A Survey of Secondary School Teachers' Perceptions, Competency and Use of Computers

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Abstract: Use of ICT for teaching and learning has received a lot of attention in the last two decades. The present study is an attempt to understand the use of ICT, more specifically, use of computers among secondary school teachers for teaching and learning. The main focus of the study is to elucidate teachers' perceptions and competency in relation to actual use computers in classroom teaching. The study was carried out among secondary school teachers working in Puducherry, India. Teachers' perception towards use of computer was found to be favorable. Age, gender, training in computers, teaching subject did not show significant difference in the teachers' perception on use of computers. However, the actual use of computer by teachers seems to differ significantly by age, gender, computer ownership, teaching subject, teachers' competency, and training. It is concluded that home access to computers, skill training and competency of teachers are the main determinants of integration of ICT in school education.

Key words: Computer perception, ICT

I. Introduction

Growth of information and communication technology (ICT) brought in rapid changes in various fields. It had also made entry into school education because of its appropriateness, applicability and versatility in use for classroom teaching. It is well recognized that ICT has great potential for improving the teaching learning process. It facilitates individualized learning and develops problem solving skills. Its interactive nature motivates students to learn. Educationists and teachers believe that with the help of ICT quality of education given to the students can be significantly improved.

In this era of digital communication, both students and teachers have an easy access to sources of information. But, to take advantages of ICT, firstly, the teachers need to be aware of various information technologies and their potential uses in the field of education. It is pertinent to expose the teachers to information technology so as to realize its benefits for them and for their students. Secondly, teachers will have to update their knowledge and skills in using ICT to make fullest utilization of hardware and software resources available. With changing teaching methods in curriculum transaction, it is essential that teachers have to leave their apprehensions behind about technology mediated instruction and adopt new technologies.

Thirdly, from the point of view of policy makers and educational administrators there is a need to redesign and reconstruct the educational systems based on the new educational paradigms so that both teachers and students develop necessary knowledge and skills sought in this digital age. Most countries around the world are focusing on approaches to integrate ICT in learning and teaching to improve the quality of education by emphasizing competencies such as critical thinking, decision-making, and handling of dynamic situations, working as a member of a team, and communicating effectively (Anderson & Weert, 2002). Governments, especially, in developing countries have been trying to improve their national programs to integrate ICT into education.

Indian government has been focusing on computers mediated teaching and learning in the schools. The significant role ICT can play in school education has been highlighted in the National Curriculum Framework (NCF, 2005). The Ministry of Human Resources Development, with its strategic partners, has engaged with approximately 400 members from the stakeholder community including education experts, ICT specialists, businesses, schools, teachers, students and others to collate their views, suggestions and recommendations on a national policy on ICT in school education. The aim has been to hold intense discussion with pedagogues and technology in education practitioners, and also increase the outreach of the process to a geographically spread pool of experts, communities of practitioners and stakeholders. India has some 1.2 million schools with 290 million students attending school every day, under 35 state boards, two central boards. India has an abundance of stakeholders representing them and assisting the state governments to integrate ICTs in schools (Towards a National Policy on ICT in School Education in India, 2007).

The policy aims at creating an ICT-knowledgeable society, providing free access to ICT enabled tools and resources to teachers and students and motivate the sections of the society strengthening the school education process through appropriate utilization of ICT (revised National Policy on Information and Communication Technology in School Education, 2012).

II.   Review of Literature

In a study on teachers' perception on use of technology in the classroom, Ertmer, Ottenbreit-Leftwich, & York (2007) found that teacher beliefs, confidence and ability to use technology and commitment influence technology integration in the classroom. Zhao (2007) study on social studies teachers supports that teachers' views influenced their use of technology in the classroom. Most teachers were willing to use technology and expressed positive experiences with technology integration. Training is found to increase their use of technology in the classroom, and to use it more creatively.

