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**Teachers and Use of ICT:
Pedagogic Practices and Policy**

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Introduction

As technology comes to dominate and transform our lives more and more, as it becomes more pervasive, user-friendly and inexpensive, schools cannot remain impervious to it. Information and communication technologies (ICT) like computers, the internet, digital cameras and probes are finding a place in schools across the world. According to experts like Papert (1998), ICT will become an integral part of schools and eventually transform the entire process of schooling, just as it has transformed medicine, industry, management and other sectors.

This paper aims to examine the role that ICT plays in the lives of teachers how do they use it, why, when, with what kind of attitudes, with whom, with what outcomes, and more. The education system in the country does not require the teachers to use ICTs, nor does it train them for it. Yet, they use ICTs to enhance their pedagogy. This paper argues for that there is an urgent need to train teachers in the use of ICT in the teaching / learning process to implement the new ICT in Education policy effectively in order to transform education in the long run.

This paper is based on fieldwork done in a private school in Delhi¹. The Kirtimaan School is a government recognized, senior secondary, co-educational, English medium school located in South Delhi². This paper delimits these to computers and the Internet, the two technologies mainly used in this school, as in most schools across India. Kirtimaan School is a full fledged three section (primary, middle and senior) school. Established in 1974, the school is spread over six acres, with a two-story building and sports grounds. The school is equipped with a Chemistry Lab, a Physics Lab, a Biology Lab, a Maths Lab and two Computer Labs.

The ICT infrastructure in the school under study includes two computer labs for

¹This paper is based on fieldwork done for my doctoral dissertation entitled "A Sociological Study of the Integration of Technology in Education".

²The name of the school is changed, and is referred to as Kirtimaan School, in this paper to maintain confidentiality

students one with 26 computers (for junior school) and one with 8 computers (for 11th and 12th classes). In addition, there is a dedicated lab for teachers with 15 networked computers, one printer, and most importantly, Internet connectivity. This lab was donated by the multinational company Intel Inc to this school in 1999.

Out of the total eighty-two teachers in the school, 62 were interviewed using semi-structured interview guides. Duration of the interviews ranged from 40 to 60 minutes. A survey was also conducted with all the teachers in the school. More than 60 teachers were observed in classrooms, across grades and subjects. Staff meetings and informal conversations with many of these teachers proved a vital source of information. The Principal is the key stakeholder in the ICT integration of the school. She has organized training workshops, encouraged teachers and students, appointed an ICT coordinator and computerized many aspects of academics and administration of the school. All the teachers in the school under study are encouraged to integrate ICT in as many ways as possible.

Pedagogic Practices and Teachers' Use of ICT

The teachers use ICTs in their day to day teaching practice in many ways. The teachers in Kirtimaan School follow traditional pedagogies, using chalk and talk / lecture demonstration as the most popular teaching methods. They tend to use ICT as a supplement to these pedagogies. During interviews, most teachers said that they use ICTs to enhance student interest and participation in their lessons.

The most commonly used form of integrating ICT in education is through the multimedia presentation. Teachers use multimedia not only to transact textbook lessons, but also to provide additional data, real images, start off a class discussion and explain abstract concepts. Most teachers consider and use multimedia as the technology application most suitable for education purposes. Unfortunately, most teachers consider and use multimedia as the ultimate application of technology in education. They need to move beyond this perception. This seems to be the case with most teachers in India as recent journal publications show³. Many articles refer to 'multimedia technology' rather than use the broader term computers or ICT, because

³For examples of Indian authors' views on ICT in Education as multimedia, see, Sumi and Benjamin (2011) who describe the use of multimedia to teach a Physics chapter in class 11 in Pudducherry. Verma (2011) examines the role of ICT in secondary education, and deals with only multimedia, ignoring other applications and technologies. Many authors write about the usefulness of ICT in education but do not report on any empirical research in the classroom. Examples include Manivannan (2006); Sasikala (2005); Amrughavalli (2005); Balasubramanian (2002) Hathi (2000); and D'Souza (2000).

multimedia is the only component of this technology that they perceive as useful to education.

