

IMPACT OF INFORMATION AND COMMUNICATION TECHNOLOGY USAGE AND THE PERCEPTIONS OF TEACHERS OF SOCIAL SCIENCES

¹ANUPAM DAS & ²SIKHAR KR. SHARMA

¹Assistant Prof. Department of Computer Science & Information Technology, Cotton Collge.

²Professor & Head Dept. of Computer & Information Technology, Gauhati University

ABSTRACT

Information and Communication Technology(ICT) in Teaching of Social Sciences is not merely developing ICT skill and competencies; it involves developing in the students and teachers ability to continuously update themselves, to ascertain the kind of ICT suitable for the learning experience to be provided and to use ICT to optimize the process of education. To achieve these objectives, students and teachers should not only have a working knowledge of ICT resources and the ability of self-financing, but also where innovations are concerned, they should be exposed to ICT-supported learning environments during training. In this article some survey results are shown which are prepared on the basis of certain parameters which are already considered as the standards.

KEYWORDS: ICT, Teachers of Social Science, Self-perceptions, ICT-Usage

INTRODUCTION

Information and Communication Technology (ICT) means involvement in the classroom. More specifically ICT can be defined as the use of all conceivable digital media in managing and processing information. Information is power. “No more swords to be feared than the learned pen”. The phrase is so old that its origin cannot be traced. With knowledge come learning, skills, adaptability, understanding and activism-all factors that contribute to the growth of an equitable society. ICT offers the means to acquire this power. Since knowledge is vital, it follows that the acquisition of knowledge must be life long. Delors Commission (1996) describes learning throughout life as the “heartbeat of society”. But how does one keep pace with this rapidly changing world? The answer is obvious- through ICT. ICT provides “anytime, anywhere” access to reliable information. It paves the way for construction of knowledge by an individual. ICT can universalize education in the truest sense. To quote the National Curriculum Framework (NCF) 2005, “ICT is an important tool for bridging social divides. ICT should be used in such a way that it becomes an opportunity equalizer by providing information, communication and computing resources in remote areas”.

In education ICT is an assisting tool. ICT is used as a tool for example while making assignments, collecting data and documentation, communication and conducting research. ICT is a

medium of teaching and learning (Malik. R, 2005). This refers to ICT as a tool for teaching and learning, the medium through which teachers can teach and learners can learn. It appears in many different forms. Such as drill and practice exercise, in simulation and educational network (Joshi, A. 2005). ICT is a tool for organizing and managing schools. ICT in teacher education has the capacity to accelerate major changes both in pre-service and teacher training as well as in service teacher professional developments (Sharma. H, 2004)

To train the student teachers to make a use of ICT, efforts have been made by NCTE, New Delhi. They provided guidelines for framing curriculum of teacher education programs, which include ICT in pre-service secondary teacher education program. A unit on information technology has been included in theory and practical training in computer literacy has also been added as an optional paper in universities in northern parts of India. Most of the teacher educators are not able to use media technologies, due to lack of training. They otherwise, are aware and realize the importance of its use in teacher education program.

THE NEED FOR ICT INTEGRATION IN EDUCATIONAL INSTITUTIONS

ICT integration in educational institutions is needed in order to accomplish many objectives and improve the quality of lessons in all subject areas as well as social sciences. ICT increasingly pervades various aspects of our daily lives like work, business, teaching, learning, leisure and health. Since ICT leads all processes based on information, every individual in a society should become technology competent. Thus, all educational institutions have to be equipped with the necessary ICT in order to provide the next generations with the needed tools and resources for access and use and to attain the expected skills. Norris, Sullivan and Poirot (2003) point out the importance of accessibility as: "...teachers' use of technology for curricular purposes is almost exclusively a function of their access to that technology" (p. 25). Merely providing educational institutions with hardware, software and in-service training is not enough. Any in-service training needs follow-up support, peer coaching and peer dialogue to ensure successful utilization of new technologies. There must be active involvement of the teachers concerned in the whole change process so that there is the element of "ownership" of the innovation. Just filling educational institutions with the necessary ICT neither improves the quality of instruction nor creates more effective learning environments. However, embracing a broader vision and philosophy, educational institutions should revise present teaching programs, practices and resources, and ICT should be integrated into all levels of an educational system from classrooms to ministries for use in management, teaching and learning activities. Thus, "Teachers must receive adequate ongoing training, technology use must be matched to curriculum's philosophy and theory of learning, and adequate numbers of computers must be conveniently located within the classroom" (Al-Bataineh & Brooks (2003),p. 479). As also concluded by Kington, Harris and Leask (2002) "...it is not necessarily the technology that has to be innovative, but the approach to teaching and learning must be" (p. 35).

