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Exploring Teacher Agency - Design of ICT and Education programs

Abstract

Teacher agency is an indicator of teacher development, it is also a cause for teacher development. The article aims to explore the role digital technologies can play in strengthening or constraining teacher agency in her practice, specifically in her choice and use of curricular resources in teaching.

An important indicator of teacher agency is the extent to which the teacher decides the curriculum for her teaching. In the 'text book' culture, predominant in Indian education, the teacher is expected to transact the text book and ensure that its contents are able to be reproduced by the students, without refering to it, in the examination, with or without understanding. Teachers are not expected to explore multiple sources of learning materials and configure learning experiences for students.

In the era of digital technologies, this problem is threatening to become worse. Earlier the teacher was expected to transmit the content to students. Now Pre-packaged content is being made available to students directly through digital devices like tablets, or broadcast over the internet. This can further reduce the role and possibilities for the teacher in the teaching-learning processes.

On the other hand, digital technologies can be used to further the agency of the teacher in this respect. Building teachers capacities to explore available open educational resources and use them in a relevant manner can broaden their universe of curricular possibilities. Secondly, becoming member of digital networks can enable teachers to share resources accessed, created or adapted by them, increasing the overall pool of contextual resources. The Subject Teacher Forum program of Karnataka attempted these approaches of integrating digital technologies and provided more opportunities for teachers to access and use varied resources in their teaching.

Whether the design of digital technology programs in education furthers or constrain teacher agency can thus be a useful parameter to assess program design and effectiveness.

1 Learning as Meaning-making

….. The second type of education system ties the teacher to the prescribed textbook. She is given no choice in the organization of curriculum, pacing, and the mode of final assessment. Textbooks are prescribed for each subject, and the teacher is expected to elucidate the text, lesson by lesson in the given order. She must ensure that children are able to write answers to questions based on any lesson in the textbook without seeing the text, for this is what they will have to do in the examination when they face one. The Indian education system is of the second type.

-(p. 452)- Krishna Kumar's (1988) 'Origins of India's "textbook culture".

The National Curriculum Framework, 2005 (NCF) has emphasized the need to move from a learning system based on memorisation of facts, required by the 'text book culture', to one involving active construction of knowledge in the mind of each learner. Such construction requires curricular resources that are appropriate for each learner. Since the learning needs of heterogeneous learners is likely to be diverse, the teacher will need to use a variety of curricular resources; the text book alone will be insufficient.

The National Curriculum Framework for Teacher Education, 2010 (NCFTE) recommends that teachers should engage with, and critically examine curriculum, and not treat knowledge as a 'given', to be accepted without question. The teacher must have the agency to actively explore and chose from a variety of learning resources, based on her judgement about their relevance to diverse learner contexts, to achieve learning objectives.

The article seeks to explore how the design of programs integrating digital technologies[1] in school education can affect teacher agency in terms of teachers' capacities to mediate curriculum in teaching.

2 ICT and Education

There is a lot of hype about ICT transforming education, and it is difficult to distinguish between meaningful use of ICT in education and that which may be trivial or even harmful. Clear identification of educational aims and principles as the basis for ICT program design, is essential for meaningful integration.

The article aims to explore how ICT program design can affect agency in mediating curriculum; this can be seen as a spectrum of possibilities, wherein at one end ICT is used to deliver content directly to students, totally or partially bypassing the teacher, and at the other end, teachers actively determine the design of curriculum. An active role can encourage and even support teachers to integrate ICT in revising their content and pedagogy. Whereas, in the former case, ICT is seen as a 'pipe' which can efficiently transmit content created by 'experts' directly to students in the school.

2.1 ICT as a pipe- 'delivering' Content to the Classroom

One model, becoming increasingly popular in Indian schools, is to provide students with tablets, containing pre-existing content (usually created outside the school by the organization implementing the ICT program, or sourced by this organization from existing web resources). Students are expected to access this content in the classroom, to supplement or complement teachers efforts.

This model seems to assume that the e-content has to be provided to the teacher and that the teacher is unable and or unwilling to create content (or modify available content) for her use; or perhaps, that the time required to prepare the teacher to access, create and adapt content is not worth the investment of time, energies and resources.

