AVAILABILITY OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) FACILITIES IN SECONDARY SCHOOLS

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ABSTRACT-In today's world, the availability of ICT facilities is very much required for the progress of education in secondary schools. This study was conducted to assess the availability of ICT facilities on secondary schools in India. Data was collected from 100 secondary schools in india. Results indicate that some schools are well equipped with ICT infrastructure while others are not due to numerous reasons. It is evident from the study that the availability of ICT facilities significantly varies with school ownership, board of education, school location and school size.

Keywords-**Information and Communication Technology (ICT) ; Secondary schools; India**

INTRODUCTION

As the world is advancing rapidly into an era of digital media and information, ICT has established a firm rooting for itself in all aspects of life. The field of ICT has made a deep and strong impact on the quantitative and qualitative aspects of teaching and learning in educational hubs. Overall, ICT adds great value to the learning process in education. It also significantly adds to the management and organization of learning institutions (Oyeet al.2011).

The term ICT refers to different forms of technology that are used to transmit, store, create, share information. The term ICT infrastructure refers to the computers, hardware that connects the computers to each other, the network cabling, Internet, and set of software. The different ICT facilities used for teaching and learning process in secondary schools include television, radio, video/ VCD machine, computers, overhead projectors, fax machines, optical fibres, CD-Rom, electronic notice board, slides, digital multimedia, , Internet and so on (Babajide and Bolaji 2003, Bryers 2004, Bandele 2006, and Ofodu 2007). In Indian schools, varied ICT infrastructure has been employed over the years which include radio, satellite based, interactive television, the Internet, various soft-wares and hardware mainly in the form of computers, projectors, multimedia facilities and peripherals (Scheuermann& Pedro, 2009). For ICT to be useful more computers should be made available to teachers and students during instruction. The availability of screens and projectors during classes is essential, but this is an elusive goal for many schools. Most traditional classrooms are not well equipped with LCD projectors due to budget constraints (Norris et al. 2003). The inclusion of ICT infrastructure into schools has affected teachers and students at various levels: new methods of learning have been adopted by students; innovative teaching methods have been formulated by teachers; active learning and autonomous processes using the technology have been taken up; teachers' traditional roles have now enlarged and now encompass ICT based tutoring (Mioduser et al .,2002). Without sufficient resources however, there is very little opportunity for teachers to integrate ICT in the curriculum (Bradley & Russell, 1997). School ICT culture is largely influenced by ICT resource acquirement and the capabilities to use these resources. School management need to asses' present ICT infrastructure with the school, how these resources are utilised by teachers, what barriers the teachers are facing with the usage of ICT in their teaching and learning. This assessment gives better information to school management about what types of ICT resources are to be acquired, how to make best possible use of these resources, how to train and motivate teachers to the use of ICT and make wise decisions concerning further ICT investment in future (Newby et al., 2012). ICT is an integral part of modern life. ICT adopted throughout the worldwide. But a considerable difference persists between developing and developed countries in terms of both ICT resources and the capabilities of teachers to effectively use these limited ICT resources. Research studies have emphasized important benefits of exposing young children to technology and integrating it into school curriculum (Castellani and Jeffs, 2001). A very real challenge for any school is to obtain and successfully utilize ICT in the environment of meagre and inadequate ICT resources.

As availability of infrastructure increases, accessibility to use various features of ICT increases. It was observed that many teachers had better computer skills and were using ICT in their teaching when infrastructure is highly abundant (Lai and Pratt, 2004). Adequate infrastructure means give leverage to incorporate ICT in the curriculum, thus contributing to overall student development (Jonassen, 2000). A clear understanding of ICT infrastructure gives an idea about the extent to which it may be utilized in education. It is in this context, an assessment about availability ICT infrastructure in secondary scale is to be made.