TEACHERS' ICT USAGE

The integration of information and communication technologies can help revitalize teachers and

students. This can help to improve and develop the quality of education by providing curricular support in difficult subject areas. To achieve these objectives, teachers need to be involved in collaborative projects and development of intervention change strategies, which would include teaching partnerships with ICT as a tool. Teachers' attitudes are major predictors of the use of new technologies in instructional settings. Teachers' attitudes toward ICT shape not only their own ICT experiences, but also the experiences of the students they teach. According to Zhao and Czikó (2001) three conditions are necessary for teachers to introduce ICT into their classrooms:

1. teachers should believe in the effectiveness of technology,
2. teachers should believe that the use of technology will not cause any disturbances,
3. and finally teachers should believe that they have control over technology (p. 27).

Demetriadis et al. (2003) reached similar conclusions in their research study: "Training efforts are generally welcomed by teachers but consistent support and extensive training is necessary in order for them to consider themselves able to integrate ICT in their teaching methodologies" (p. 35). According to Rogers (1995) one of the major factors affecting people's attitudes toward a new technology is related to the features of the technology itself. Rogers points out five basic features of technology that affect its acceptance and subsequent adoption: relative advantage, compatibility, complexity, observability, and trialability. Thus, a new technology will be increasingly diffused if potential adopters perceive that the innovation:

- (1) has an advantage over previous innovations;
- (2) is compatible with existing practices,
- (3) is not complex to understand and use,
- (4) shows observable results, and
- (5) can be experimented with on a limited basis before adoption.

Preparing students for real life in our technological and diverse world requires that teachers embed ICT in significant learning experiences (Braun & Kraft, 1995). However, research studies show that most teachers do not make use of the potential of ICT to contribute to the quality of learning environments, although they value this potential quite significantly (Smeets, 2005). Harris (2002) conducted case studies in three primary and three secondary schools, which focused on innovative pedagogical practices involving ICT. Harris (2002) concludes that the benefits of ICT will be gained "...when confident teachers are willing to explore new opportunities for changing their classroom practices by using ICT" (p. 458). As a consequence, the use of ICT will not only enhance learning environments but also prepare next generation for future lives and careers (Wheeler, 2001).

PURPOSE OF RESEARCH

The purpose of this study was to explore ICT usage, factors that support the use, barriers that hinder the use, and self-perceptions of efficacy and level of expertise by looking at the teachers of social sciences. In order to shed light on these topics, this research study mainly focused on the following nine questions.

1. Which ICT resources (software, instructional tools and materials) do social science teacher's use?
2. What are teachers preferred methods for professional development?
3. What are the incentives that encourage social science teachers' technology usage?
4. What are teachers' perceptions of self-efficacy in relation to ICT usage?
5. What are the barriers the teachers of social sciences face during technology usage in the teaching learning process?
6. Is there any relationship between awareness and self-rated expertise level of teachers and, between self-perception of efficacy and self-rated expertise level of teachers?
7. Is there any relationship between teachers' computer related tools usage in the classroom and self-perceptions of efficacy?
8. Is there any relationship between teachers' computer related tools usage in the classroom and level of expertise?
9. Is there any relationship between having a computer at home and the expertise level of teachers?

