

# ICT LITERACY AND PENETRATION IN HIGHER EDUCATION

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## ABSTRACT

*Use of ICT for teaching and learning has received an extreme attention in the last fifteen years. The present research is an attempt to understand the use of ICT, more specifically, use of computers among college teachers for teaching. This research explored the level of usage of information and communication technologies (ICT) by college teacher. Thus, the main objective of this paper is to examine the contribution of ICT tools and its utilization at undergraduate level. The effectiveness, appropriateness and efficiency of specific ICT (computers, and its attached devices', Internet and its application, software, various Internet apps) tools for educational purposes. In this research paper, I have used data from various grant in aid science colleges and self-finance science colleges of Gujarat state particular of Anand district. Results of this research indicates teacher's perception towards use of computer, ICT tools, popular software, Internet, and its related applications etc., Teachers perception towards use of computer and ICT tools were found to be favorable. Age, gender, training in computer did not show significant difference in the teacher's perception on use of computers and ICT tools.*

**Key words:** Teacher Perception, ICT literacy; Science teachers; Internet literacy; Higher Education; Internet Apps.

## 1. INTRODUCTION

The term ICT might be still strange to some, confusing to others and yet misunderstood by an even larger number of well-intentioned colleagues. For many there may appear to be no difference between 'IT' and 'ICT' - and in fact for those who have a good understanding of what teacher of IT also.

As any teacher of I(C) T knows, the difference between Information and Data is that Information is only effective if it actually communicates, thus the conjunction of 'Information' and 'Communication is nothing less.

ICT is the most astounding breakthrough in educational technology since the invention of the blackboard. Since the introduction of ICT we have seen many recent developments both in 'mobile computing' in all its forms and the increasing developments in Open Source Software. However, how we define ICT is the key to how we use it and thus how it can pervade all aspects of Teaching, Learning and Administration.

The definition of ICT needs a serious consideration of the general confusion in the understanding of the word 'Technology' - for without a clear understanding of 'Technology'.

Technology has been defined as the process of using scientific, material and human resources in order to meet human need or purpose. If we consider a simple definition of Information as 'that which can be communicated and understood', One can then put together a basic definition of IT as "Technology is the use of information in order to meet human need or purpose". The definition of ICT therefore has become the use of information in order to meet human need or purpose including reference to the use of contemporary devices such as the Internet. However, in an ever-changing world of Video-phones, mobile computing, blogs, Skype and OSS perhaps we should no longer just include the Internet, but leave the definition at 'contemporary devices...?'

It is the simple truths of the definition of ICT that must be understood before anything in the ICT Schemes of Work make any real sense. Primarily it is not the actual practical skills that are required to be assessed but the capability of a student to determine an appropriate range of strategies or processes in order to obtain a satisfactory solution. As much as we must consider individual applications in terms of both functions and functionality, so too must ICT be considered holistically. We need to consider the Design Process with much more care. Whenever we use any IT application we must first stop and think in terms of 'Fitness-for-Purpose'.

Why are we using ICT? Of all the possible applications, am I using the most appropriate? Who is my audience? What constraints must I recognize? What additional benefits can this application deliver? Etc.

As Applications become more and more versatile perhaps we should also consider the impact of convergence. It is possible that some time in the future we may be using only one application that does everything! However, ICT is no longer just a 'School Subject' arcane and isolated in its own self-importance. The question is often posed as to whether ICT can ever be taught effectively as a cross-curricula subject only. Serious issues both of staff development and leadership need to be addressed before we can attempt to answer this particular conundrum.