LITERATURE REVIEW

The usage of ICT in secondary schools is more influenced by the availability of ICT facilities. When ICT facilities are available and adequate in schools, usage of ICT for teaching and learning can be seen more often. There is a high correlation between availability of ICT resources and ICT usage (Judge, 2013). The availability of ICT infrastructure is largely influenced by school related factors such as school policy, top management support and school ownership. The school factors investigated by researchers include access to technology (Pelgrum, 2001), school policy and ownership (Baek et al., 2008; Hew and Brush 2007) and school support in the form of funds (Phelps and Graham 2008). A research study indicated that availability and use of ICT for teaching and learning was significantly higher in independent-autonomous schools as compared to government and government-

aided schools (Lim, 2006). A study by Vesisenaho (2007) shows that it is mostly private secondary schools in Tanzania are able to offer ICT integration or computer science in teaching and learning. These findings are supported by Hare (2007), who reports that, "most private schools in the urban areas are more equipped with ICT facilities. Hence, the ownership of school will have influence on availability of ICT facilities. Board of education may be another school related factor which has influence on availability of ICT infrastructure. The board of education decides the content and curriculum of ICT education. The Board of education also decides if ICT is used for examination purposes. The entire curriculum planning is done at a higher level by the Board of Education whereas the teachers plan at the school level. The curriculum design and pedagogy may affect the integration of ICT infrastructure (Webb and Cox, 2004). The board of education also decides the model of integration of ICT in schools if, for example the ICT in schools follows an outsourced model or an integrated model (Kasinathan, 2009). The availability of ICT facilities is also influenced by location of the school where urban schools are well equipped with ICT infrastructure because of its connectivity and rural schools are not well equipped with ICT because of its isolation and poor connectivity. Another important factor is school affordability. Small and medium sized schools have less affordability as compared to large sized schools. School size plays a role in teachers' usage of ICT as well (Norris et.al, 2003). Small sized schools usually have more collegiality. However, small schools are often short of staff and teachers might lack time for creating ICT lessons (Hennessy et al. 2005). It is apparent from above literatures that, the availability of ICT infrastructure significantly vary as per school characteristics such as school ownership, board of education, school geographical location, and school size.

OBJECTIVES AND METHODOLOGY

Objectives of the study

This study assess the availability of ICT facilities for teaching in secondary schools in India and examining how the availability of these facilities vary with school characteristics such as school geographic location, school size, school ownership and board of education. The study aims to test the following research questions.

1. Test whether is there any significant difference in the availability of ICT infrastructure as per ownership of the school.
2. Test whether is there any significant difference in the availability of ICT infrastructure as per board of education.
3. Test whether is there any significant difference in the availability of ICT infrastructure as per school size.
4. Test whether is there any significant difference in the availability of ICT infrastructure as per geographical location of the school.

The sample

The sample consisted of 100 secondary schools selected from following 4 states of India: Andhra Pradesh, Goa, Kerala and Tamilnadu. The schools profile (ownership, board of education, size, and location) are shown in Table 1.

Research Instrument

A survey methodology using questionnaire is used to assess the availability of ICT facilities in secondary schools. . Data was collected using this questionnaire, which consists of two sections. Section A consists of 13 statements aiming to investigate availability of ICT facilities in secondary schools. The respondents were required to indicate to what extent they agree or disagree with each of the statements using five-point Likert scale. The total ICT infrastructure score (ICTIS) was calculated for each school based on the responses obtained for each statement. Section B consists of questions relating to school characteristics (ownership, location, board of education, and size). Thorough literature review and pilot study was conducted to establish content validity for the questionnaire. First, a literature review was conducted to ensure that the availability of ICT facilities were based upon established concepts. Second, questionnaire was pilot tested by school administrators, school teachers for its content validity. Wherever necessary, questions are reworded to improve its clarity and validity.

Data Analysis

The data collected from survey were analyzed in several ways. First, a frequency distribution generating absolute and cumulative frequencies and percentages is calculated for each question. Frequency is a statistic that tells as how many times a given score occurs in a collection of data. Percentile is also calculated from frequencies. Second, mean is calculated for the purpose of comparison of data with other questions. Lastly Analysis of variance (ANOVA) was used to compare the differences in mean values of the constructs among school characteristics such as ownership, location, board of education and school size. The statistical software SPSS version 20.0 was used in data analysis.