METHOD

Convenience sampling was used to reach the participants in this study. The participants for this study were about 150 teachers of social sciences of different levels from various schools and colleges, who voluntarily participated in the study.

The "Information and Communication Technology Usage Survey" ($\alpha = 0,84$) developed by the researchers, mainly based on discussions in the related literature (Iding, Crosby & Speitel (2002); Bielefeldt (2001); Haydn, Arthur & Hunt (2001); McCormick & Scrimshaw, 2001) was used to collect data for this research study. The survey was composed of five parts. The first part of the survey consisted of 24 items regarding teachers' software use, as well as other instructional tools and materials. The purpose of this part was to find out the self-expertise level of the teachers of social sciences. The second part consisted of 9 items about preferences for professional development on information gathering and support. The subsequent part consisted of 8 items about factors that encourage teachers' usage of technology. In the fourth part of the survey there were 18 items related to teachers' perceptions of self-efficacy. Finally, the last part was composed of 19 items regarding the barriers that teachers faced during

technology utilization in the teaching-learning process.

RESULTS

ICT Resources Used by Social Studies Teachers

In this part of the study, the results of the previously listed research questions are reported. ICT resources used by social science teachers. The majority of social studies teacher in this study, 98.2% have access to a computer at work and among them 88.7% have access to the Internet. Daily computer usage of social studies teachers was found to be as follows: 53.1% uses a computer for less than one hour, 30.7% uses a computer for between 1 and 3 hours, 2.8% uses a computer for between 3-5 hours and 1.5% uses a computer for more than five hours a day.

The Teachers of Social Science specified their level of expertise on thirteen types of computer software by using a three- point likert-type scale (that is,. 2=Good, 1=Average and 0=None) ($\alpha=0,93$). Over fifty-four percent of the participants rated their skills as average or high at word processing, spreadsheets, presentation software, computer aided instructional software, web browsers, search engines, electronic mail, chat/forum, electronic encyclopedias and instructional films. The Teachers of Social Science indicated their usage of eleven types of instructional tools and materials by using a three-point likert-type scale (2=Frequently, 1=Sometimes and 0= Never) ($\alpha=0,81$). The preferred instructional tools according to usage rate are as follows: board, printed materials, overhead projector, television/video, radio cassette recorder, multimedia computer and slide projector. Teachers preferred methods for professional development The Teachers of Social Science give preferences for professional development, namely accessing knowledge (5 questions) and support services (4 questions), were taken through a three-point likert type scale (2=I prefer, 1=Neutral and 0=I don't prefer) ($\alpha=0.66$). Printed materials (99.4%), Internet resources (83.4%) and self-study (80.7%) and participation in seminars and workshops (79.1%) were the most favored knowledge resources for professional development. On the other hand, the majority of teachers favored every kind of support service: experienced teachers (96.9%), colleagues in the same field (87.7%) and technical support group within the school (81.0%). The incentives that encourage social science teachers' technology usage The participants used a three-point likert-type scale (i.e. 2=Important, 1=Neutral and 0=Not Important) to rate their level of importance on 8 statements about incentives for adoption (Table-1). All the statements were rated as important incentives by over 80% of the teachers. ($\alpha=0.73$).

Table 1. Percentage of Assessed Factors that Encourage Social Studies Teachers' Technology Usage:

Sl No	Factors Encourage Technology Usage	Important	Neutral	Not Important
		(%)	(%)	(%)
1	Rewarding the technology usage efforts of teachers in instructional activities	80.4	8.3	10.4
2	Investments of the institution on infrastructure of instructional technologies	96.6	3.1	0
3	Investments of the institution on in-service education programs for instructional technologies	90.8	8.9	0
4	Investments of the institution on the support services of instructional technologies	84.7	12.9	0
5	Developing the policies and plans for diffusion of the instructional technologies	89	9.5	1.2
6	Providing support for the projects towards the expansion of instructional materials	92	5.8	1.8
7	Carrying out the studies for integration of technology into curriculum	88.7	9.2	1.8
8	Reducing work load to provide opportunities to teachers for developing instructional materials	91.7	4.9	3.4

TEACHERS' PERCEPTIONS OF SELF-EFFICACY IN RELATION TO ICT USAGE

The participants used a three-point likert-type scale (i.e. 2=Agree, 1=Neutral and 0=Disagree) to specify their perceptions on 18 statements about using computers and instructional technologies ($\alpha=0.62$) (Table-2). The results showed that teachers believe that technology will bring to them advantages, but they lack the basic skills of computer usage, and they also feel that their skills are lacking for other technologies which could also be used as an aid in the classroom.