Anne Mundy, Kupczynski and Kee (2012) studied teacher's perceptions of technology use in the schools in the USA. Teachers expressed that there was a significant increase in the areas of student engagement, student excitement and student acceleration of learning was observed after the completion of a teacher empowerment programme. Gulbahar and Guven, (2008) studied ICT usage in schools by the social studies teachers in Turkey. The study highlights that teachers are aware of the potential of ICT but they are facing the problem of lack of ICT accessibility and opportunity for in-service training programmes.

Gorder (2008) in his study on the Teachers' Perceptions of Instructional Technology Integration in the Classroom reported that teachers who use technology regularly are more likely to integrate technology in the classroom. He observed significant differences in technology use and integration based on grade level while there were no differences based on gender, age, teaching experience, content area, and educational level. A study by Hutchison (2009) on teachers' perception of use of ICT in the USA revealed that several applications of ICTs are not frequently integrated by the teachers. ICTs are not used in ways consistent with definitions associated with 21 century literacy. ICTs are still used most often to replace existing print-based activities with digital activities instead of as a vehicle for transforming learning. The study reports that ninety eight percent of teachers reported that they would like to increase their integration of ICTs into instruction.

A study conducted by Bee Theng Lau and Chia Hua Sim (2008) indicated that teachers held a reasonably positive attitude towards ICT adoption in school and those who received training recorded a higher competency in ICT. Elderly teachers were keen to adopt ICT in schools. Respondents who were more

competent in using computers reported more favorable perception towards ICT. It was observed that teachers who have been using ICT extensively also felt the need for high training and support needs.

Rajasekar and Raja (2007) studied computer knowledge and attitude towards computer of 670 higher secondary school teachers in Cuddalore district of Tamilnadu. The study found no significant difference in attitude towards computer between male and female teachers and the teachers working in the urban and rural schools. The study revealed that 60.40% of the teachers had relatively a favorable attitude towards computer and teachers' computer knowledge was weak.

A survey conducted by Uniyal and Pandey (2008) on teachers of Uttarakhand, observed that teachers who are above 40 years of age and teachers with 20 years of experience and above showed a favourable opinion but used less in the classroom. The study also reported that there is no difference in opinion between the male and female teachers but difference was found between rural and urban teachers. The study says that though there is availability of computers teachers did not use.

Panigrahi (2011) studied perception of teachers' towards extensive utilization of information and communication technology. One hundred senior secondary school teachers from Haryana were selected through simple random sampling technique. The study reported that there is no difference between the perceptions of urban and rural teachers and male and female teachers.

Manisha (2012) studied the attitude of secondary school teachers on using new technologies in Northern Goa. The sample was drawn from150 secondary school teachers working in 45 schools. The study showed that there is no difference in attitude by gender or experience but significant difference was noticed with respect to age, computer ownership and computer experience of the respondents.

Narasimhan (2012) studied the attitude of secondary school English teachers in Srikakulum district of Andhra Pradesh. The English teachers under study showed a positive attitude towards using information and communication technology in teaching of English.

III. Methodology

The present study is a cross-sectional survey among the Secondary school teachers. Its main focus is to elucidate the teachers' perception, competencies in computer and its relationship with actual use of computer in classroom teaching. The socio-demographic factors such as gender, age, teaching experience, education and teaching subject are analyzed in relation to teachers' perception, competencies and actual use of computers. Further, information on computer ownership, knowledge of computer and training in use of computers are also analyzed for their relation to actual use of computer. The study is confined to randomly selected teachers working in secondary schools in Pondicherry and the findings cannot be generalized.

3.1 Research Questions:
1. What are teachers' perceptions towards usefulness of computers in teaching-learning process?
2. What are teachers' competencies in using computers?
3. What are the purposes of use of computer by teachers?
4. What is the extent of use of computers in teaching-learning processes?
5. Are gender, age, computer ownership, teaching subject, and training in computers having influence on teachers' perceived usefulness and actual use of computer?

3.2 Sample: The accessible population in this study was secondary school teachers working in the government and government aided schools in the union territory of Pondicherry.

3.3 Data Collection: Self-administered questionnaire was employed to gather data from randomly selected 134 secondary school teachers. The questionnaire consists of information on socio-demographic profile; ownership, knowledge and training in computer; purpose of use of computer, teachers' perception of computer technology for classroom transaction, computer competency and actual use of computer for teaching.