### **1.1. ICTs and Education**

In education, the delivery of knowledge using ICTs has influenced the design of various Curricula programmes nationally and globally in launching of different educational programmes. The current technology for example, allows learners' interaction with the computer screen rather than the teacher. Through the computer network, learners were able to communicate with the instructor on the material and could discuss assignments involved. In this process learners were able to attend lectures "online". Current technologies in e-learning such as Aula Net tend to provide a groupware for creation, participation and maintenance of Web-based courses emphasizing group learning where individuals shared ideas online (Gay & Lantini, 1995 and Fuks, 2000). It has been argued that ICT was a way to move from elite to mass education through digital media where more learners could get access to education for both campus and distance-learning students Kennedy (2001). ICT is seen as a way to promote educational change, improve the skills of learners and prepare them for the global economy and information society (Haddad & Draxler, 2002; Kozma & Wagner, 2005; McNamara, 2003; UNESCO, 2002). ICT is used to improve delivery of and access to education. ICT as focus of learning, it tends to improve the understanding of the learner, increase quality of education thereby increase the impact of education on the economy. While basically ICT based innovations can occur in classrooms, their linkage to national policies is essential to achieve intended social and economic outcomes.

### **1.2. The Promise of ICTs in Education**

For developing countries ICTs have the potential for increasing access to and improving the relevance and quality of education. It thus represents a potentially equalizing strategy for developing countries.[ICTs] greatly facilitate the acquisition and absorption of knowledge, offering developing countries unprecedented opportunities to enhance educational systems, improve policy formulation and execution, and widen the range of opportunities for business and the poor. One of the greatest hardships endured by the poor, and by many others who live in the poorest countries, is their sense of isolation. The new communication technologies promise to reduce that sense of isolation, and to open access to knowledge in ways unimaginable not long ago.<sup>12</sup> However, the reality of the Digital Divide is the gap between those who have access to and control of technology and those who do not means that the introduction and integration of ICTs at different levels and in various types of education will be a most challenging undertaking. Failure to meet the challenge would mean a further widening of the knowledge gap and the deepening of existing economic and social inequalities.

### **ICTs Help Expand Access to Education.**

ICTs are a potentially powerful tool for extending educational opportunities, both formal and non-formal, to previously underserved constituencies—scattered and rural populations, groups traditionally excluded from education due to cultural or social reasons such as ethnic minorities, girls and women, persons with disabilities, and the elderly, as well as all others who for reasons of cost or because of time constraints are unable to enroll on campus. It also helps in anytime learning, anyone learning, Anyone teaching, anywhere learning, one can access to remote learning resources

### **1.3. ICTs and Types of ICTs are Commonly Used in Education.**

ICTs stand for information and communication technologies and are defined, for the purposes of this primer, as a "diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information." These technologies include computers, the Internet, broadcasting technologies (radio and television), and telephony. In recent years there has been a groundswell of interest in how computers and the Internet can best be harnessed to improve the efficiency and effectiveness of education at all levels and in both formal and non-formal settings. But ICTs are more than just these technologies; older technologies such as the telephone, radio and television, although now given less attention, have a longer and richer history as instructional tools. For instance, radio and television have for over forty years been used for open and distance learning, although print remains the cheapest, most accessible and therefore most dominant delivery mechanism in both developed and developing countries.<sup>6</sup> The use of computers and the Internet is still in its infancy in developing countries, if these are used at all, due to limited infrastructure and the attendant high costs of access. Moreover, different technologies are typically used in combination rather than as the sole delivery mechanism. For instance, the Kothmale Community Radio Internet uses both radio broadcasts and computer and Internet technologies to facilitate the sharing of information and provide educational opportunities in a rural community in Sri Lanka. The Open University of the United Kingdom (UKOU), established in 1969 as the first educational institution in the world wholly dedicated to open and distance learning, still relies heavily on print-based materials supplemented by radio, television and, in recent years, online programming. Similarly, the Indira Gandhi National Open University in India combines the use of print, recorded audio and video, broadcast radio and television, and audio conferencing technologies.

**1.****REVIEW OF LITERATURE**

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 from 150 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 Srikakulam district of Andhra Pradesh. The English teachers under study showed a positive attitude towards using information and communication technology in teaching of English.

India's higher education system has finally broken free of decades of colonial overhang. In recent years, the country has undertaken massive structural and systemic changes that have started to yield encouraging results. About 15 years ago, India consciously moved to a differentiated academic system with a three-tiered structure comprising highly selective elite research universities at the top, comprehensive universities and specialized institutions in the middle, and an array of highly-accessible and high-quality colleges at the bottom. While the first tier caters exclusively to furthering India's intellectual capital, the other two focus on delivering economic and social value respectively.