Table 2. Perceptions of Teachers about perceived self-efficacy on ICT Usage

Sl No	Perceptions	Agree (%)	Neutr al (%)	Disagr ee (%)
1	I don't use computers as much as other resources (books, overhead projectors etc.) for instructional purposes.	42.0	5.5	52.1
2	I know what to do for using computers in instructional environments.	48.5	29.8	20.6
3	I am aware of the opportunities that computers offer.	28.5	34.0	33.1
4	I can answer any question my students ask about computers.	19.3	16.3	64.1
5	I am not sure that I am computer-literate for use computers in my classes.	23.3	27.0	48.8
6	I don't want to use computers.	55.5	13.5	27.3
7	I think that I can use instructional technologies in class activities more effectively day by day.	70.9	18.7	10.1
8	I believe that tools like e-mail, forum and chat will make communication with my colleagues and students easier.	90.5	6.4	3.1
9	I think that technology supported teaching makes learning more effective.	95.7	2.1	1.8
10	I think the use of instructional technologies increases the interest of students toward courses.	97.5	2.1	0.0
11	I think the use of instructional technologies increases the quality of courses.	94.8	4.6	0.3
12	I think that usage of instructional technologies makes it easier to prepare course materials (assignments, handouts etc.).	90.8	7.1	1.8
13	It is hard for me to explain the use of computer applications to my students.	37.4	21.8	38.3
14	I can handle different learning preferences of my students having different learning styles by using instructional technologies.	25.8	44.8	29.1
15	I think technology makes effective use of class time.	77.9	17.8	4.0
16	I think using instructional technologies makes me more productive as a teacher.	94.2	4.9	0.0
17	I think that using technology makes it easier to reach instructional resources.	95.4	0.6	3.7
18	I don't prefer to be assessed about my instructional technology based applications by any other professionals.	54.2	19.3	24.2

BARRIERS SOCIAL STUDIES TEACHERS FACE DURING TECHNOLOGY USAGE

The participants used a three-point likert-type scale (i.e. 2=Agree, 1=Neutral and 0=Disagree) to rate their level of agreement on 19 statements about barriers to adoption ($\alpha=0.87$) (Table-3). Of the 19 statements, 17 have been rated by more than 50% of the teachers as major barriers to adoption of technology into the teaching-learning process. Of these 17 statements the top three are:

- (1) inefficiency of teachers' technical knowledge to prepare materials based on technology,
- (2) inadequacy of the technology courses offered to students and
- (3) lack of incentives for encouraging technology usage.

Table 3. Percentage of Assessed Barriers that Teachers' Faced During Technology Usage in Teaching-Learning Process