It is assumed that the students will directly connect to the e-content in the tablet which is pertaining to the topic taught by the teacher, view the e-content and enrich their learning. Where there is little or no teacher preparation before the digital content is introduced to the classroom, the e-content is unlikely to be a formal part of the teachers' lesson planning. This approach has two limitations:

2.2 Consuming Cntent v/s Learning

As stated earlier, conceptual

understanding is not the same as merely acquiring or memorising content. The processes of constructing knowledge are complex and need to be actively faciltated by the teacher. Since the teacher herself is unlikely to be familiar with the content being seen by the students, the probability of her being able to help the student 'learn' from the content is quite low. (Students could refer to the tablets outside of the classroom for self-directed learning, however the program design often restricts access to within the school).

In some cases, teachers or students cannot download the content from the tablet to their computers or phones; proprietary content is used, which prohibits sharing and adapting. Some programs allow download of content, but prevent teachers from modifying it or contextualizing to their needs. Here the teachers and students are treated as consumers for the content created or sourced by the implementing organization.

The role of the teacher gets reduced to a process facilitator managing the viewing of content by students on their individual / group tablets, rather than someone actively designing the curricular experience for each learner. It may appear that students are excited to connect to the devices, however such interest is likely to be due to novelty rather than a deeper engagement with learning. An extensive literature search by the Commonwealth of Learning, an organization working in the area of ICT and education, concluded that a majority of tablet initiatives have been driven by hype rather than by educational frameworks or research-based evidence.

A variant of the tablet model disseminates content over a broadcast medium, further reducing the teachers role in the classroom transaction. In the Computer Aided Learning (CAL) program implemented by the education department in Karnataka, along with IIM Bengaluru, the teacher had no role during the broadcast other than ensuring that students were watching the screen. As per the program design, students 'doubts' were to be answered over phone by 'experts' situated elsewhere.

These models also assume that there are no heterogeneous learner contexts which would make it difficult if not impossible for all students to 'learn' from the same content being synchronously 'consumed' in an unmediated manner. In the process of broadcast, usually, the teacher would usually be viewing the content along with the students, hence it would be quite difficult for the teacher to interpret the content to facilitate student learning.

Mass broadcast media such as radio and television are themselves undergoing a transformation due to the internet (another digital technology invention), with programs being stored on the cloud, and accessed by users when they want to. This approach has already being used by NCERT, its 'National Respository of Open Educational Resources' (NROER) hosts resources that teachers can freely download, view and use.

There is a need to popularize such repositories amongst teachers and encourage them to access these. There is also a need to develop capacities to assess the relevance and educational value of these resources. These teacher capacity development processes could promote agency in including digital resources as a part of her mediating curriculum in teaching.

2.3 Personalised Learning

A second principle being assumed of 'content delivery through tablet' is of learning to be an individual experience. The buzzword is 'personal analytics'

where the ICT device is expected to sense the learners 'learning levels' and provide 'level appropriate content' and design 'individual learning paths'.

Since different students may be watching different content pieces or be in different parts of the same piece of content at a point in time, it is likely that there would be no 'single' or 'unified' content that the entire class would explore at any point of time. This is applicable even if 2-3 students share a device, each such group is on its own, within the classroom. The teacher may have little idea of what the students have learnt from the content being explored, despite 'dashboards' that may be made available to her (in her device) informing her of the actions and responses of all students in her class.

This approach grossly underestimates the complexity of the teaching-learning processes. While accessing content for self-learning can be useful, making this a part of the regular classroom activities can can disrupt any coherence in the learning processes and destabilise learning. As Carl Hendrick says "Allowing kids to browse the internet in a lesson and then expecting they will work productively is like bringing them to McDonald's and hoping they'll order the salad".

From the perspective of teacher agency, the role of the teacher in interpreting the curriculum and facilitating learning is compromised when content is provided to the students from external sources, with no participation by the teacher in the selection and curation of such content.

