A STUDY OF INFORMATION AND COMMUNICATION TECHNOLOGY IN COLLEGES OF EDUCATION IN TAMIL NADU

SYNOPSIS OF THE
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SYNOPSIS

1. Introduction

Education combines intellectual growth with the socialization of the individuals and paves the way for enhanced awareness, greater openness, ability and courage to question, and creative power to search for solution. Education in other words, must lead a life-long process of development exploration, within its two dimensions, the one being the self and the other being the community and the wider society. Teaching is a complex activity, it needs systematization for effective delivery of information; otherwise, the learning may not be effective. To ensure better information delivery, teachers have to understand the dynamics of the teaching – learning process. As yesterday's knowledge becomes obsolete to-day, new technologies, new methods and practices help the teacher design the instruction in a systematic way. In this context, the emergence of Information and Communication Technology (ICT) has ushered in a new era. It has influenced every sector of the society, that is, trade, industry, science, technology including education. The emergence of ICT is not only affecting teaching style but also influencing the learning style, whereby a student becomes the explorer of information and independent knowledge worker. The ICT has immense power to enhance personalized learning.

Having realized the importance of ICT, the NCERT has come out recently with a school curriculum framework wherein it has been emphasized to integrate ICT in school education. Integration of ICT in school education is not possible without the teachers who have the competence in techno-pedagogic dimensions of ICT. The NCTE – an apex body in the area of Indian teacher education is also stressing the importance of ICT in teacher education. It is because ICT has tremendous potential for education. ICT enables a teacher teach efficiently and effectively.

Information and communication technologies (ICTs) exemplified by the internet and interactive multimedia are obviously of great significance for teacher education. The integration of ICTs in education in general and teacher

education in particular is the need of the day. ICT is not only an essential tool for teachers in their day to day work, but it also offers them opportunities for their professional development.

Information and communication technology is a major factor in shaping the new global economy and producing rapid changes in society. Within the past decade, the new ICT tools have fundamentally changed the way people communicate and do business. They also have the potential to transform the teaching – learning roles of students and teachers in the learning process.

In ICT era, the learners have moved from the old practice of memorizing facts to discovering data and information and synthesizing them for problem solving. ICT makes research more convenient and sufficient. The learners learn the subjects at their own pace and convenience in the quickest possible time, through ICT. Having realized the importance of ICT in India, the NCTE has made information and communication technology literacy a compulsory component of the secondary preservice teacher education. With the implementation of this decision, the students of B.Ed. and M.Ed will acquire ICT literacy and have experience in preparing lesson plans in multimedia, accessing off-line resources, document creation and of communication using e-mail etc. For all these to happen, it will be essential that teacher educator himself/herself is an ICT literate and feels confident in using ICT in teacher education. The 21st century requires teacher educators as e-content assemblers and persons familiar with ICT tools. In this present research, an attempt is made to study five aspects of information and communication technology in the colleges of education (namely, availability, awareness, attitude, internet utilization and problems while using internet) and the outcomes of the research would definitely help the colleges of education cope with the challenges of the 21st century, thanks to the outbreak of information and communication revolution.

2. Statement of the Problem

Science and technology have provided innumerable comforts to the society, thereby elevating the standard of living of the masses. The growth of

human civilization is achieved through technological revolution. The information and communication technology (ICT) has made major inroads in educational system in general and teacher education in particular. As a result, the traditional methods of teaching and learning have been relegated to background giving room to information and communication – based teaching, learning and evaluation approaches. The National Council for Teacher Education (NCTE) in India, in order to meet the challenges posed by science and technology, has initiated concrete actions of incorporating such technological revolutions in teacher education system. A series of such programmes of action on the part of the NCTE aim at achieving overall efficiency and effectiveness of the system besides making teaching-learning process a pleasurable and joyful activity for the teacher educators and student teachers. In this context, it is worthwhile to understand the availability of information and communication technology devices in the colleges of education; it is worthwhile to understand the awareness of teacher educators and student teachers in information and communication technology, their attitude towards the concept, the extent of utilization of internet services by the teacher educators and student teachers and problems encountered while making use of internet services. Thus an attempt is made to explore the five stated aspects of information and communication technology at the teacher education level.

3. Contribution of the Study to Knowledge

Educational research can play three major roles – a) a 'leading' role in which research leads to decision – making policy, b) a 'supportive' role in which research contributes to existing policies and practices and c) a 'following' role in which research follows on the lines of the findings ("Improving Linkages between Research and Education Reform", Report of Regional Seminar 1990, International Cooperation in Education, NIER, Japan). The findings of the present study may contribute to knowledge in the above three directions.