There is an urgent need to educate the teachers on other ways in which ICT can impact the teaching / learning process, e.g., it can be used to build cognitive maps or enhance creativity and collaboration. Some teachers use commercially produced educational CDs as teaching aids, but only as a last resort, when they are unable to develop their own presentations, since they find that these CDs are of “very poor quality”. Some of the younger teachers develop their lesson plans on the computer. In fact, only four teachers in the school follow this practice regularly. They said they same time and effort as replication and modification is very easily done on the computer.

The CBSE guidelines for the curriculum in middle school include student projects, as part of the internal assessment. Most teachers deal with this by assigning the projects that students must do as part of the annual Holidays Homework during their summer vacation. The students surf the internet, visit libraries and collect data on the project and put it together in project files. Mrs. Bela, who is a Geography teacher to classes 8 and 9 demonstrates how ICT is effectively and seamlessly integrates in student projects. The project observed is on population and census. The census is explained to the students through the traditional lecture method. A class census is conducted as project work. She distributes the census questionnaires she has prepared beforehand. The students gather primary demographic data about their families. A group of students developed a spreadsheet to record and analyze this data. One student gives a demonstration on the spreadsheets to show how data is entered; data analysis is done and represented graphically. The students enter this data on spreadsheets in the computer lab. Once the data is analyzed and depicted on graphs, the students collaboratively develop the multimedia presentation. Students from each section made presentations in the other sections. This project involves ICT to get the students participate in various processes. They learn and use ICT skills in a geography project. Every year, Mrs. Bela teaches one topic through a project, and gets the students to use ICTs to learn about the topic while teaching geography. Her other projects include types of forests, stages of a river, and Yamuna Action Plan. She also uses the same teaching method for teaching the course on disaster management.

The above example shows that ICTs are just tools in the hands of the teacher. She can use them as she wishes - for increasing her productivity, lesson transaction or interdisciplinary collaborative projects. A teacher uses ICT as a tool. And every teacher is unique, and uses ICT (just as she uses books, blackboard and other teaching aids) in her own way. It is the way teachers use ICT that leads to different

outcomes. It is the rare, gifted teacher who uses ICT in such a way that it transforms the learning experience. In the case of Ms. Bela, ICTs form an integral part of a larger pedagogic goals and strategies. Through these projects she tries to increase the ICT skills capital of the students, foster co-operative learning, team work, presentation skills, leadership skills, self-confidence, research skills and more.

This can be understood using Bernstein's (1977) analysis of educational discourse⁴. The instructional discourse in the students' project discussed above is changed by the use of ICTs: the content and style of teaching and learning, as well as the skills developed are different from traditional lessons. The regulative discourse has also changed, as this project demands that students develop new skills, which are the focus of the work world (as seen in the emerging focus on 21st century skills in the developed world)⁵.

ICT can be considered an important 'prop' for both students and teachers when it is analyzed on the basis of the dramaturgical approach developed by Goffman (1969)⁶. Goffman used the metaphor of drama in daily life, and it finds apt application in classroom teaching. ICT enhances a teacher's (and students') performance through Net research in the "back region" and multimedia presentations or other classroom activities in the "front region" or on the classroom "stage". It becomes an important tool that enhances the impression a teacher (or student)

⁴According to Bernstein's theory (1977), pedagogic discourse is made up of two discourses: regulative discourse (RD), and instructional discourse (ID). RD is a discourse of order which translates the dominant values of society and regulates the form of how knowledge is transmitted. ID is a discourse of competence that refers to what is transmitted. The two discourses are incorporated in such a way that RD always dominates ID.

⁵21st Century skills refers to a growing global movement to redefine the goals of education, to transform how learning is practiced each day, and to expand the range of measures in student achievement, all in order to meet the new demands of the 21st Century. The broad skill areas are: Learning and innovation (critical thinking and problem solving; creativity and innovation; communication; and collaboration); digital literacy (information literacy; media literacy; and ICT literacy); and career and life (flexibility and adaptability; initiative and self-direction; social and cross cultural interaction; productivity and accountability; leadership and responsibility). (Source: www.p21.org).