Top-tier research universities are centers of excellence for the creation of new knowledge, set up with the vision to emerge as national and international leaders in research output and intellectual property. They enroll a selective set of talented, research-oriented students to be taught by stellar faculty. Faculty and students at the university attract handsome research grants and exhibit the greatest international diversity. Going beyond traditional scientific and applied research, these universities have phenomenally broadened the scope of India's research capabilities to new interdisciplinary areas of scholarship that present the greatest opportunity for the creation of new knowledge and hold most relevance for India in the new world. For example, Indian universities are at the forefront of research in bioscience, environment and climate change, inclusive development and leadership. Leveraging their cost and competitive advantage, Indian research universities have pioneered the model of blended research where they collaboratively produce cutting-edge research with other top-rung universities around the world. Further, despite directly educating only a small group of elite students, these universities have emerged as the indirect wellspring of content and curriculum for millions of other students who have seamless access to high-quality content from these universities through the Massive Open Online Courses (MOOCs) model. (FCCI Summit Higher Education in India – 2030).

**2.****METHOD**

Educational institutions should train teachers who are technology - competent and how effectively use and integrate technology into their teaching activities. This study aims at drawing an understanding of how teacher in a science college perceive technology can help institutions of higher education to successfully integrate, in relation with the current ICT usage. Thus, the following research questions were proposed by Researcher.

**3.1. The Broad Objectives of Research Study.**

- i. To know about which ICTs tools are most popular in education.
- ii. Teachers are knowing regarding the usefulness, appropriateness and efficacy of specific ICTs (including radio television, handheld devices, computers, networked computers and the Internet) tools for educational purposes or Not ?.
- iii. To know, teachers are using internet and its Appes., in teaching.
- iv. Open source and free software are used by the teacher?
- v. To analyzed the difference regarding ICTs tools used by U.G. teachers and P.G. Teacher?
- vi. Which agencies give financial support for ICTs in education?
- vii. Does the use of so-called "open source software" offer compelling benefits in education?

**3.2. Sample**

The accessible population in this study was self-finance and grant in aid science college teachers of Gujrat State- Anand district

**3.4. Data Collection:**

Self-administered questionnaire was employed to gather data from randomly selected 100 teachers. The questionnaire consists of information on socio-demographic profile; ownership, knowledge and training in computer; purpose of use of computer, It tools, Internet etc. and teachers' perception of computer technology for classroom transaction, computer competency and actual use of computer for teaching

**3.5 Data Analysis**

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

**3. RESULTS OF DESCRIPTIVE ANALYSIS****4.1. Socio –Demographic Profile**

An analysis of the socio-demographic factors is shown in Table-1., of the 100 teachers. Female teachers were 32% and 68% male. Different age group of teachers were examine. Only 13% were above 50 years of age and 87% teachers were between 25-50 years of age. In grant in aid colleges 68% teachers were teaching and 32% in self-finance colleges.

**Table-1: Socio-Demographic Profile**

No.	Variable	Category	No.	%
1	Gender	Male	68	68%
		Female	32	32%
2	Age	25-39	41	41%
		40-49	46	46%
		50-62	13	13%
3	Type of Institute	Grant in Aid	68	68%
		Self-Finance	32	32%
4	Teaching in	U.G.	82	82%
		P.G.	09	09%
		U.G. & P.G.	09	09%

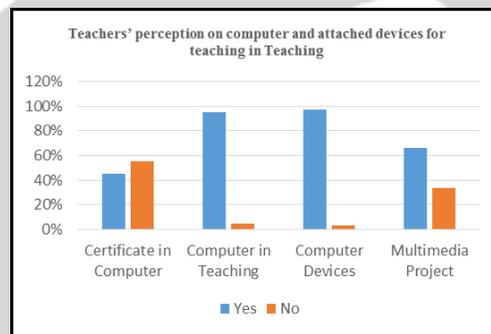
**3.2. Teachers Perception on Computer & Devices.**

The information on teachers' perception with respect to the transformative role of ICT in the teaching were collected. Question regarding use of computer in teaching, certificate in computer, use of various devices, multimedia projector, various option regarding computer handling, to find teacher's perception on ICT in teaching.

