required to do. Most of the teachers were therefore left to their own capacities and initiatives to use or not use ed-tech, depending on the availability of infrastructure and feasibility of using them.

Shulman's PCK or Pedagogical Content Knowledge is a concept, which is the ability to have command over content as well as the processes that are required to teach effectively. It is an ability that is central to teachers and will not be held by either non-teaching subject experts or teachers of low content knowledge of the subject. The TPACK model adds another realm of technology to PCK – meaning that teaching effectively with technology will require Technological Content Knowledge (TCK) and Technological Pedagogical Knowledge (TPK) – that is, the understanding of technology and how it works as well as the knowledge of how that technology can be used in the teaching-learning processes.

From the interviews, it has emerged that the TCK part has been partially attempted to be fulfilled, but it does not help the cause of the teachers within the classroom if it is not coupled with TPK. Most of the teachers interested in technology found themselves inadequate at knowing exactly what to do with technology and wanted that they be given specific training in their own subject area.

The in-service training courses seem to follow a very top-down method with no feedback or opinion sought from the teachers. If trainings are one-time events sans a programme of follow-up and the scheme of things are "one size fits all", it can hinder a well-intended training from delivering adequate results. Also, providing definitive goals for a training programme helps in giving direction and perspective to the participants, otherwise, it is reduced to a formality that is to be done in the line of work.

Infrastructure vs Demographics

The intention of the study was to capture the infrastructure directly related to the use of technology in the schools. However, the general infrastructure and the demographics of the school were also highly interrelated if one has to analyse the technological infrastructure and its implication.

Amenities vs students

To elucidate the above, there are several such intersectionalities that emerged that can be quoted. One school in SE district was found to have an extremely large number of students and average class strength is 80, highest being 110 in a single class. The total strength was 5000. On the other hand, let us take another school from the Central district, where the average class size was 25-30, and total population under 300. Both schools were found to have one computer laboratory each, with 10 terminals, slow internet, limited RAM and one projector. Smartboards were not available in either of the schools. Teachers in the two schools had extremely different problems even with similar technological infrastructure, due to the imbalance between demographics and infrastructure – number of students vs available computer terminals or laboratories.

The infrastructure in all the government schools visited is extremely limited, keeping in mind the student population of the school. While the South, Central and West districts seem to have average class sizes and total population, districts of SE and North that were visited had a very high population. The PTR is extremely high, in one of the schools it went up to 80 students in a classroom.

Technological Tools

The Directorate has introduced new equipment called the K-Yan or Knowledge Yan, developed in collaboration with the Indian Institute of Technology (IIT), Mumbai, as a Community Computer. It is effectively a digital multimedia device that was designed in 2004, commercialised in 2007, and has been a recipient of various

awards nationally and internationally as a technological innovation in education. K-Yan has been introduced into schools in various other states in the East and North-East with encouraging results, especially in remote areas. The device contains a computer with an inbuilt projector, content, speakers, and has a wireless keyboard and mouse. It combines the computing power of a computer with an appropriate high luminosity, high resolution, and large screen projection system. This portable device contains interactive material on various subjects pertaining to KG right up to the 12th standard. K-Yan has shown very good results in the hilly states and the Eastern states in the last few years, as it does not require internet or any other hardware and is highly mobile. One only needs to arrange for a flat surface to project the material.

However, it does not cater to all subjects and not all topics in each subject, and more importantly, has not been provided to all schools in Delhi yet. Amongst the schools that were visited, in two schools, they had arrived recently. In one school, teachers were already using it and are competing against each for the time to use it, in the other school most of the teachers did not even know about the new equipment. In schools, where the K-Yan has not reached, the teachers have no knowledge of this technology. Mathematics, Science and English teachers used the K-Yan extensively and claimed to derive better responses from the students. However, even those teachers posed the requirement of more than one K-Yan since simultaneous classes were not possible with only one K-Yan, limiting its use to one teacher at a time, the way in which the projector is being used in the lab.