IV.   Data Analysis

The data were analysed using frequency distribution, percentages, mean, t-test and ANOVA. Statistical Package for Social Sciences (SPSS) was used to carry out the data analysis.

V.   Results of Descriptive Analysis

An analysis of the socio-demographic factors is shown in Table-1. Of the 134 teachers, a majority of them are females constituting 81.34% as compared to 18.66% of males. Only one-third (34.33%) of respondents had less than 10 years of teaching experience, as compared to others whose experience ranged from 10 -19 to 30 -39 years. Since the sample is drawn from secondary school teachers all of them had completed graduation and B.Ed. It is interesting to note that more than two-thirds (68.65%) of the sample are post graduates. In terms of subject taught, 48.5% are science and mathematics teachers, closely followed by 32. 8% are language teachers and 18.7% are social teachers.

The availability of computer and knowledge of its use are important facilitating conditions for effective utilization computers. From the Table-2 we can observe that a majority of teachers reported to have computers at home (65.7%) and at school (61.9%). A majority of the teacher-respondents found to have knowledge in use of computers, while 40.3% of them had no familiarity in use of computers. This could possibly due to lack of tainting to school teachers in use of computers. Among the sample studied, only 47.8 % had some training in use of computer as against 52.2 % with no training in computer use. Knowledge of use of internet among the school teachers is also moderate. Only about 53% of the teachers have some knowledge of use of internet.

Table-1: Socio-Demographic Profile

Variable	Category	N	%
Gender	Male	25	18.66
	Female	109	81.34
Age	20-29	14	10.44
	30-39	36	26.86
	40-49	43	32.08
	50 +	41	30.59
Teaching experience	<10	46	34.33
	10-19	26	19.40
	20-29	17	12.68
	30-39	15	11.19
Post Graduation	No	42	31.34
	Yes	92	68.65

Subject Taught	Mathematics	32	23.9
	Science	33	24.6
	Social	25	18.7
	Language	44	32.8

Table-2: Ownership, Knowledge and Training in Computer

Variable	Category	N	%
Availability of Computers at Home	Yes	88	65.7
	No	46	34.3
Availability of Computers at School	Yes	83	61.9
	No	51	38.1
Knowledge of Use of Computer	Very familiar	34	25.4
	Somewhat familiar	46	34.3
	Not familiar	54	40.3
Computer training	Yes	64	47.8
	No	70	52.2
Knowledge of use of internet	Yes	71	53.0
	No	63	47.0

5.1 Teachers' perception on ICT for teaching
The information on teachers' perception with respect to the transformative role of ICT in the teaching and learning were collected using a 20-item scale with three-point scoring: agree=3, undecided=2 and disagree=1.

It may be noted that close to 77% of the respondents are in the range of 2.5 to 3.0 mean score and remaining 23% of the respondents are in the range of 1.5 to 2.4 mean score. It shows that the overall perception of teachers towards transformative role of ICT is positive with 2.68 mean score. A majority of the respondents are in agreement with the view that use of ICT provides an opportunity for teachers to a) obtain educational resources from the internet to enrich course content, b) improve teaching and learning processes and c) enhance student attention and motivation.

5.2 Teachers' competencies in using computers
Competency is essential for successful integration of technology in classroom teaching. As observed earlier, nearly one-half of the respondents have no training in use of computers (Table-2). So the teachers' competency in the use of simple software packages is also not satisfactory. It is generally accepted that power point presentations are widely used in schools for lesson preparation and presentation. However, in our study only 19.4% of teachers are somewhat competent followed by 11.2% competent in using power point presentations. The scenario is slightly better in use of word processing with 17.9% as 'competent' to 33.6% as 'somewhat competent' leaving 48.5% with no competency in using word processing. The competency to work with spreadsheet is absent among 70.9%. Similarly, 66.7 % had no competency to use internet and procure resources from the World Wide Web and downloading them for teaching purpose.