**Table-2: Teachers Perception on Computer & Devices**

No	Use of ICT in Teaching	Yes	No.
1	Certificate in Computer	45%	55%
2	Computer in Teaching	95%	05%
3	Computer Devices	97%	03%
4	Multimedia Project	66%	34%
<b>Average</b>		76%	24%

Majority of teachers (95%) were using computer in classroom teaching, 97% of teachers were using various computer devices, only 45% teacher were having certificate in computer i.e. average 50% of the teachers were using computer without certificate in computer or training. Average perception of use of computer for teaching is 76%.



**Chart - 1**

**4.3. Teachers Perception on Software.**

Efficient use of computer is only possible when we are knowing how to use software. Researcher has included question regarding commonly used software like operating system, office software, open source software, some other popular software and media player software.

I found that 99% of teachers were using various version of windows operating system, 95% of teachers were using MS Office, 95% teachers are using various media player software, 81% of teachers are using antivirus software, and 56% teachers are using other software.

Only 26% teachers are using open source operating system and other software. Open source software are not popular or user friendly.

Average use of Computer in teaching 76% and software is more than 90%. It show that a majority of the respondents are agree with the view that use of computer, attached devices and software 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.

Table-1, Table-2 and Table-3 shows that gender, age, and training doesn't effects on use of ICT in Higher Education, particularly for the science teacher.

**Table -3: Teachers Perception on Software in Teaching**

No	Software Analysis	Yes	No.
1	Window as Operating System	99%	01%
2	MS Office	95%	05%
3	Open Source Software	26%	74%

4	Other Software	56%	44%
5	Media Playas	95%	05%
6	Using Antivirus Software	81%	19%

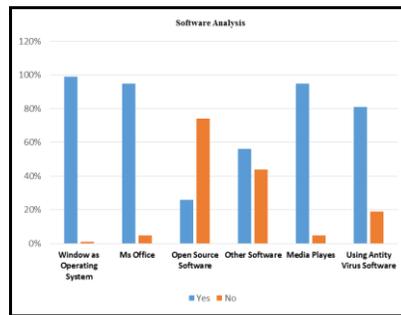


Chart - 2

**4.2. Teachers Perception on Internet.**

The Table 4 and Figure 4 reveal the frequency of internet use. 91% of the teachers use the internet for educational purposes like visited of university and college website, search for latest trends in education, various educational government websites, etc.

**Table -4 Teachers Perception on Internet**

No	Use of Internet in Education	Yes	No.
1	Using Internet for Education	91%	09%
2	Using Google Apes.	94%	06%
3	Downloading Education material	94%	06%
4	Using Educational Website for reference	74%	26%

Table-4 also how that 94% teachers are using various Google Appes and also downloading educational material. 74% teachers are agree that they are surfing various educational websites for reference.

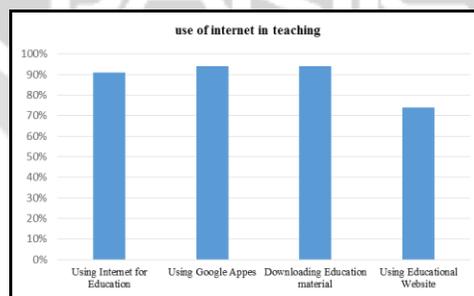


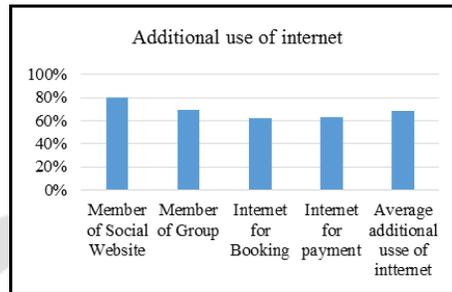
Chart – 3

**4.5. Supplementary Use of Internet by Teachers.**

Researcher has examine teachers by asking question about supplementary use of internet like whether teacher is member of any social website or not. Teacher is member of any social group. Teacher using any booking or payment facilities available on interne .Table-5 also shows that average 69% teachers are using internet of other purpose. From the questionnaire I found that only 4% of teachers having own website and 18% teachers were having blogs and 95% teachers having email account.