Sl No	Barriers to Technology Usage	Agree (%)	Neutral (%)	Disagree (%)
1	Inefficient time to prepare materials based on technology	67.2	9.2	23.9
2	Inefficiency of teachers' technical knowledge to prepare materials based on technology	94.2	4.3	1.2
3	Problems about accessibility to existing hardware (computer, overhead projector etc.)	70.6	11.0	18.1
4	Inefficiency of institutions computer laboratory	69.0	4.0	26.7
5	Inefficiency of institutions technical infrastructure about instructional technology	55.2	6.7	37.7
6	Inefficient number of media (printer, scanner etc.) for effective use of computers	62.3	11.0	26.4
7	Shortage of computers used by teachers	65.6	0.6	33.4
8	Absence of reward systems for encouraging technology usage	73.9	15.0	10.7
9	Poor technical and physical infrastructure of learning environments.	69.9	8.6	21.2
10	Inadequacy of computers used by learners	69.3	7.1	23.3
11	Inefficiency of guidance and support by administration	68.7	8.9	22.1
12	Insufficiency of financial resources for technology integration	69.6	16.9	13.2
13	Inefficiency of instructional software/electronic resources	62.6	13.8	22.7
14	Scarcity in resources on technology for attaining information	50.3	18.7	30.7
15	Deficiency in professional development opportunities for gaining knowledge and skill	65.3	16.3	18.1
16	Deficiency in support services in material development/technology usage	47.5	21.8	29.1
17	Lack of interest of teachers in technology usage	66.6	12.9	20.2
18	Difficulties of improper teaching methods for technology usage	54.6	34.4	6.1
19	Inadequacy of the courses of technology offered to teachers	80.1	9.5	10.1

THE RELATIONSHIP BETWEEN AWARENESS AND SELF-RATED EXPERTISE LEVEL OF TEACHERS AND BETWEEN SELF-PERCEPTION OF EFFICACY AND SELF-RATED EXPERTISE LEVEL OF TEACHERS

Correlation analysis was conducted to determine if there are any relationships between awareness and self-rated expertise level of teachers and, between self-perception of efficacy and self-rated expertise level of teachers. The results indicated that there is no significant relationship between teachers' awareness and their self-rated expertise level. However, a significant correlation between teachers' self-perception of efficacy and teachers' self-rated expertise has been identified.

Table 4. Correlational Analysis between self-perception of efficacy and self-rated expertise level of teachers

		Computer Software Usage	Self Perceptions
Computer Software Usage	Pearson Correlation	1	0.552
	Sig (2-tailed)	--	0.000
	N	136	126
Self Perceptions	Pearson Correlation	0.552	1
	Sig (2-tailed)	0.000	--
	N	130	126

** . Correlation is significant at the 0.01 level (2-tailed).

THE RELATIONSHIP BETWEEN TEACHERS' USE OF COMPUTER RELATED TOOLS IN THE CLASSROOM AND SELF-PERCEPTIONS OF EFFICACY

To determine the proportion of variance in the attitudes of teachers toward ICT in education that could be explained by the selected independent variables, simple correlations were performed. Simple correlations (using Pearson and Spearman analyses) were first performed to identify independent variables that individually correlate with self-perception of efficacy and related tools usage in the classroom for each of the four tools: multimedia computer, computer-aided educational software, computer-projector system and the Internet/Web Environment.

Table 5. Correlational Analysis between Relationships of teachers' computer related tools usage in classroom and self-perceptions of efficacy

		Computer Software Usage	Self Perception of Efficacy
Computer Software Usage	Pearson Correlation	1	0.553**
	Sig (2-tailed)	--	0.000
	N	146	135
Self Perception of Efficacy	Pearson Correlation	0.553**	1
	Sig (2-tailed)	0.000	--
	N	130	126

** . Correlation is significant at the 0.01 level (2-tailed).

Follow-up tests were conducted to evaluate pairwise differences among the means. The results of these tests, as well as means and standard deviations for multimedia computer, computer-aided educational software, computer-projector system and the Internet/Web environment are reported in Table-5. The results indicated that the groups who sometimes and frequently use multimedia computer and computer-projector system in the classroom have a higher self-perception of efficacy than the group

that never uses them. Moreover, the groups that frequently use educational software and the Internet/Web environment have a higher perception of efficacy than the one who never used them. In other words, teachers who have high perception of efficacy tend to use computer related tools in the classroom more frequently than the others.

