Identifying Factors Affecting Information Communication Technology Enabled Teaching and Management in School

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Abstract

Teaching in schools is not the same as it uses to be a few decades back. The world of school education and learning is changing rapidly bringing new realities and challenges on a daily basis. The shift is primarily because this is the age of Information Communication and Technology (ICT), an age that requires that school teachers also to facilitate the gathering of information and not merely teach. The potential of ICT usage towards enhancing teaching-learning process has received considerable attention in recent times. ICT provides the learners with an environment that allows them to distribute their studies in terms of place, time and pace, and most importantly, the ICTs give teaching staff more opportunities to actually communicate with students than just face-to-face. Although use of ICT is very helpful in teaching and learning in schools but there are various problems associated with it. Although this pedagogy is picking up in schools but prima facie it seems that the usage is more by private schools. Off late now government schools have also started using ICT based teaching but it is still not up to the mark. This study makes an attempt to identify factors affecting Information Communication Technology enabled teaching by school teachers.

Introduction

Past few decades have witnessed extensive use of computers in many areas of our life on a daily basis. One of such area is teaching and learning process in schools. Today computers are extensively used for teaching, learning, examination, result declaration, attendance management and office administration in schools. Advancements in information technology innovations and computer usage has rapidly transformed work culture of school teachers. They cannot escape the fact that today's teaching must be aided with Information and Communication Technology (ICT).

In Indian society education has always been accorded an honoured high place. In the last few years improvement in the status of school education has been the prime focus of government. Use of ICT enabled technology has been a very helpful in this step. India recognised the importance of ICT based school education in early 80's when the Computer Literacy and

Studies in Schools (CLASS) Project was introduced as a pilot project with the introduction of BBC micro-computers.

Since then the use of ICT in teaching learning in schools has been increasing. In recent years blackboards have given way to projectors with interactive whiteboards. ICT enables interactive classrooms improve teaching and learning process. It has changed the way of teaching and learning of subjects like Mathematics, Science, Social Sciences and English etc. It allows a teacher to engage students in class more effectively by using audio visual means. Further enables them to create question papers and analyse students' performance in much better way. Science teachers can give a visual tour of entire laboratory in classroom with the help of ICT. Lesson plans can be easily captured and shared online enhancing the interaction with students. Concept dealt with the use of ICT based teaching methodology enables students to grasp them more effectively and quickly. With the help of ICT based learning teacher can easily make their teaching material and can spread that material to students. ICT based technologies is not restricted within four walls of classrooms. Teaching material can be spread with a single click and it depends on students when and where they want to access that material given by teacher.

The use of technology, particularly information and communication technology, to support learning promises much. This technology provides the learners with an environment that allows them to distribute their studies in terms of place, time and pace, and most importantly, the ICTs give teaching staff more opportunities to actually communicate with students than just face-to-face.

Some of these advantages of ICT base teaching are:

- ***Flexibility and Control:*** The learner is not restricted by four walls of classroom or time constraint. It depends on learner when and where he/she wants to access that material.
- ***Reduced Cost****:* Once material has been developed by faculty members than it can lasts for many years and it is easy to make changes in to it as compared to hard copies.
- ***Improved Interaction:*** ICTs provide many ways to teachers and students to interact with each other. It can be face to face or if they are not same place than with the help of ICT based technologies they can interact with each other either live or in recorded video.

- ***Sharing and Re-use of Resources:*** ICTs can reduce the need for the scarce resources and allow for their sharing among more students.
- ***Collaborative Work:*** ICT's enhanced interaction facilities can remove barriers of all sorts among learners and hence facilitate an easier environment for them to carry out many kinds of group projects.
- ***Student-centred Learning:*** ICT-based learning places the student at the centre of the learning process. It provides greater flexibility in terms of learning time and pace.

Although use of ICT is very helpful in teaching and learning in schools but there are various problems associated with it. High cost of infrastructure, peripheral devices, networking and appropriate training of teachers are some of the issues that need to be properly taken care of before deciding upon using the same. Although this pedagogy is picking up in schools but prima facie it seems that the usage is more by private schools. Off late now government schools have also started using ICT based teaching but it is still not up to the mark. This study makes an attempt to identify factors affecting Information Communication Technology enabled teaching by school teachers.