3 Bringing Teacher to the Centre

However, the National ICT Curriculum, 2013, NCERT provides a framwork for ICT integration in school education, in which the teacher has an important role in accessing, creating, adapting and publishing digital curricular resources. While the curriculum is yet to be fully adopted/adapted by governments, two of its six broad 'themes' for ICT integration - '*connecting and learning*' and '*creating and learning*', informed the design of the 'Subject Teacher Forum[2]' program, an ICT integrated in-service teacher education program of Karnataka education department. In this program, around 20,000 teachers from government high schools across Karnataka (which is roughly half the population), learnt to use ICT applications and digital repositories for accessing, creating and adapting digital resources, for TPD and for subject teaching, between 2011 and 2016.

3.1 Creating and Learning

Teachers learnt digital tools in Subject Teacher Forum program workshops held in ICT labs in teacher education institutions at state and district levels. These included subject-specific software applications for Mathematics ('Geogebra' software), Science (Phet, Kalzium), Maps (Marble, KGeography), and generic[3] applications including text editors (LibreOffice writer), image editors (Tux Paint, Screenshot), video editors (record-my-desktop) etc. Teachers used these tools to create resources in English and in Kannada. They also learnt to access and adapt (edit) existing resources from the web, and share created and adapted e-content as 'open educational resources' (OER).

Creating and combining resources to develop lessons, helped teachers see ICT applications as TLM sources. Learning to use digital tools contributed to their sense of agency in integrating e-content in their teaching. During the process of creating OER, teachers also reflected on the possibilitiess and relevance of teaching using these resources; they were sensitive to the need to access, create and adapt OER

relevant to their classroom contexts[4].

3.2 Connecting and learning

The Subject Teacher Forum program also built capacities of teachers to use ICT for 'connecting and learning' by enrolling them into subject-wise, state-wide[5] virtual forums (mailing-lists[6]). The state mathematics and science teachers forum for instance has more than 11,000 members. In addition, some teachers also created district-wide (and block-wide) mobile phone communities (using mobile-apps such as Telegram, Whatsapp, Hike) in which teachers of a subject across the district (or block) were enrolled.

These forums are 'autonomous' meaning they are not subject to department's authority and participation is not encouraged or discouraged through administrative fiat. Teachers freely share resources created by them, or accessed from the web and discuss issues of their schools and the larger education system. Teachers also often receive acknowledgements and gratitude of other teachers in response to their sharing of resources. While social media communities themselves may be of no great significance, the conversations in these forums are almost exclusively centered on teachers' practices and concerns.

The NCFTE recommends that teacher education programmes must build on the principle of creating 'spaces' for sharing of experiences of communities of teachers among themselves. OER access, creation and sharing in the virtual 'spaces' was an important professional experience encouraged in this program, and practiced by teachers.

4 Design Principles Affecting Teacher Agency

Two principles of the Subject Teacher Forum program supported strengthening of teacher agency in the processes of learning digital tools to develop, share and use OER.

4.1 Freedom to Explore

Teachers learning a software application may not always be able to access a copy of the software for continuing to use and learn beyond the teacher education program. For instance, in the 'Academies of Learning' that Microsoft established in many states in India, teachers were taught to use the Microsoft Office Suite and the Windows operating system. However, the teachers could not get a copy of the proprietary[7] software, nor did they have the freedom to freely download or share the software. A license to use the software had to to be individually procurred from the vendor, paying license fees, which were not trivial.

In the Subject Teacher Forum program, teachers learnt to use free and open source (FOSS) Ubuntu GNU/Linux operating system. They could buy[8] a DVD containing this operating system, into which the educational and generic software applications taught in the program were 'bundled'. Such bundling is possible only with a FOSS operating system, proprietary application vendors forbid it. Teachers were also taught to install the system. Many teachers installed this system on their home and school computers, copied and distributed the DVDs to their colleagues in district workshops.

The program also encouraged teachers to purchase personal laptops, rather than tablets. Laptops provide scope for creating and modifying digital resources, while tablets (in their current avatar) are primarily 'consumption' devices. More than a third of the teachers participating in the program purchased personal laptops.

4.2 Learning Processes than Products

The basic approach of the Subject

Teacher Forum program was to build teachers capacities to use a range of software applications, so that they become comfortable exploring the digital environment. The teachers were encouraged to think of software applications as 'resource creation' tools, which teachers could use to create new, or adapt existing digital content for their requirements. The workshop had 'creating text resources' as a session topic rather than 'Learning LibreOffice Writer, likewise 'creating image resources' instead of 'Learning Tux Paint', bringing the focus to the academic activity of making materials, than on learning a specific software application.