THE RELATIONSHIP BETWEEN TEACHERS' USE OF COMPUTER RELATED TOOLS IN THE CLASSROOM AND LEVEL OF EXPERTISE

The expertise level of teachers in a classroom motivates teachers' use of ICT more effectively. The expertise level of teachers has been analyzed here. Correlation analysis was conducted to determine if there is any relationship between teachers' use of computer related tools in the classroom and the expertise level of teachers. A one-way analysis of variance was conducted to evaluate the relationship between the level of expertise and computer related tools usage of social studies teachers in the classroom for each of the four tools: Multimedia Computer, Computer-Aided Educational Software, Computer-Projector System and the Internet/Web Environment.

Follow-up tests were conducted to evaluate pairwise differences among the means. The results of these tests, as well as means and standard deviations for multimedia computer, educational software, computer-projector system and the Internet/Web environment are reported in Table-6. The results indicated that the groups that sometimes and frequently use computer related tools in the classroom have a higher level of expertise than the groups that never use them. In other words, teachers who have a high level of expertise tend to use computer related tools in the classroom more frequently than the others.

Table 6. Correlational Analysis between Relationships of teachers' computer related tools usage in classroom and level of expertise

		Computer Software Usage	Level of Expertise
Computer Software Usage	Pearson Correlation	1	0.552
	Sig (2-tailed)	--	0.000
	N	145	144
Level of Expertise	Pearson Correlation	0.552	1
	Sig (2-tailed)	0.000	--
	N	130	126

** . Correlation is significant at the 0.01 level (2-tailed).

DISCUSSIONS

Educators wishing to support the integration of ICT into subject teaching need to overcome the organizational and political obstacles that occur as well as certain limiting perspectives, both personal and professional, that some teachers' may hold. There are few studies that have analyzed how subject cultures differentially affect teachers' use of ICT. Studying teacher perspectives on ICT allows us to

suggest further methods for successful integration into the core subjects. This is the first attempt to make explicit how teachers go about integrating ICT into core subject social sciences in India. Rapid growth and improvement in ICT have led to the diffusion of technology in education. Studies in controlled environments suggest that the use of technology under the right circumstances improves educational outcomes, and many educators believe that a new pedagogy that incorporates technology is necessary to prepare students for work in the information age. The study investigated the perceptions and ICT usage of teachers of social sciences. Perceptions and skills in relation to ICT have been universally recognized as an important factor in the success of technology integration in education. Findings from this study suggest that teachers of social sciences understand the benefits of ICT usage in education. Teachers of Social Science considered computers as a viable educational tool that has the potential to bring about different improvements to their institutions and classrooms. The findings of the study indicated a very strong positive correlation between teachers' attitudes toward ICT in education and their perceptions of the advantages of the use of computers. However, teachers' perceptions of the compatibility of ICT with their current teaching practices were not as positive. Teachers pointed out that the class time is too limited for ICT usage. Hence, the introduction of ICT innovations into education requires promoting structural, pedagogical and curricular approaches. Cultural perceptions should be taken into consideration. This conclusion points to the need for considering cultural factors in studies conducted in developing countries. This study examined the extent to which teachers have access to ICT in assessing the frequency with which teachers used computers for various activities. Teachers of Social Sciences mostly preferred board, printed materials, overhead projectors, television/video, radio cassette recorder, multimedia computer and slide projector for instructional aims. Teachers most frequently used computers for accessing information on the Internet, communicating electronically, doing word processing and making slide presentations. Only a few teachers reported using ICT to help them learn school material, and less than one-fifth regularly used educational software. Some teachers reported using ICT for programming, drawing, graphics or analyzing data with spreadsheets, but this is very rare. Printed materials (99.4%), Internet resources (83.4%), self-study (80.7%) and participating in seminars and workshops (79.1%) were the most favored knowledge resources for professional development. On the other hand, the majority of teachers favored every kind of support service: experienced teachers (96.9%), colleagues in the same field (87.7%) and technical support group within the school (81.0%). The teachers of Social Sciences focused on elective courses and other short, in-service professional development courses and workshops for professional development. Teachers pointed out the need for some sharing of experiences and discussion of new technologies and contemporary issues, so that teachers receive support in trying to keep up with new developments in ICT. In addition to longer practical work, teachers needed more resource materials such as supplementary workbooks and a resource center where they could find teaching materials and ideas. The majority of teachers acknowledged the importance of using ICT in their own teaching. The majority of teachers also reported a lack of confidence in applying ICT in their teaching. All teachers maintained an increased enthusiasm to apply ICT in their teaching in every circumstance. Based on these results, the training course succeeded in giving the teachers enhanced skills in pedagogical and technical use of the ICT-based learning, program components and an increased