Review of Literature

Margaret Robertson, Neville Grady, Andrew Fluck, Ivan Webb, (2006) in their research focused on outlining the emerging imperative for the integration of ICT into schools and to locate such integration within broad notions of governance and effective implementation. The methodology used by researchers involved a flexible interview structure, conversations concerning ICT integration into schools were held with 65 school-based personnel in 50 Tasmanian schools. They identified 14 themes; many of the themes focused on issues of governance and a number of strong correlations were found to exist between the themes. Researcher concluded that there is likely to be considerable agreement about the content of such conversations in schools and that they are likely to be concerned with people and processes rather than with ICT technology/software/hardware and the like per se.

Jyoti Bhalla (2013), countries have responsibility to include computer in school education for improving teaching and learning approach in teachers and use of computers by students. Researcher examined 300 Central School teachers‟ use of computers. For this a questionnaire was constructed that listed essential dimensions for teachers‟ use of computers: Computer Aided Learning (CAL), Computer Managed Instruction (CMI), and Computer Assisted

Instruction (CAI). Findings revealed that teachers often used computers to update subject knowledge and teaching skills, develop lesson plans, prepare additional instructional material, notify relevant information via internet, prepare question banks but sometimes they use computers for showing something in the class, showcasing students‟ work on school-website, preparing test papers, simulations, games, students‟ assignments. The analysis indicated that amongst the three categories of computer use, CAL was the most popular category of computer use whereas CAI was the least popular among teachers.

International Association for Evaluation of Educational Attainment (IEA) survey (1992) indicated that almost half of middle/junior high and high school mathematics, language, and science teachers and about 70% of elementary teachers in these areas use computers "at least several times during the year".

Drury (1995) found that Canadian ministry officials estimated that only 20 percent of the teaching cohort were at least "moderately committed computer users" and even this 20 per cent might not be in favour of a dilution of the traditional curriculum model.

Hadley and Sheingold (1993) found teachers in the United States used computers in multiple ways and reported changes in teaching practice, including: presenting more complex material to students, giving students more individual attention, allowing students to work more independently, and becoming more of a coach and facilitator in the classroom.

Glennan and Melmed (1996) examined 5 "technology-rich schools" of Santa Monica, California, in which curriculum and instruction had been changed, and the school days were reorganized to make effective use of technology. These schools were considered to be "representative of the best practices across the nation," and they demonstrated that technology could be used to restructure the learning experience for students and improve learning outcomes. Glennan and Melmed were cautious in their conclusions however and stated: "research has not yet identified a sufficient number of examples of technology-supported whole school reforms to allow us to fully gauge the contributions that educational technology can be reliably expected to make to reform objectives".

Harris (2000) revealed that the highest percentage of use of computers and the internet was for preparing instructional materials. Lowest percentage of use of computers and the internet was for instructional use for students. The teachers used word processing primarily for

preparing instructional materials, instructing students in the classroom and interactive lab. The second highest use was for web searching.

Wallace (2001) developed a conceptual framework as to how teachers used internet in their teaching and how they used material resources. The results stated that teachers made use of internet by transforming it into a resource which fit into their own teaching methods.

Kellenberger and Hendricks (2000) and **Martin Ofori-Attah (2005)** identified that the computer use by teachers was divided into three main components namely, for teaching purposes (to impart knowledge, create variety, and to give confidence to teachers), administration purposes (in preparation of job-related materials and to ensure safe-keepings of data and information about students), and personal purposes (to engage teachers‟ free time in a beneficial and fruitful manner).

Omur (2008) in Turkey, investigated the manner and frequency of primary school science teachers‟ use of computer. Results demonstrated that improving the computer literacy of science teachers seemed to increase science teachers‟ computer use and consequently increase their integration of computer applications as an instructional tool. Internet, email, and educational software Compact Discs (CDs) were found to be used frequently in the classrooms.

Dawson (2008) while examining the extent to which science teachers perceived that their pre service education prepared them to use ICT in their teaching role, found that the most frequent uses of ICT were word processing, internet research, email, and PowerPoint while the least frequent uses were palm top computers, web page design, online discussion groups, and virtual excursions.