Leading Role

The present study aims at finding out the five aspects of information and communication technology – availability, awareness, attitude, internet utilization and problems faced while using the internet. No doubt, information and communication technology plays a crucial role in shaping the educational system of a nation. It is observed that the educational system has been revolutionized as a result of application of information and communication technology. It is pointed out that educational objectives could be easily achieved through information and communication technology.

It is stated that the development of a nation depends upon its scientific and technological policy formulated from time to time. So also, in the case of teacher education. The present teacher education system requires such a technological policy that aims at promoting good educational practices, creating desirable learning environment and achieving desired goals and objectives.

In this respect, the present study will help the National Apex Bodies such as the National Council for Teacher Education (NCTE), National Council for Educational Research and Training (NCERT) and the University Grants Commission of India evolve needed technology policy related to teacher education. Such a step on the part of the statutory bodies may ensure academic excellence in the portals of teacher education institutions.

Supporting Role

The outcomes of the present study will help the universities, NCTE, the UGC, the curriculum planners and the government in order to realize the role of information and communication technology in the teacher education system. As a quality assurance measure, the study may enable the colleges of education identify the extent of application of information and communication technology in the teacher preparation programmes and the measures needed to strengthen information and communication technology facilities in such colleges.

The present study may highlight the deficiencies in the application of information and communication technology if any, and suggest appropriate

measures for the effective application of ICT in the teacher preparation programmes.

Further, the present study may provide information regarding the status of such colleges of education in ICT awareness, ICT availability, Internet utilization, ICT attitude and the problems encountered in utilizing internet in the teaching – learning environment. This kind of feedback may help the management of the colleges to chalk out appropriate strategies in creating ICT awareness, utilizing internet, developing attitudes towards ICT, utilizing internet services for education and problems while utilizing internet services for education purpose. A measure taken in the direction of strengthening ICT components may ensure quality improvement in education.

Following Role

The present study will provide scope for promising research in the selected area, namely, information and communication technology. The present study will provide scope for further exploration of research in information and communication technology in terms of its conceptualization and replication of the study in other places and the primary teacher education and pre-primary teacher education levels. Information and communication technology has more potentialities for further exploration in all branches of knowledge. The present study will help in evolving a body of organized knowledge in information and communication technology and provide scope for further exploration of research activities towards this direction.

4. Research Questions

In the course of investigating the problem, the following research questions are set forth:

1) Do the colleges of education in Tamil Nadu have information and communication technology laboratory facilities?

2) Have the teacher educators and student teachers sensitized the importance and relevance of information and communication technology and its judicious application in the teaching – learning environment?
3) Have they shown any preliminary interest in understanding and employing the information and communication technology?
4) Have they developed positive attitude towards information and communication technology as a result of their sensitization and understanding of information and communication technology?
5) Are information and communication technology laboratory facilities provided by the colleges of education for benefit of the teacher educators and student teachers?
6) Have the teacher educators and student teachers availed the information and communication technology facilities provided in the colleges of education?
7) Do they face any problems while making use of information and communication technology facilities for their educational purposes?
8) Do they differ in their sensitization of information and communication technology, in their awareness, attitude, in the extent of utilization of internet and problems encountered while making use of internet on the basis of certain institutional and individual related variables?
9) Are there any variations among the colleges of education in the five aspects of information and communication technology namely, ICT availability, ICT awareness, ICT attitude, internet utilization and internet usage problem?

5. Objectives of the Study

The following are the major objectives of the study:

1) To study the availability of information and communication technology facilities in the colleges of education.

2) To study whether the teacher educators and student teachers in the colleges of education have awareness about information and communication technology.
3) To find out the attitude of teacher educators and student teachers in the colleges of education towards information and communication technology.
4) To find out the extent of internet utilization by the teacher educators and student teachers in the colleges of education.
5) To study the problems experienced by the teacher educators and student teachers in utilizing internet services.
6) To compare the colleges of education in Tamil Nadu in terms of ICT awareness, ICT availability, ICT attitude, internet utilization and the problems in the utilization of internet services.
7) To find out whether the teacher educators in the colleges of education differ in their awareness and attitudes towards ICT, utilization of internet and facing problems while making use of internet services on the basis of certain institutional and individual related variables.
8) To find out whether the student teachers in the colleges of education differ in their awareness and attitudes towards ICT, internet utilization and facing problems while making use of internet services on the basis of certain institutional and individual related variables.