⁶Goffman's dramaturgical approach mentioned here is outlined in Goffman (1959). It uses the metaphor of drama to analyze daily life in great detail. Goffman saw a connection between the kinds of acts that people put on in their daily life and theatrical performances, and his approach is termed 'dramaturgical'. It treats face-to-face interaction as a subject to study in the sociological aspect. When an individual comes in contact with other people, that individual will attempt to control the impression that others might make of him by changing or fixing his or her setting, appearance and manner. At the same time, the person that the individual is interacting with is trying to form and obtain information about the individual. Goffman also believed that all participants in social interactions are engaged in certain practices to avoid being embarrassed or embarrassing others. They use 'props' like clothes, accessories, cars and other status symbols to give a certain impression about themselves and the class they claim to belong to. In social interaction, like in theatrical performance there is a front region where the "actors" (individuals) are on stage in front of the audiences. This is where positive aspect of the idea of self and desired impressions are highlighted. There is a back region or stage which can also be considered as a hidden or private place where the individual can be themselves and get rid of their role or identity in society.

creates on the audience (students). It gives the impression that a teacher is “with-the-times, cool and happening” (as said by a student). In Goffman's terms, perhaps all of educational technology could be described in terms of a prop a repository of tools to enhance a performance. On the other hand, students can easily use this prop easily to showoff and thus embarrass the teachers. No such instance was observed during fieldwork, but the teachers of the senior classes said that they are apprehensive that some students could indulge in “such mischief”. Some teachers articulated this as a threat to technology integration.

When teachers are asked what ICT integration means to them, most of them refer to the use of multimedia presentations to deliver a lesson, and Internet to research a topic or share resources. Some mentioned worksheets and question papers also. It is rather strange that during interviews, none of the teachers articulate any pedagogical reasons to use ICT. When asked why they use ICT, the teachers give responses like the Principal's orders, make the lesson interesting, or saving time and energy. Thus, the teachers use ICT, but without clear pedagogic objectives, and only as a supplement to their traditional pedagogies. The use of ICT does not alter the way they approach the subject, transact a lesson or lead a project, which in theory, it should be able to do.

Factors Affecting Usage of ICTs in Teaching / Learning

All subjects do not have the same amenability to ICT integration. Many studies in the developed world have shown that teachers' ICT usage is highest in science and maths, lower in languages and social science, and almost negligible in arts, physical sciences and crafts (Becta 2002, Korte and Husing 2006). In the Indian scenario, vernacular languages find it most difficult to use ICTs, though some content in these languages is being developed by most state education agencies as well as private companies. Most of the Hindi and Sanskrit teachers are not comfortable using computers, although there are some notable exceptions, as is the case of Mrs. Bharati mentioned earlier in this paper.

The school provides professional development in ICT skills to all the teachers. Various training programmes for teachers' training in ICT have been conducted in the school. Among these, the Intel Teach programme is the foremost. The Intel programme has gained much favour in this school. The reasons for this are many Intel had the advantage of being the first ICT programme, it updated its trainings with the changing technology, its regular follow up with the teachers, and most significantly, it provided the school with a computer lab completely free of cost. All the teachers in this school have been trained under this programme. The teachers subsequently appointed are also trained on this program by their colleagues. The Principal herself was one of the first few trainees, and her extensive use of ICTs, and

understanding gives her an edge in developing strategies for ICT penetration in her school. She encourages the teachers to use computers in their classes. Many of the teachers during their interviews have said that they used computers for the first time in school, and the Principal supports them throughout.

It was observed during the fieldwork that it was usually the highly motivated teachers who integrated ICT in their classes regularly and effectively. The teachers who were generally in the forefront of school projects, extra curricular activities, functions, administrative tasks were also the ones who used ICTs. The less motivated teachers tended to participate in all these activities only as much as was needed. As the school provides its teachers with full-scale salaries, supportive environment and access to resources, their extrinsic motivation should be similar. Therefore, it is intrinsic teacher motivation that lies behind effective ICT integration. It was observed that the teachers who are enthusiastic, who relate positively with the school as an institution, their students and their profession tend to be leaders in ICT usage as well. Others, with low motivation, do not participate in any of these activities of the school, including the use of ICT.

Most of the teachers have talked about the problems of access to ICT in school. Yet, according to the Principal, and the ICT coordinator, the infrastructure available in the school is quite adequate if the teachers sincerely want to use it. This cannot be denied, since the Intel lab was often seen locked. In Goffmanian terms, the teachers are employing the narrative of 'lack of access' to create an impression that they are willing to do their part, if they can access the resources. If this lab were to be locked with an electronic lock, the password key of which is available to all the teachers, the teachers would be deprived of this narrative of lack of access that they now maintain.