**Table -5:** Supplementary Use of Internet by Teacher

No.	Supplementary use of internet	%
1	Member of Social Website	80%
2	Member of Group	69%
3	Internet for Booking	62%
4	Internet for payment	63%

**Chart – 4**

#### 4.6. Teachers Opinion about Use of Internet.

From questionnaire I try to know teacher's view about use of internet on followings.

- Internet save time.
- Internet is easy to use.
- Internet is an ocean of Knowledge.
- Internet help us to learn new things.
- Internet increases our level of Confidence.
- Internet Increases our level of awareness.
- Internet is vital to our job.
- Internet is vital to our life.
- Internet provide us valid information.
- Internet provides us Authentic Information.

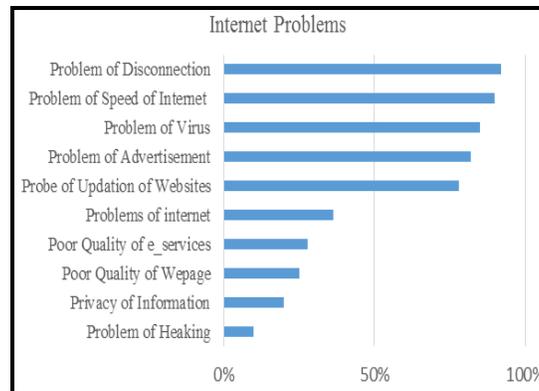
I found that 90% teachers were agree that internet save time, easy to use, develop confidence, provides us valid information and it plays vital role in job and life.

#### 4.7. Teachers Opinion about Problems of Internet.

As universal rule that coin has two sides. As internet has may advantages with problems or difficulties in use. Researcher has try to identify some common problems that teachers are facing. Table – 6 shows list of common problems and teachers has given their opinion on it.

**Table -6:** Teacher's Opinion about Problems of Internet.

No.	Teacher's opinion about internet problems	%
1	Problem of Hacking	10%
2	Privacy of Information	20%
3	Poor Quality of Webpage	25%
4	Poor Quality of e-services	28%
5	Problems of internet	36%
6	Problem of Updating of Websites	78%
7	Problem of Advertisement	82%
8	Problem of Virus	85%
9	Problem of Speed of Internet	90%
10	Problem of Disconnection	92%



**Figure 5**

## 5. DISCUSSION AND CONCLUSION.

This paper examines the teachers' perceptions, competency and use of IT, ITS and internet by the science teachers of grant in aid and self-finance colleges of Anand district - Gujarat State. 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 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 (Herman's 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 this 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, ICT tools and internet equally.

The study reports that science teachers used computers, ICT tools and internet more frequently. Teachers are using computer, ICT tools and internet facilities very proficiently without having certificate or training.

Data shows that Microsoft software are more popular than open source or free software. Teachers are member of social groups, using internet in mobile, using internet for booking and purchasing, so teachers are using technology very efficiently.

Data shows that 90% teacher has given opinion that internet is very useful. On the other hand they complain on speed of internet, connectivity, hacking etc.

Data also show that only 4% of teachers are having own website and 18% teachers are having blogs so, for them it is difficult to put study material online for the students.

It is found that only 22% teachers has received research project and 54% teacher has participated in ICT related workshop or conference. This show that teachers are less interested in research.

### 5.1 Limitations

The participants who took part in this study were teachers in urban and semi-urban colleges of Anand district and the outcome might be different if participants from rural colleges. 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.

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