5.3 Teachers' actual use of computers by purpose
The self-reported information indicates that 26.54% of the teachers use computers for personal work like communicating with people through e-mail, entertainment; banking etc. Only a small percent of teachers

(19.64%) reported to have used computers with academic interest that includes lesson preparation, class notes preparation, and browsing the websites for extra material on course content. Approximately 13.53% of the teachers have been using school computers for administrative work. It includes question papers typing, entry of marks, and preparation of grade cards. It is significant to note that 40.29 % of respondents have never used computers.

VI.   Results of Differential Analysis

6.1 Relationship of teachers' perception and teachers' use of computer with gender
A t-test was conducted to find the difference in the means of computer usage among males and females. The results failed to reveal a statistically significant difference between the mean number of males and females using the computer for teaching and teachers perception about use of computers for classroom teaching.

6.2 Difference in teachers' perception and teachers' use of computer by age
ANOVA test was conducted to analyze the differences between computer perception, computer usage, and the age of the respondents. Respondents were categorized into four groups: 20-29 years; 30-39 years; 40-49 years and 50 years and above. Results indicate that with regard to the teachers' perception of computer, there is no difference in the means of different age groups.

As it can be seen from Table-4, there was a statistically significant difference at the $p<.05$ level in actual use of computer among different age groups. Post-hoc comparisons using the Turkey HSD test indicated that the mean score for 30-39 years was significantly different from 40-49, 50 and above age groups regarding the use of computers.

6.3 Difference in teachers' perception and teachers' use of computer by teaching subject
Table-5 shows the mean and SD of teachers' perception and teachers' actual use of computer by their teaching subject. Data shows that science teachers' perception as well as actual use was better than the remaining subject teachers. ANOVA test indicates no significant difference in the mean perception of different teachers but there is a significant difference in the mean use of computers among different subject teachers. Post-hoc comparisons using Turkey HSD test revealed that the mean of science teachers (mean = 2.06, $<.05p$) was significantly different from social studies, mathematics and language groups.

Table-3: Independent sample t-test: teachers' perception and actual use of computer by gender

Variable	Male	Female	t-value	Sig (2- tailed)
Perception	2.66	2.22	.755	.454
Actual use	1.65	1.42	1.159	.255

Table-4: Difference in teachers' perception and teachers' use of computer by age

Variable	Age				F	Sig (2- tailed)
	20-29	30-39	40-49	50 +		
Perception	2.66	2.60	2.64	2.63	0.313	.816
Actual use	1.67	1.79	1.35	1.24	3.608	.015*

* Significance at 0.05 level

Table-5: Difference in teachers' perception and teachers' use of computer by teaching subject

Variable	teaching subject				F	Sig(2- tailed)
	Science	Math	Social	Lang		
Perception	2.68	2.67	2.61	2.57	1.825	0.146
Actual use	2.06	1.26	1.31	1.26	8.876	.000**

** Significance at the 0.01 level

6.5 Relationship of teachers' perception and teachers' use of computer by computer ownership
An independent-samples t-test was conducted to evaluate if there is a significant difference in the means of respondents having computer at home and the computer use by the teachers in class (table-7). The results of the *t* –test revealed teachers who owned a computers had a statistically reliable difference between the mean number of respondents having computer access at home and that of respondents without access at home and their use of computers (t= (132) = 3.270, *p*=.001, α=.05). Significant difference in means in the perception of teachers about use of computers and computer ownership was found (t= (132) = 2.397, *p*=.018, α=.05).

Table-7: Independent sample t-test: actual use and perception by computer ownership

Variable	t	df	Sig. (2-tailed)
Perception	2.397	132	.018*
Actual use	3.928	132	.001**

*Significance at .05 level
**Significance at .01 level

6.4 Relationship of teachers' perception and teachers' use of computer with training in computers
To find the difference in use of computer among teachers with training and teachers without training, an independent sample t- test was conducted. Table-6 shows that there is a significant difference in the means of trained (M=1.88 SD=1.080 and untrained teachers (M=1.17, SD=.503), t= (74) =.539, *p*=.000

Table-6: Independent sample t-test: teachers' actual use of computer by training in computers

Variable	Training in computers		t-value	Sig. (2-tailed)
	Yes	No		
Actual use of computer	1.77	1.17	5.319	.000**

** Significance at .01 level

VII.   Discussion and Conclusion

This paper examines the teachers' perceptions, competency and use of computers by the in-service teachers. Results of the present study suggest that majority of the teachers acknowledged the importance of using computers in teaching. The mean perception of the teachers regarding the use of use of computers for teaching-learning was found to be favorable.