When asked how computers affect teachers' workload, all the teachers said that computers mean more work for them. When they use computers in class, they need to spend more time and effort to plan the innovative lessons; design scaffolds and develop assessment schemes for well in advance. Most teachers, who use ICT, use it to do only some of these aspects of the entire lesson, due to lack of time.

Teacher attitude is recognized as the most critical factor in ICT integration. It has been demonstrated that is not enough to place infrastructure in school, nor is it enough to empower the teachers with ICT skills in order to ensure its effective usage (Ely, 1990). It is crucial that teachers develop a positive attitude towards ICT integration. Negative attitudes of teachers can have various reasons: lack of computer skills (or confidence), or lack of pedagogical skills to integrate ICT effectively, etc. There are few teachers who have a negative attitude in the school under study. Most of them do use ICTs. An example of positive attitude of a teacher can be seen through Ms. Pamela, who teaches Biology to classes 11 and 12. She

says:

“Education is now more students oriented. Earlier, students were dependent on teachers for everything. Now, they are supposed to be facilitators of learning. Technology has empowered students, and they know far more than their teachers. There are no limits to how far a child can explore.”

Some teachers feel threatened by technology. They see it as a challenge to their all-powerful authority in the classroom. Ms. Meena, a social studies teacher said:

“The Internet seriously questions the teacher's autonomy in class. Traditionally, the teacher was God to the students. What I told them held more value to them, over what they learnt from textbooks or their parents. Now, before I say something in class, I think twice... Is it on the Net? Have my students seen it? Will they question me on it? And the students are also very smart. I have heard they get the latest information from the internet and challenge the teacher's knowledge publicly. This has not happened with me yet, as I am very strict, but I think this will happen as more and more students get access to the internet. This is not healthy trend. We are losing control in the class... and losing it to technology...”

Thus, some teachers feel threatened by ICT. In Goffmanian terms, teachers and students, who stand perpetually opposed to each other as performers and audience (taking turns in these reciprocal roles) now occasionally come together to develop a performance together. Teachers, who were in complete control of the classroom, now feel it slipping out of their hands. The balance of power seems to be shifting.

Teachers' age is usually directly related to the use of ICT. The younger teachers are generally more adept at using ICTs than the older ones. Some of the older teachers said that they have given up the technology aided teaching method after trying it for some time, as it does not align well with their traditional pedagogies. However, many of them are quite adept at getting work done from the children. They give the creative ideas that their students execute using ICT. A notable exception is Mrs. Bela, who was mentioned earlier in this paper. Her projects are considered exemplary and are often showcased for other teachers and eminent guests.

Many of the teachers are involved in the various international projects of the school. These international projects are organized by various international organizations. The most prominent among them is Project Citizen, aimed at building a responsible citizenry in democracy. Other projects are based on bilateral or multilateral collaborations with teachers and students from various countries. They are based on literature, geography, technology, sports and culture. The teachers who are part of

these projects interact with students and teachers in other countries, and may even visit them. The teachers who have higher technological skills are usually given charge of these international projects, since they have to deal with emails, participate in video conferences, help the students with online research, and more. The teachers develop and hone their technological skills and value them as it helps gain opportunities not generally available to school teachers.

Many young teachers use ICT more in school as it has become a part of their daily life. Many young teachers use ICT in class comes “almost naturally” to them. Some of them have e-mail groups of students and share subject related news, articles, interesting websites, and resources, etc., but have not received very encouraging response from them.

Some of the older teachers whose children are studying or working abroad also use ICT frequently. They use e-mail, chat and skype applications for instant and economical communication with their children. This usage of computers in their personal lives has helped hone their skills a great deal. Many teachers have computers and Internet connectivity at home. Many middle aged teachers have growing children and are learning how to use computers and the terminology attached from their children, in order to keep themselves updated with them. Some of them see ICT as a life changing agent. One teacher said:

“It (ICT) has changed my way of life, not just my lifestyle. It has impacted my relationship with my kids.... It helps me feel more connected to my teenaged kids... Till the time I did not have these skills, my son used to say 'Mom, you are from an ancient civilization.' When I learnt to use them, apart from the ease and utility of it etc., I realized that my son came closer to me, and came to respect me more. It is really wonderful.... He says that now I speak the same language as he does.... It is very strange, but this technology has changed our relationships, our work, entertainment, entire lives actually.”