6. Scope of the Study

The present investigation aims at analyzing the five aspects of information and communication technology. The first aspect is concerned with the availability of information and communication technology tools in the colleges of education. The investigation tries to give answer to the question about the level of information and communication technology tools available in the colleges of education in Tamil Nadu.

The second aspect is concerned with information and communication technology awareness. The investigation tries to give answer to

the question about the level of information and communication technology awareness among the teacher educators and student teachers.

The third aspect of enquiry is related to the attitude of teacher educators and student teachers towards information and communication technology.

The fourth aspect of enquiry is related to the extent of internet utilization by the teacher educators and student teachers. Here, various internet services are studied.

In the last aspect, attempts are made to find out the problems faced by the teacher educators and student teachers while utilizing internet services for their educational activities.

For studying these five aspects, sixteen colleges of education in Tamil Nadu are selected. The teacher educators in the colleges of education of the above sixteen colleges of education and the student teachers who are pursuing their B.Ed. courses of study in the above sixteen colleges of education are selected and the five aspects of information and communication technology are studied by collecting data from the teacher educators and student teachers of sixteen colleges of education. The study may provide a first hand status of knowledge about ICT and this may help to identify the strengths and weaknesses in the application of ICT in the colleges of education. A good feedback will certainly help greater application of ICT in the colleges of education.

7. Title of the Study

The title of the present research study is precisely stated below:

"**A STUDY OF INFORMATION AND COMMUNICATION TECHNOLOGY IN COLLEGES OF EDUCATION IN TAMILNADU**".

8. Operationalisation of Variables

The meaning of important terms used in the study is given below:

Information and Communication Technology

Information and communication technology means the use of hardware and software for efficient management of information (i.e.) storage, retrieval, processing, communication, diffusion and sharing information for social and economic upliftment. Putting the “C” in the middle of the IT is important to emphasize that it is not just about “techie” matters, but is relevant to everyone whose job involves communication. ‘Computer technology’ and ‘communication technology’ are the two main supporting pillars of this technology.

Internet

Internet is defined as worldwide network of computer communication via on agreed upon protocol (rules for exchange of information). It provides access to the most diversified sources of information hosted by individuals and various organizations world wide on a vast network of servers.

College of Education

A college specializing in the initial and in-service training of teachers, usually offering B.Ed. degree .

Teacher Educators / Teachers

The teaching staff who are working in the departments of the colleges selected and conducting teaching, research, in-service and extension activities are designated as ‘Teacher Educators’ or ‘Teachers’.

Student Teachers / Students

The learners who are pursuing Bachelor degree course of study in education in the colleges of education are designated as ‘Student Teachers’ or ‘Students’.

9. Epitome of Literature Scanning

The review of related literature in information and communication technology reveals that information and communication technology as a tool has totally transformed educational scenario in general and teacher education in particular in India and abroad. The review has pointed out the shift of learning mode on the part of the learners and the greater impact of information and communication technology on higher education. **Febry and Higge** (1997) found that teachers have innate dislike for change; they do not want to see a change in their roles as brought out by technology. Further the teachers lack training in the application of ICT. **Goel, Chhya Goel and Malgar** (2002) found that every teacher training institute needs to have an ICT laboratory.

Le Gallasis and Tricia (2001) found that ICT had the potential to provide cost effective and efficient training. **Higgins and Steve** (2001), **Christies and Michael** (2002), **Rudd and Peter** (2001) found that there are clear possibilities for improving learner's understanding using ICT's; ICT is a powerful tool for teaching and learning. But enhances the learning experience; a clear linkage is made between the patterns of thinking and positive use of ICT. **Torgerson** (2002) found that teaching of spelling by using computer software proved to be effective rather than conventional teaching of spelling. **Kankaanranta Marja** (2001) found that teachers had a need for formal and informal support in the use of ICT. **Ramsay Grant (**2001) found that government funding for ICT in schools should be linked to demonstrable improvements in student learning outcomes. **Drijvers Paul** (2001) **Goodison and Terry** (2002) found that ICT tools turned out to be fruitful in the interpretation of student behavior; staff commitment plays a pivotal role in successful integration of ICT into the teaching and learning. Many researchers have explored the possibility of applying information and communication technology at school, higher education and teacher education levels. **Maki Jukka** (2001) found that ISDN – Video conferencing has solved many education problems in rural areas.