RESULTS AND DISCUSSION

This section reports the results related to availability of ICT infrastructure. There are 13 constructs were used to measure the availability of ICT infrastructure with ICTIS. Table 2 shows that, mean scores for each construct or item are less than 3.0 with a standard deviation ranging between 0.90 and 1.20. This indicates secondary schools in India are not well equipped with ICT facilities. The Cronbach's alpha for 13 items of the scale was found to be 0.88. This indicated high internal consistency of the scale.The ICT Infrastructure Score (ICTIS) was calculated by taking the sum of mean values of all 13 constructs. The ICTIS indicates level of availability of ICT infrastructure in secondary schools. The mean value of ICTIS indicated that schools are lacking in availability of ICT infrastructure.

Table 3 shows mean and standard deviation of ICTIS as per school characteristics such as ownership, location, board of education and school size. Schools in the government sector possess lower level of ICT infrastructure and their ICTIS are lower (Mean = 26.17) than that of aided private schools (Mean = 31.04) and private un-aided schools (Mean = 40.61). Urban schools have high level of ICT infrastructure availability (Mean = 35.89) as compared to that of semi-urban schools (Mean= 29.76) and rural schools (Mean= 26.57). The schools functioning under CBSE possess higher level of ICT infrastructure (Mean=46.15) as compared to that of state board schools (Mean = 29.24). Smaller schools have least ICT infrastructure availability (Mean = 25.21) as compared to that of medium sized schools (Mean= 34.38) and large schools (Mean= 42.36).

Availability of ICT infrastructure was examined by school ownership, board of education, geographical location and school size. Analysis of Variance (ANOVA) was used to test the significance of difference in availability of ICT infrastructure as per ownership, location, board of education and school size. Results of ANOVA in table 4 showed that there is a significant difference in the availability of ICT infrastructure as per school ownership at p = 0.000 (F= 10.747). ANOVA results in table 5 showed that there is a significant difference in the availability of ICT infrastructure as per board of education at p = 0.000 (F= 14.976). ANOVA results in Table 6 showed that there is a significant difference in the availability of ICT infrastructure as per geographical location at p = 0.020 (F= 4.088). ANOVA results in table 7 showed that there is a significant difference in the availability of ICT infrastructure as per school size at p = 0.000 (F= 14.267).Results from the study shows that some schools are well equipped with ICT infrastructure while others are not due to a myriad of reasons. Private schools particularly in urban area and functioning under CBSE are well equipped with ICT facilities as compared to government schools particularly in rural areas and functioning under state board. There was a significant difference between urban schools and rural schools with regard to availability of ICT facilities. Schools in rural areas are lacking ICT facilities as compared to schools in urban area. Similarly, there was a significant difference between CBSE schools and state board schools with regard to availability of ICT facilities. Schools functioning under state board are lacking ICT facilities as compared to schools functioning under CBSE. There was a significant difference between large sized schools and small and medium sized schools with regard to availability of ICT facilities. Small sized schools are observed to be lacking ICT infrastructure as compared to large sized schools. There was a significant difference between private schools and government schools with regard to ICT facilities. Government schools are observed to be lacking ICT infrastructure as compared to private schools. It was also found that ICT infrastructure is very limited in small sized schools particularly those owned by government as compared to private schools.

CONCLUSION

It is evident from the study that rural schools have very meagre ICT facilities when compared to urban schools. In developing countries like India, the availability of basic requirements of continuous electricity supply become crucial factors for making ICT conducive for use in rural areas. Most rural schools are lacking ICT facilities due to inaccessibility and lack of network communications. The government of India must ensure that rural schools are not isolated from the urban education mainstream. Rural schools have to be updated with the new innovations in education. It becomes much more important to provide ICT infrastructure in rural India as digital technology is especially beneficial to students from disadvantaged backgrounds. Rural schools need to be renovated to provide appropriate infrastructure for a radical change. New modes of instruction, learning approaches and most importantly ICT tools including reliable internet connectivity will have to be established in order to enhance teaching and learning in rural schools.