This has been the experience of many teachers who have shared similar instances of surprise, joy, admiration and respect that they have gained from the children in their families and classes by the simple act of working on the computer or sending emails, etc.

The gender factor is also important. Gender segregation among the teachers in this school is almost complete. As mentioned earlier, most of the teachers are women, and, there are only three male teachers in the academic disciplines. They teach senior classes, keep to their own group socially, and maintain only the bare essential professional relationships with the women teachers. They do not even sit in the same

staff room as the all the women teachers do. The male teachers rarely participate in the life of the school in terms of school functions, extra-curricular activities or international projects, etc. Even when discharging administrative duties, like superintendent of examinations, they kept aloof. Conversations with them indicate that they have low motivation and, therefore, did not participate in the life of the school. It is, therefore, not surprising that they do not use ICT in their lessons at all. On the other hand, research in developed countries shows that men are more active in ICT. Most teachers and coordinators of ICT are male. Janssen et al (1997) conducted a large-scale international study on the use of computers in primary and secondary education investigates the differences between male and female teachers (Janssen et al, 1997)⁷. Only primary schools in the United States have a high percentage of female computer coordinators, namely 75 per cent (Janssen et al, 1997).

Impact of ICT in education on teachers

Most of the teachers are impacted by the advent of ICT in the school. Many of them are impacted positively, but some also harbour negative attitudes towards ICT. Some of the key areas of impact of ICT on the teachers are delineated below:

ICT has influenced teacher-student relationship in many ways. It takes this relationship beyond the school walls in to cyberspace. Some teachers share their mobile phone numbers and e-mail addresses with their students. This has led to closer and more informal relations between them. This indicates that the Indian teacher student relationship is becoming friendly as opposed to the earlier authoritarian approach of the teachers, but still some issues persist. The teachers are a little wary of the social networking sites, as students can post “just about anything” for public viewing. This is seen as a dangerous situation, which “could easily get out of control”. Therefore, the teachers do not share their Orkut and Facebook details with students, nor do they add them as 'friends' on these sites. For example, in an informal conversation, some teachers said that they were upset about rude comments made by students on the school community page on social networking

⁷Many studies across the globe show this trend of domination of male teachers and coordinators in the field of ICT in education. This is shown by the large-scale studies (Janssen Reinen and Plomp, 1993) as well as to a number of smaller studies that study the computer attitudes of secondary school teachers (Dupagne and Krendl, 1992, in the United States; Robertson et al., 1995, in the United Kingdom), of students following a teacher-training course (Nash and Moroz, 1997), and of teachers in technical education (Gordon, 1993, United States).

sites. They feel that students are misusing technology to show disrespect towards the teachers. They found it 'painful' to see all these comments posted by their students and ex-students online on a public forum.

Analyzing this situation in Goffmanian terms, the social networking sites have opened up a new stage in the social drama, one that does not involve face to face interaction. Here social interactions (or expression of opinions) occur without the scope of immediate response. The negative side of the relationship between students and teachers finds an immediate expression on these sites. This has many repercussions. One of them is reflected in the anecdote given above. Other negative aspects of relationships in cyberspace include obscene messages and posts, hate pages, cyber bullying, stalking and much more. While all these mean a loss of face for the persons whose impressions have been injured in such interactions, the victims cannot react immediately in order to save face or retaliate as in the case of face to face interaction. Thus, these teachers feel insulted and helpless, since they do not know how to react to such an assault by their own students. In fact, they wonder how *can* they respond to such behavior of their students. No response seems appropriate if your students distort your name, or make fun of you, or heap insults at you. While there do exist norms of behavior on the Net that are called “netiquettes”, these are rarely followed, since there are no strong negative social or legal sanctions attached to them.