As can be gauged from the above mentioned studies that researchers have employed varying research methods in an attempt to understand the role that technology can and does play in education. Consequently, there are a number of differing lines of research that have been conducted, and many of the lines of inquiry may overlap with others. This has resulted in a large amount of research, but so varied in method and treatment that at times is difficult to categorize. Unfortunately, much of the early research on computer uses in education has ignored the systematic study of ways in which computers can be used by the teachers in teaching-learning process. Studies focused on the most frequent ways of using computers, on

the frequency of computer use, on the strength of teachers employing use of computers, or on its effect on students‟ achievement; thus overlooking the conceptual or contextual aspects of ways of computer use in teaching-learning process.

Pritam Singh Negi, Vineeta Negi and Akhilesh Chandra Pandey (2011) investigated that the pace of change brought about by new technologies had a significant effect on the way people live, work, and play worldwide. New and emerging technologies challenge the traditional process of teaching and learning, and the way education is managed. Information technology, while an important area of study in its own right, is having a major impact across all curriculum areas. Easy worldwide communication provides instant access to a vast array of data, challenging assimilation and assessment skills. Rapid communication, plus increased access to IT in the home, at work, and in educational establishments, could mean that learning becomes a truly lifelong activity, an activity in which the pace of technological change forces constant evaluation of the learning process itself.

Research Methodology:

Objectives

1. To find out the current status of usage of ICT in schools of Indore.
2. To identify factors that affects the use of ICT in teaching by teachers in Indore.

Date Collection: Primary data was used for the purpose of this research.

Development of Survey Instrument

Extensive review of relevant literature and discussion with academicians and practitioner 36 items were developed. These 36 items were further circulated to a panel of experts possessing vast experience in the field of school teaching and research. The panel suggested certain changes which were incorporated finally leaving the total number of statements as 28. The questionnaire was made on Likert scale and responses were marked as 5 = Strongly Agree, 4 = Agree, 3 = Neutral, 2 = Disagree, 1 = Strongly Disagree.

Sample Size

The questionnaire was circulated to a sample of 175 school teachers from both government as well as private schools of Indore. Out of 175 questionnaires 145 were found to be appropriate for use. 30 questionnaires were rejected due to missing data.

Reliability

The reliability of an instrument refers to its ability to produce consistent results each time it is administered. The reliability of the questionnaire was calculated using split- half reliability method. The reliability was found to be 0.73.

Validity

The validity of the instrument was found to be very high. The validity was 0.632.

Table 1 : Descriptive Statistics

S. No.	Demographic	Numbers	Percentage
1.	Gender	Male = 105 Female= 40	Male = 72.41 % Female = 27.58 %
2.	Age	20 - 30 = 56 31 – 40 = 41 41 – 50 = 30 50 – Above = 18	20 - 30 = 38.62 % 31 – 40 = 28.27 % 41 – 50 = 20.68 % 50 – Above = 12.41 %
3.	Teaching Stream	Science = 15 Maths = 25 Social Science = 37 Language = 42 Commerce = 26	Science = 10.34 % Maths = 17.24 % Social Science = 25.51 % Language = 28.96 % Commerce = 17.93 %
4.	Teaching Standard	Primary = 62 Secondary = 47 Higher Secondary = 36	Primary = 42.75 % Secondary = 32.41 % Higher Secondary = 24.82%
5.	School Category	Government = 81 Private = 64	Government = 55.86 % Private = 44.13 %
6.	Position	Lower Division Teacher = 62 Upper Division Teacher = 48 Principal = 35	Lower Division Teacher = 42.75 % Upper Division Teacher = 33.10 % Principal = 24.13 %
7.	Level of Education	UG = 64 PG = 57 Ph.D. = 24	UG = 44.13 % PG = 39.31 % Ph.D. = 16.55 %
8.	Education Background	Science = 17 Commerce = 26 Arts = 42 Others = 60	Science = 11.72 % Commerce = 17.93 % Arts = 28.96 % Others = 40.68 %
9.	M.Ed.	Yes = 74 No = 71	Yes = 51.03 % No = 48.96 %
10.	B.Ed.	Yes = 134 No = 11	Yes = 92.41 % No = 7.58 %
11.	Diploma / Certificate in Computers	Yes = 86 No = 59	Yes = 59.31 % No = 40.68 %

Statistical Tool Used

Factor analysis was used to analyse the data.