State board schools have lesser infrastructure as compared to CBSE due to the fact that ICT is not integrated into the curriculum in most of the state board schools. This gap between the state board and CBSE schools can be bridged by promoting ICT into the curriculum in one of the following ways: making it a compulsory subject, introducing ICT as an optional course or by teachers incorporating ICT into everyday teaching of various subjects and involving students in use of ICT, for, example in submission of projects, submission of everyday home works etc. The conditions of government schools particularly in rural areas are awful. The quality of instruction and teaching and classroom materials is poor with little or almost no ICT infrastructure. The student–teacher ratio is also very high. Government schools lack the adequate funding necessary to incorporate state of the art ICT infrastructure. The lack of coordination between various government bodies might result in inefficiencies at the school level. Dissolving hierarchy and empowering government school authorities might bring more positive results relating to ICT in such schools. Strong and sustainable partnerships between school management and government must be built to balance costs and alleviate the complexities of the integration of ICT in secondary education. This indicates that government support and community based ICT facilities might be the most crucial factors to make ICT infrastructure more available, especially in developing nations like India. It is recommended that government must ensure adequate computers and internet connectivity across the country especially in rural schools to facilitate ICT based education for rural schools.

Table 1. Profile of Secondary Schools

School Characteristics		Frequency	Percentage
Ownership	Government	37	37.0
	Private Aided	27	27.0
	Private Unaided	36	36.0
Location	Urban	62	62.0
	Suburban	17	17.0
	Rural	21	21.0
Board Of Education	State Board	78	78.0
	CBSE	20	20.0
	Others	2	2.0
School Size	Small (<500 students)	38	38.0
	Medium(500-1000 students)	37	37.0
	Large(>1000 students)	25	25.0

Table 2.Constructs for Measuring Availability of ICT Infrastructure

Availability of ICT infrastructure	Mean	Std. Deviation
Sufficient computers are made available for teaching and learning	2.96	.963
All class rooms are well equipped with television sets	2.46	1.176
Electronic notice boards are provided for faster communication.	2.21	1.085
Internet access is provided to all teachers and students	2.84	1.061
All class rooms are well equipped with video/audio equipments	2.58	1.182
All classrooms are well equipped with overhead projectors	2.45	1.175
All classrooms are well equipped with LCD projectors	2.55	1.201
All classrooms are well equipped with smart boards	2.30	1.115
Academic or electronic resources are made available through school website	2.37	1.186
Adequate number of software's are provided.	2.53	1.251
Regular maintenance and upgradation of hardware and software is observed	2.59	1.190
The school employs teachers who specialize in ICT education.	2.68	1.230
Employs technicians who are experts in ICT tools.	2.37	1.160
ICT Infrastructure Score (ICTIS)	32.89	14.243

Table 3.Mean and Standard deviation of ICTIS

School Characteristics		N	Mean	Std.Deviation
Ownership	Government	37	26.73	15.374
	Private Aided	27	31.04	10.614
	Private Unaided	36	40.61	11.955
Location	Urban	62	35.89	13.410
	Suburban	17	29.76	14.368
	Rural	21	26.57	14.576
Board Of Education	State Board	78	29.24	13.081
	CBSE	20	46.15	10.230
	Others	2	42.50	13.435
School Size	Small (<500 students)	38	25.21	13.314
	Medium(500-1000 students)	37	34.38	12.216
	Large(>1000 students)	25	42.36	12.227

Table 4.ANOVA Table Showing Relationship between Ownership and Availability of ICT Infrastructure

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3642.974	2	1821.487	10.747	.000
Within Groups	16440.816	97	169.493		
Total	20083.790	99			

Table 5.ANOVA Table Showing Relationship between Board of Education and Availability of ICT Infrastructure

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4738.368	2	2369.184	14.976	.000
Within Groups	15345.422	97	158.200		
Total	20083.790	99			

Table 6.ANOVA Table Showing Relationship between Location and Availability of ICT Infrastructure

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1561.379	2	780.689	4.088	.020
Within Groups	18522.411	97	190.953		
Total	20083.790	99			

Table 7.ANOVA Table Showing Relationship between School Size and Availability of ICT Infrastructure

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4565.012	2	2282.506	14.267	.000
Within Groups	15518.778	97	159.987		
Total	20083.790	99			

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