ICT also impacts teachers' attitudes towards education. A teacher who works in education-as-informationdissemination model tends to feel threatened by ICT, especially, the Internet. A teacher who shifts to education-as-learningto-learn model will find new friends when working with ICT and among students. A teacher tends to take on new roles an advisor, critical dialogue partner and leader for specific subject domains. The Impact2 study (Becta, 2002) analyzed the potential of ICTs to alter the teacher-learner relationship, and found it favorable as its shifts the balance from the dominant provider/recipient model to a more facilitative approach, thereby promoting greater independence of learning. Despite clear evidence that learners work more autonomously with ICT, the study suggests that it is not necessarily associated with a fundamental shift in teaching practices or roles.

Education Policies

The impact of ICT in education is discussed prior to the education policies, as the policies on ICT in education in India are quite recent. Moreover, they are in the nature of recommendations, rather than directives for action. It is, thus, not possible to assess their impact on pedagogic practices.

Kozma (2008) has given detailed analysis of how a positive policy of ICT in education in various countries has supported its integration by teachers. ICT - or any other technology - can be integrated in education only when the education system supports it. In India, the ICT in Education policy has recently been developed by the Ministry of Human Resource development that aims to integrate ICT in education,

but it does not make it mandatory as it recognizes the multifarious problems that the implementation of this policy entails.

As education is a subject on the concurrent list, i.e., its responsibility lies with the state as well as central governments, the ICT in Education policy asks the states to ensure that every school will have at least one computer lab with at least 10 computers and an ideal student computer ratio of 1:10⁸. Internet connectivity to be provided in this lab, teachers' room and the school head's room. It also recommends the introduction of digital devices like still and video cameras, music and audio devices, digital microscopes and telescopes, digital probes for investigation of various physical parameters. In terms of software, it suggests that schools should go beyond the Office suite and introduce graphics and animation, desktop publishing, web designing, databases, and programming tools have the potential of increasing the range of skills and conceptual knowledge of the students and teachers. Keeping an eye on the ground realities, the policy proposes that all schools be provided with some mechanisms for uninterrupted power supply using alternate sources where needed. It asks the states to “provide universal, equitable, open and free access to ICT and ICT enabled tools and resources to all students and teachers.” Further, the state shall develop, share, maintain various kinds of e-content and learning objects. Principals, Teachers and officers in the Education departments are to be provided training in the development of e-content. It also lays emphasis on using ICT for children with special needs, libraries, vocational education, open and distance learning⁹.

The policy covers almost all areas of ICT integration - installation, maintenance, management and capacity building of the stakeholders. It envisions a shared cyberspace where digital resources can be shared by all stakeholders, building collaborations and learning communities across the country. It is a well thought out document indeed, but it will face trouble in getting it cleared as a policy as it entails tremendous expenditure from the exchequer. Its implementation would also be

⁸<http://education.nic.in/secedu/ict.pdf>

⁹<http://education.nic.in/secedu/ict.pdf>

fraught with challenges as the present state of government schools is very far from this ideal world created in this draft policy, and the journey from the present state to this ideal state will be long and difficult.

There are various problems that implementation of this policy would face - lack of

regular power supply; non-existent or unreliable telecommunication lines; under skilled teachers not just in tech skills, but also pedagogic skills; and a mismatch between funding allocation and actual needs. Given the linguistic and cultural diversity of the country, every state / region needs its own local resources. In the absence of sharing and communication between state agencies, this results in duplication of efforts apart from learning from its neighbors. Replication and up-scaling of efforts becomes difficult in the absence of such information sharing and documentation. Institutional collaboration is also noticeable by its paucity. Thus, it is possible to have efforts in the same region working independently and unwilling to collaborate or pool efforts for greater effectiveness. This is further exacerbated by various agencies having multiple responsibilities and not sharing information and resources with each other. In fact, they could even be working at cross purposes at times.

However, there are significant aspects to some of these issues. First, it is impossible in a country like India to address these challenges through centralized planning and decision-making. Second, central control makes for a cumbersome and slow process of hardware and software acquisition and production and response to problems and issues. Third, a decentralized educational system with multiple players cannot expect to continue to operate with a central monopoly over the control and operation of the delivery of education. Fourth, there is increasing evidence of local efforts succeeding, where nationwide efforts have failed, for the simple reason that local efforts have addressed local needs, local culture and local language. Finally, many local efforts cannot be up-scaled, for the simple reason they address local problems and succeed because they are local. There is not much research done in this area in India that documents the good practices and outcomes.