In many areas, teachers were purposely exposed to more than one tool in a domain, to disabuse themselves of equating a domain to a single product. For instance while covering web browsing, more than one browser (Mozilla Firefox and Google Chromium) was taught and participants were encouraged to explore additional software applications similar to the ones taught, to emphasize that each tool basically taught a set of processes and no single tool had any greatly unique or monopolistic features which needed teachers to be dependent only on them. Software vendors are eager to encourage such dependencies for their vested interests, and it is necessary for teachers to think of themselves as free agents exploring multiple applications, without being 'locked-in' to any specific application, in any domain,.

Similarly, the emphasis was not on teaching the 'use' of specific digital content, but to encourage teachers to access a wide variety of existing on-line content, as well as creating content using these applications[9]. The teaching and learning needs of teachers were placed as the starting point for them to explore the use of freely available applications and content, without previleging any one source.

5 History repeats itself?

"… there is a repetitive cycle of technology in education that goes through hype, investment, poor integration, and lack of educational outcomes. The cycle keeps spinning only because each new technology reinitiates the cycle"
- Kentaro Toyoma. *There Are No Technology Shortcuts to Good Education*

In the 'Computer Aided Learning Program' (CALP) component of the Sarva Shiksha Abhiyaan (SSA) program, many states provided desktop computers to a few hundred to few thousand higher primary schools, sometimes with bundled content. However, in an most cases, in the absence of required teacher preparation (including supporting teachers capacities and agency to mediate digital content and processes in their teaching), the digital infrastructure and content was usually not used by teachers in their regular subject teaching[10]. The cycle of spending huge amounts on ICT hardware, is being repeated now with tablets, under the belief that providing access to tables with e-content to students will help learning. As in the case of the 'text book', e-content can also serve to reinforce the power of the education bureaucracy in determining the classroom transaction. ICT as a 'pipe' can be used to 'monitor' more effectively[11].

"While computers appear to engage students (which is exactly their appeal), the engagement swings between uselessly fleeting at best and addictively distractive at worst. No technology today or in the foreseeable future can provide the tailored attention, encouragement, inspiration, or even the occasional scolding for students that dedicated adults can, and thus, attempts to use technology as a stand-in for capable

instruction are bound to fail."
- Kentaro Toyoma. *There Are No Technology Shortcuts to Good Education*

ICT program design should focus on building the capacities of the 'dedicated adults' to support subject teaching, develop OER and connect to learning communities for mutual support. These processes enhance agency, encouraging and enabling the teacher to revise her content and pedagogy, and are foundational to meaningful integration of ICT in school education. Given huge shortage of resources in school education, where even basic infrastructure is not yet available in all schools, investing in ICT programs that limit teacher agency, would not serve any educational purpose.

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[1]. popularly known as Information and Communication Technologies or ICT, which term will be used in the rest of the article

[2]. Disclaimer - IT for Change collaborated with RMSA and SCERT Karnataka, in the design and implementation of this program

[3]. Meaning, relevant to teachers of all subjects

[4]. 2017. Cheryl Hodgkinson-Williams & Patricia B. Arinto. Adoption and Impact of OER in the Global South

[5]. meaning teachers of a subject across the entire state are enrolled

[6]. These lists can be accessed from http://karnatakaeducation.org.in/KOER/en/index.php/See_old_STF_mails

[7]. Software, where the ownership is retained by the vendor and only a 'license to use' is given to the 'buyer'

[8]. For a nominal payment of Rs 50 per DVD

[9]. Based on these experiences, a toolkit for teachers to develop 'open' educational resources using 'open' source software has been developed, as a part of the program

[10]. See for instance 'A Study of the Computer Assisted Learning Program (CALP) Vidya Bhawan Society & Azim Premji Foundation 2008'. In many states, the CD-ROM content provided by Azim Premji Foundation was the main academic input in the CALP

[11]. Such as through the on-line submission of information about classroom transaction to central repositories, or through district and state level 'dashboards' that purport to monitor the teacher in each school.