A few studies are reported about e-books and e-text books. **Versaware** (2001) found that learners read about 25 % slower from computer

screen than from printed paper. Further, e-text books could be more interesting than print-text books. **Eric Simon** (2001) found supremacy of e-books over print media.

Karsenti, Thierry (2002) found that e-mail allowed teachers to have more efficient and less time consuming communications with parents. **Smith and Mark** (2002) found greater utilization of web-pages; the web-pages are easily used and readily accessible to students. **Ne Lumpkin** (1997) found that teachers have positive attitude towards the multimedia presentations.

From the review of related literature, it was found that internet has also attracted the attention of researchers. **Le Jang** (1997) found that internet application was widely used by learners. It was found that 78 % of the respondents used the internet for learning purposes. **Jacobson Robert** (1995) stated that more expenditure was involved for internet use in colleges and universities. **Avani Maniar and Deboling Talapatra** (2002) found greater use of internet for class assignment in comparison to research work and other educational purposes. **Richardson Eric** (1995) found greater role of internet in colleges and universities. **Jacobson Robert** (1994) found the positive effect of internet on learning. According to **Praft David** (2002), internet was used to a greater extent for the preparation of lessons. **Baheerathan** (2004) found lesser internet awareness among the teachers of mathematics at high school level.

Relgram Anderson (1999) reports that ICt as a tool promotes constructivism among children and supports others for life-long learning. The study of **Becta and Manitoba** (2000) revealed that the use of ICT resources across curricular areas prove that students exhibit substantial improvement in learning.

Helayne Leslie (1995) explored the effects of multimedia literacy tool on first grade reading and writing achievement. The study concluded the effectiveness of multimedia as a powerful tool for enhancing reading and writing in young learners. The study of **Sakamota Takashi** (2002) revealed the greater contribution of information and communication technology in virtual universities. **Ariwa Ezendu** (2002) found the use of ICT to provide online student support.

Diezen Agnes (2002) found that young women are moving away from ICT occupations; only 50 % who had ICT training found ICT related jobs.

Kirk Jenny and Kirk Gordon (2002) found that ICT courses attract new learners. Learners described a variety of benefits from their ICT courses. They gained the confidence to learn something else; they had a positive experience that was informative, interesting and fun; about half the learners who enrolled on short ICT courses progressed to another ICT courses. The study of **Hammond and Michael** (2003) revealed that i) ICT would be good for students, ii) teachers were influenced by past teaching experiences, iii) teachers were not motivated by material rewards. **Cuckle Pat and Clarke** (2002) found that student teachers face difficulties with access to computers. **Oden and Michael** (2002) found that i) leading produces of ICT products and services have a relatively weak presence, ii) lack of information combines with access barriers limits the effective adoption of ICT, iii) ICT hardware, software and connectivity integration is under – supplied by the market, especially in rural areas, iv) ICT access and capacity barriers create disadvantage situation against economic development in rural areas. **Robertson and John** (2002) found that the ICT is not is not in growing use in the professional practice in Scottish and English primary schools. **Anna Raja** and **Nima Joseph** (2005) found that 68% teacher trainees possess high level of attitude towards ICT. **Subbiah** (2005) found that attitude of teacher educators towards ICT is quite positive.

10. Assumptions of the Study

The following are the basic assumptions of the study:

i) It is assumed that information and communication technology facilities are available in the colleges of education in Tamil Nadu.

ii) It is assumed that information and communication technology plays a vital role in colleges of education in the teaching – learning environment.

iii) Information and communication technology is useful to both the teacher educators and student teachers in the colleges of education.

iv) The application of information and communication technology tools in the colleges of education may vary from one college of education to another college of education.

v) Certain teacher educator and student teacher related variables and institutional variables create variation in the five aspects of information and communication technology.

11. Hypotheses of the Study

The following are the major hypotheses of the study:

1) Information and communication technology is available to a greater extent in the colleges of education.
2) Teacher educators and student teachers have positive attitude towards information and communication technology.
3) There exists greater information and communication technology awareness among teacher educators and student teachers.
4) Internet services are utilized to a greater extent by the teacher educators and student teachers.
5) Teacher educators and student teachers experience problems to a greater extent while utilizing internet services.
6) ICT availability, ICT awareness, ICT attitude, internet utilization and problems while making use of internet differ on the basis of certain institutional, teacher and student related variables.