Factors Affecting Usage of ICT by School Teachers

The scale was administered on sample of 145 school teachers of Indore. The scores obtained were subjected to factor analysis and 6 factors were identified. Items whose load factor was less than 50% were ignored. (Refer Table 2)

Table 2

Factor No	Factor Name	Question No
1	ICT Enabled Resources	7,8,9
2	Student Data Management	23,24,25
3	ICT based Teaching and Learning	1,2,3,4,5,6
4	Hands on Experience using IT	26,27,28
5	Knowledge Management using ICT	11,12,13
6	IT Supported Examination	18,19,21

1. **ICT Enabled Resources**

In India majority of government and private schools are equipped with IT enabled devices now. Government had invested lot of money on IT hardware and services in schools and have even provided training to teachers. Both teachers and staff in schools have started using computers by which their working efficiency has increased. ICT has enhanced capacity for tailoring instruction for individual students and monitoring student performance. Information technology has made possible professional development for teachers. Technology has overcome school scheduling problems by delivering training during off-hours or as the teacher works with students and colleagues in the classroom. Teachers and students can collaborate outside the classroom in synchronous (real-time) and asynchronous (delayed response) manner which brings far more resources, perspectives, and analysis to classroom assignments.

2. **Student Data Management**

Traditional approach of schools to maintain student's data was fully dependent on papers, register etc. Data related with students includes results, attendance, record of previous classes, current status of students etc. Information Technology provides different tools and technique to manage data of student in database management system which can be easily maintained by software. Accurate, up-to-the-minute data is the main advantage of this

approach and sharing data with students and parents is also beneficial for teachers and parents. By adopting IT enabled service in schools flow of information has become easy and fast between different users of information.

3. ICT Based Teaching and Learning

Education in current scenario has witnessed major shift in teaching and learning processes with the help of usage of ICT. Unlike earlier days when learning was more focused on problem solving, learning and examination oriented today it is focused on discovery, invention, creativity, action and reflection. The major shift of this learning is from teacher centric to student centric. With the present infrastructure, class size, availability of teachers, quality of teachers, training of teachers, etc., it is difficult to impart quality teaching to all. ICT is of great use in such situations. A single teacher is not capable of giving up to date and complete information in his own subject. ICT can fill this gap because it can provide access to different sources of information. It provides correct information as comprehensive as possible in different formats with different examples. ICT provides online interaction facility. Students and teachers can exchange their ideas and views, and get clarification on any topic from different experts, practitioners, etc. It helps learners to broaden the information base. ICT provides variety in the presentation of content which helps learners in concentration, better understanding, and long retention of information which is not possible otherwise. The learners can get opportunity to work on any live project with learners and experts from other countries. The super highway and cyber space also help in qualitative improvement of Teaching – Learning Process. ICT provides flexibility to learners which are denied by the traditional process and method. Flexibility is a must for mastery learning and quality learning.

4. Hands on Experience Using IT

The students understand better, if they do some practical related to the concept. It makes learning easy and interesting. Laboratory helps in developing scientific temper. But the fact is that practical are not done by each student in each school. There are many schools which do not have laboratory. Sometime if laboratory is available, the instrument is not available. The students are not given freedom to do experiments at their own. Virtual laboratory can provide lots of freedom to the student. That is, student can take different types and shapes of objects, change the distance between mirror and object to any extent, change the thickness of the mirror, etc. and can see how such attributes affect the focal length of the mirror. The Virtual

Laboratory can be developed using ICT. It may be made available at the door step of each and every student by uploading it on the Website. ICT helps students to do many thing virtually rather going in a field. Many tools are available which creates same scenario as they are working in field we call those tools as simulations. Similarly teacher use ICT in teaching method than student can also do the same thing in laboratory or in their own computers. When teacher cover any topic in class which requires any further exercise on computer than student can perform those thing on computer later on.