Work environment and workload

The teachers have to work under a lot of constraints. Most of the staff rooms are ill-equipped for rest or work. Many staff rooms did not have drinking water facilities provided by the school. There are no computers available for the teachers use, nor the time to complete their teaching and other numerous administrative duties, and therefore did not additionally seek to use technology for classrooms. To many, it was a burden, especially with the compulsory use of tablets for the teachers.

Use of technology

The circulars from the government directed the teachers to purchase a tablet in a stipulated budget reimbursed by the government but did not concretely lay down the objectives. In February 2019, circulars directed that the teachers download the DOE application, on which the attendance of the students got collated at the state level daily. However, many of the teachers complained that the application had several glitches and coupled with bad internet connectivity within the old buildings, uploading attendance each day was a time taking process. On top of that, this was not a paperless exercise, as the daily registers were to be maintained as well. In fact, all documentation work, related to subsidies, scholarships, receipts, payments, had to be done multiple times by the class teachers and the teachers-in-charge, once at the school documentation computers and several times manually to keep different records like teacher diary, class register, exam registers etc. Thus, technology for even administrative purposes not really benefited the teachers and improved their workload. Also, a tablet cannot be a device for regular classroom teaching without the support of a projector and speaker.

Most of the teachers have various other duties in the school and many of them range into highly clerical work and time-consuming organization, causing anxiety and pressure. In the North and SE districts, where the population of the students is high, teachers reported being stuck in administrative and clerical jobs so much so that they were not able to do justice to their primary job of teaching.

Time and again, it has been voiced that agency needs to be brought back to the teachers. They need to be given decision making powers and not be treated as merely the foot-soldiers to carry out tasks designated by higher authorities. Many of the teachers during the interviews raised how the teaching profession, especially in a government school, has lost prestige and social status. If the work environment doesn't provide for the

minimum support for working with such high-stress levels, then the increased work is bound to wear out the teachers.

Conclusion and Suggestions

Education technology holds immense potential in transforming the way teaching-learning is happening in schools. However, due to the lack of correct balance of infrastructure, systematic workload, teacher awareness and training, the benefits are not being reaped. Digital learning not only helps in stimulating young minds in different ways conducive to comprehension and retention, but also opens up a space for co-creation of knowledge. It greatly upskills the teacher in understanding and delivery of subject-area when they are able to access and use digital technology, to some extent, make them empowered and enriched. From the narratives that emerged from the field, the following suggestions can be made:

- There is an urgent need for a more holistic and long-term planning approach towards teacher training. A blended style of training can be adopted that takes care of content, pedagogy as well as technology, along the lines of TPACK that represents a logical connection between these three elements required for the success of education technology.
- The subject-specific seminars that are already planned periodically should contain sessions on teaching methodologies with the help of technology.
- Some of the teachers who have some background with technology are interested in creating the e-content themselves that can be used by everyone. Such teachers should be identified and encouraged to create in-house content creation teams.
- A network of mentor teachers already exists who are assigned to support the schoolteachers in upgrading their skills in teaching-learning processes. Perhaps the teacher mentors could be trained to be guides for education technology and help teachers build their perspective with regular personal interactions.
- The government needs to have a regular review of the infrastructure that is being provided by them with the context of the school, i.e., location, student population, PTR, level of ICT achieved. There is a genuine need for more computer labs, projectors, stable internet connection and multiple units of devices like K-Yan.
- Some of the teachers said that the process of acquiring or repairing equipment in the schools become cumbersome and extremely delayed as such requests have to follow a bureaucratic line of the protocol. It was suggested that if these processes could be decentralised, and the school could handle these decisions at the school level, there would be higher accountability from the school as well as things would move in time of requirement.
- There is also an urgent need to look into the work environment and workload of the teachers by re-imagining how the administrative work can be carried out effectively in terms of personnel, infrastructure as well as the time and effort put in by the teachers. It is recognised that teachers cannot be freed from all the administrative work, but they should not be reduced to clerks either. Providing basic facilities in the staff rooms like drinking water, chairs, lockers etc will go a long way in making the teachers feel dignified about their work.

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