While some studies found no gender deference in attitude towards computers (Gressard and Loyd, 1986; Kellenberger and Hendricks, 2000: Bakr, 2011), other studies indicate that gender plays a role (Hermans et. al., 2008). Findings of this study revealed that there is no significant difference in perception of computer in terms of gender. This indicates that both male and female teachers have the same perception about use of computers in education. Also in terms of use of computer for classroom teaching no significant difference between male and female teachers was observed which suggests that gender plays no role in use of computers for teaching.

In the literature, there are different studies on teachers' attitudes and teachers' age. While some studies found that there was no significant relationship between teacher's age and attitudes (Massoud, 1991; Woodrow, 1992), other studies found that teachers' age had critical effect on the teachers' attitude (Blankenship, 1998; Cavas et al., 2009). In our study, no significant difference was found in the means of different age group regarding the perception of computers. This shows that teachers of all age groups perceived the importance of computers equally. But in the use of computers, teachers in the age group 30-39 have used computer in the class more than the teachers of other groups (40-49 and 50+). This could be because those teachers were more exposed to the computers than the senior teachers.

The study reports that science teachers used computers more frequently compared to the remaining subject teachers. This shows that science teachers experienced the advantages of using computers more than the teachers of other disciplines Present study is supported by the study of Kumar et.al (2008). This differential usage may be because it is a general belief of the people that mathematics has to be learnt by practice and working out individually with paper and pencil and use of computers will not facilitate learning. In the case of language teachers, generally, they use chalk and talk method and enrich the class with language games for vocabulary development. The observation of results show that science teachers have used computers frequently for teaching and others still did not exploiting the benefits of using computers for their subjects.

Results indicate that teachers who are trained in using computers integrated computers for classroom teaching purpose better than those who lack it. Present study is in line with the earlier studies (Kumar et al. 2008). There is a statistically significant difference in the means of actual use of computers with reference to training was observed in the present study. Research studies show that training improves use of computers by the teachers. So, there is a need to strengthen the in-service training to reinforce the teacher motivation to use ICT. Customized training courses incorporating the needs of the teacher, both basic as well as pedagogical skills, which give the teachers the enhanced skills in pedagogical and technical use of the ICT-based learning, will help the teachers to integrate technology. Further, periodic training in designing of instructional materials gives teachers an opportunity to update their skills, prepare lessons which suits to the level of their students. Models to effective integration of computers should be introduced in the teacher training programs to improve teachers' level of confidence and use of ICT.

Data shows that around 47% of the respondents have no knowledge of internet and have not used it either for personal or professional work. Use of internet is essential for teachers to access the information and get up to date with the developments around the world. Schools should provide internet access so that teachers can download required information and videos necessary for their respective subjects.

There are several studies that investigated the relationship between teachers' personal computer ownership and other variables (Cavas et al., 2009; Sadik, 2006). Roussos (2007) found that computer ownership had a significant effect on the participants' computer attitudes. According to Wood, Putney & Cass (1997) computer ownership and access to computers at home are the best predictors of perceived

computer competence. Results of the present study indicate that computers ownership has an effect on computer perception and computer use by the teachers. This was possible because increased home access allows flexibility of time to use computers and increased use may improve confidence in using computers which has led to increased use in the school.

From the above observations we can conclude that teachers' training, computer competency, and home access to computers are important for teachers to use computers effectively in the classroom.

VIII.   Limitations

The participants who took part in this study were teachers in urban and semi-urban schools in the union territory of Puducherry and the outcome might be different if participants from rural schools were included. Thus, this places a limitation on the generalization that could be made on the findings of this study. The sample study relies on the self reported information of the respondents.

IX.   References

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