5. **Knowledge Management Using ICT**

Elias M. Awadet. al., (2008) Knowledge Management is a systematic, organized, explicit and deliberate ongoing process of creating, disseminating, applying, renewing and updating the knowledge for achieving organizational objectives ICT focuses on how information is managed. A wide range of ICT tools are used to create, codify and share knowledge across both geographical and temporal boundaries. At present there is a shortage of qualified and competent teachers in all most all subjects at all levels. Not only this, even the instructional material available in the print form is not of quality. There are many teachers who are well known for the specific subject. Their lectures can be digitalized and made available to all the users. It will enhance the quality of instruction in the classrooms. The teacher can use them in the classrooms. Another form of digitalized lectures is e – content. A teacher can develop e – content in their own areas of specialization. This has lots of potentiality to bring quality in teacher education. The ICT can be used in developing instructional material and e-content.

6. **IT Supported Examination**

These days' teachers are using ICT for tests and examination. With the help of ICT test can be conducted online without any barrier of location. Teachers can make papers easily by comparing various questions online. Evaluation can be done easily by various machine and in online test result can be given to students after submitting results.

Conclusion

This is the age of information dominated by the Digital Technology. The Digital Technology has influenced all aspects of human life. School education is not an exception. The objectives of school teaching are multi-dimensional in nature, so for their achievement multiple methods should be used in an integrated way. In this regard ICT has proved to be very helpful. This study made an attempt to identify factors affecting Information Communication Technology

enabled teaching by school teachers. Six factors were identified namely ICT Enabled Resources, Student Data Management, ICT based Teaching and Learning, Hands on Experience using IT, Knowledge Management using ICT, IT Supported Examination . Although use of ICT is very helpful in teaching and learning in schools but it is not totally free of problems. High cost of involved in its equipments and appropriate training of teachers are some of the prominent issues which hinder the use of ICT in school education and needs to be identified and addressed.

Table 3: Rotated Component Matrix[a]

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
Questions	ICT Enabled Resources	Student Data Management	ICT based Teaching and Learning	Hands on Experience using IT	Knowledge Management using ICT	IT Supported Examination
Q7	0.81932					
Q8	0.801249					
Q9	0.711972					
Q23		0.822614				
Q24		0.756335				
Q25		0.616908				
Q1			0.777596			
Q2			0.711391			
Q3			0.685268			
Q5			0.844183			
Q4			0.824972			
Q6			0.6322			
Q28				0.779671		
Q27				0.764095		
Q26				0.722542		
Q13					0.769344603	
Q12					0.699578259	
Q11					0.517340563	
Q21						0.813078

Q18						0.819915
Q19						0.535475

Extraction Method: Principal Component Analysis
Rotation Method: Varimax with Kaiser Normalization
a. Rotation converged in 12 iterations.

Table 4: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.058	18.066	18.066	5.058	18.066	18.066	2.942	10.506	10.506
2	3.298	11.779	29.845	3.298	11.779	29.845	2.850	10.178	20.683
3	2.825	10.089	39.934	2.825	10.089	39.934	2.568	9.172	29.855
4	2.126	7.591	47.526	2.126	7.591	47.526	2.347	8.382	38.238
5	2.043	7.298	54.824	2.043	7.298	54.824	2.283	8.155	46.393
6	1.989	7.104	61.928	1.989	7.104	61.928	2.198	7.848	54.241
7	1.323	4.725	66.653						
8	1.134	4.052	70.705						
9	.949	3.389	77.693						
10	.893	3.190	80.883						
11	.759	2.711	83.594						

13	.675	2.410	86.004						
14	.607	2.168	88.172						
15	.542	1.935	90.106						
16	.427	1.524	91.631						
17	.376	1.342	92.972						
18	.333	1.189	94.161						
19	.275	.984	95.145						
20	.270	.965	96.110						
21	.245	.876	96.986						
22	.206	.735	97.722						
23	.187	.666	98.388						
24	.171	.609	98.997						
25	.117	.419	99.417						
26	.071	.254	99.671						
27	.057	.205	99.876						
28	.035	.124	100.000						

Extraction Method: Principal Component Analysis.

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