motivation for using ICT. The self-expressed feeling of teachers of social sciences, that they lacked the “technical knowledge to prepare materials based on technology”, showed the importance of in-service training and paralleled the result on instructional tools and materials usage. Moreover, teachers of social sciences appear to be unaware of possible technologies that could be helpful in the teaching processes and the majority does not use ICT. On the other hand, all kinds of professional development preferences and support service opportunities were highly rated, showing the willingness of teachers to learn and highlighting the lack of in-service training opportunities.

CONCLUSIONS

By the 1950s, educational institutions had teaching materials such as maps, laboratory equipment, and filmstrip projectors for instructional use. Although they had teaching material such as maps and other equipment they did not use them. Until the 1990s, mostly printed instructional materials were used in schools. Between 2000 and 2011, schools colleges had technologies such as audio cassettes and overhead projectors. In addition, some big universities started to offer graduate programs aimed at training professionals in the field of traditional educational technology. Though some of these traditional technologies are still in use to prepare students, educational policy makers in India believe that schools must give students the knowledge and skills they will need in the future. Therefore, ICT have gained more importance than any other educational technology.

SUGGESTIONS

Here are some suggestions for effective usage and implementation of ICT. It would be useful to provide ICT knowledge as modules so that teachers may integrate ICT into lessons. The ICT materials should therefore be based on classroom research and provide excellent teaching ideas and activities for developing and strengthening students' concepts, skills and meta-cognition. Teachers and researchers can make even better use of ICT facilities together. ICT has vast potential in education but its effective use must be carefully tried out and planned by researchers and teachers who know what to do with it in the teaching-learning process. They have to determine what strategies are needed for certain learning situations and how learning processes can be enhanced using the technology. Merely providing schools with hardware, software and in-service training is not enough. Any in-service training needs follow-up support, peer coaching and peer dialogue to ensure successful use of the new technologies. Teachers must be part of the decision making process with respect to the implementations of ICT innovations in schools, so that they may commit to the innovation with conviction. Easy access to databases of the available curricular resources and strategies would provide very useful information for communication among teachers. There is a need for localized resource centers to provide support for schools within a certain district. Workshops for teachers and students in the area could be conducted to promote cooperative projects and sharing of experiences and expertise.

Most teachers rely heavily on textbooks and blackboards; we can re-vitalize education with ICT. In subsequent training workshops, key personnel and trainers could each have opportunities to present an aspect of ICT concept or use in the classroom. These presentations could be about a feature of some ICT concept, resource or application in the teaching and learning of a subject, a useful web site, or to show the work of pupils themselves. The presenters could bring along handouts for every teacher as well, so that teachers can compile the materials into a guide or resource book. Repeat sessions may be necessary if there are too many teachers for one group. There are also difficulties with the maintenance of hardware and the purchase of new equipment and software because of the high costs involved. It would also be useful to have technicians available to assist the schools. Educators find it difficult to integrate and introduce ICT for everyone in schools due to the high cost of the provision and updating of networked equipment needed in an already overloaded curriculum, and with teachers knowledgeable in ICT in short supply. Teachers stated that they attended some courses, which the principals selected for them. The instructors were not competent in using computers and their knowledge of computer was average. Providing continuing courses and sharing workshops planned throughout the implementation of the project might be useful for these teachers. Independent teachers will be able to achieve the project objectives with minimum support from key personnel. A regular newsletter or bulletin would be useful for teachers to write about good teaching ideas, that they have found to be effective and successful, and for sharing with others throughout the country and beyond.

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