Further, using ICTs in teaching / learning is not a compulsory in the syllabus prescribed by any examination board or emphasized by NCERT, the apex body in school education. It finds mention in the new education policy, the National Curriculum Framework developed by NCERT and the National Curriculum Framework for Teacher Education developed by NCTE, for it is a well known fact that technology access and connectivity in institutions are enormous challenges.

It is quite ironical that while private schools in India are using ICT since almost a decade now, and even the government schools are being computerized, yet, ICT in education is not taught in most of the teacher training institutions of the country. The faculty in the University departments and Colleges are not skilled in ICT. It was with a view to fill this gap that the National Council for Teacher Education (NCTE) made various efforts towards professional development to the faculty in the teacher education institutions¹⁰. When NCTE brought out its National Curriculum for

Teacher Education (NCFTE) in 2009, it laid emphasis on ICT in education. It also lays down the technology infrastructure for teacher education colleges, and has included ICT in Education in the curriculum. Various state governments are also making efforts towards computerizing schools, providing internet connectivity and providing professional development to the teachers. Various multilateral agencies like the UNESCO, NGOs and multinational corporations are also working towards this goal.

The key challenge lies in orienting teachers towards the pedagogic aspects of ICT integration. As seen in the school under study, where many of the teachers are using ICT in their teaching practice, they are largely unable to integrate it into their pedagogies, such that it can transform the teaching / learning processes. The massive investment (financial, technological and human) in ICT in education would be really worth the while only if we can achieve the transformation of the teaching / learning process.

Concluding Remarks

Many teachers in Kirtimaan School integrate ICT in their teaching practice to a large extent. There are variations according to the classes, subject areas, exposure to ICT outside the school; age and gender of the teachers, but overall, there is a positive attitude towards ICT integration. Teachers use ICT most often largely to explain concepts and enhance student interest. They gain productivity, reputation, and closer relations with their students in the process.

ICT is changing the relationship between students and teachers. Many teachers are bonding better with their students by communication through the Net, while few feel threatened by ICT. Some teachers use their tech skills to realize dreams of authorship; some are gaining a 'smart' reputation; most of them are reconnecting with children and friends; and some are using them to implement the international

¹⁰NCTE was established in 1995, as an autonomous body to monitor the teacher education institutions in the country and improve the standards of teacher education. For details see: www.ncte-india.org.

projects of the school. Thus, it emerges that teachers are engaging with ICT in meaningful ways.

Considering that teachers do not get exposure to ICT integration during their teacher education; and the school system also does not require them to integrate ICT in their

teaching practice, and the constraints of time and infrastructure, it is really appreciable that these teachers make the effort to use ICT to enhance student learning. In such a scenario, it is commendable that these teachers make such efforts and use ICT despite the various challenges of lack of time; overwork; lack of policy directives, norms and guidelines; lack of incentives; and a fixed curriculum. It is not surprising that they use it as an add-on activity in a traditionally designed lesson, without developing any pedagogic objectives for using ICT. Teachers' objectives in using ICT generally are to make a lesson interesting and interactive, or clarify abstract concepts (especially in science and maths), but not to enhance or transform the learning experience.

This paper argues that if the new policies are to succeed there is an urgent need to train teachers (both pre-service and in-service) effectively in ICT skills. The infrastructure can be provided if the government makes sufficient financial resources available, but all the time effort and money would be wasted if it is not properly utilized by teachers and students. Therefore, if this policy is to be successful, and education is to be transformed in to a meaningful process where students learn to think creatively, critically and innovatively; where they can execute complex / protracted tasks / projects; and learn to share and collaborate in teams, ICT can be an important agent to enable this transformation one of the key challenges ahead is to train the teachers. Most significantly, they should be trained not only in ICT skills (as is the case today), but how to integrate ICT in pedagogy to achieve educational transformation. The need is to move away from traditional pedagogy and develop innovative learning environments, and ICT is only a tool in the hands of a resourceful teacher to achieve this end.

Wherever teachers, academicians and technologists develop new resources, (especially in regional languages), or have used applications like Facebook, GPS, digital photography in school, they should share their good practices. There are numerous platforms to do so, and new ones can be easily developed. The teachers need to follow the three X's of digital literacy: explore, exchange and express and they will not only become smarter, engage more effectively with their students, but also open up another avenue that can help them find agency in life.

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