12. Research Strategy

The following research strategy is planned in the present study:

i) Stage 1 : Problem Clarity

Literature scanning is done to conceptualize the variables involved in this study and their relationships.

ii) Stage II : Selection of Research Method

An appropriate method of study for the present problem on the basis of literature review and expert opinion has been identified.

iii) Stage III : Developing Research Tools

Relevant questionnaires are developed and validated to collect data from the institution, teacher educators and student teachers.

iv) Stage IV : Selection of Colleges of Education

Certain colleges of education have been selected for studying the different aspects of information and communication technology.

v) Stage V : Fixing the Sample

First of all, the target population is identified; then the size of the sample is fixed.

vi) Stage VI : Administration of Tools and Collection of Data from the Sample.

This stage involves the administration of validated tools and collection of relevant data from the teacher educators and student teachers in the colleges of education.

The possible response errors are identified and appropriate measures are taken to control them. Further, the threats that affect the internal validity of the study are identified and appropriate measures are taken to control them.

vii) Stage VII : Data Analysis

The classified and tabulated data are analysed using appropriate statistical techniques.

viii) Stage VIII: Presentation of Results

The analysed data are presented in terms of findings.

13. Research Method

Research method is a systematic procedure through which the desired outcomes are achieved by setting up of situations in such a form that the investigator gathers information and draws conclusions on the basis of the collected data (Good, 1945).

In this study, survey method is considered as the appropriate method. The main purpose of selecting survey method is to study the information and communication technology in the colleges of education in Tamil nadu.

14. Research Tools

The general type of data gathering instrument used in survey research is called 'Questionnaire' through which respondents respond to statements given in the questionnaire. It is used to collect factual information from the target population. Investigators consider four basic standards of survey questionnaire. They are as follows:

i) Mode of presentation of items in the questionnaire
ii) Common items for all individual respondents
iii) Ability to respond the item by the respondents and
iv) Willing to respond the items in the questionnaire (Floyd Fowler, 1989).

The survey research, the type of the question and mode of responding the items are important to obtain appropriate response. In the present study, close ended type of questionnaires are used as they are easy to use, score and code for analysis on a computer.

The following research tools were developed and validated:

1. Information and Communication Technology Availability Check-list (ICTACL)
2. Information and Communication Technology Awareness Scale (ICTAS)
3. Information and Communication Technology Attitude Scale (ICTATS)
4. Internet Utilization Scale (IUS)
5. Internet Usage Problem Check-list (IUPCL)

15. Sample of the Study

In the present study, 16 colleges of education in Tamilnadu were selected by means of simple random sampling technique. The data were collected from the teacher educators working in the colleges of education and student teachers doing their B.Ed. course in the above colleges of education. In

each college of education, stratified random sampling technique was employed for student teacher population. Regarding teacher educators, simple random sampling technique was employed. Thus 79 teacher educators and 764 student teachers from 16 colleges of education in Tamil Nadu formed the sample of the study.

16. Data Collection Procedures

Researchers point out that direct face to face data collection procedures are more valuable than the mailed questionnaire approach. In the present study, direct questionnaire administration approach was employed in order to ensure objective collection of data from the respondents. This is preferred because it enhances high response rate and the researcher has an opportunity to clarify the doubts raised by the respondents.

In the process of data collection from the respondents, necessary permission was obtained from the principals of the colleges of education. Having obtained permission from the principals, the validated questionnaires were administered to the teacher educators and the students teachers of 16 colleges of education. Prior to the tool administration, proper explanations were offered by the investigator about the present investigation and the mode of responding the items in the questionnaires. The respondents were assured that the data collected would be kept in utmost confidential and would be used for statistical interpretation only. A close rapport was maintained with the respondents to create an open and friendly environment. The friendly approach in the data collection procedure would help to collect objective and valid data from the respondents. No time limit was fixed while responding the items in the questionnaires. The respondents were asked to respond all the items in the questionnaires. Thus attempts were made to collect objective data from the target group.

17. Application of Statistical Techniques

In the process of analyzing and interpreting the data, the following statistical techniques were employed to arrive at valid conclusions after consultation with statisticians and experts in computing.

i) Percentages were calculated to study the utilization of internet services by the teacher educators and student teachers of colleges of education.

ii) To study the availability of information and communication technology tools, frequencies were calculated.

iii) Mean and standard deviation (SD) scores were computed.

iv) 't' test was used to find out the significance of difference between two means. In the case of more than two variables, 'F' test was employed.

v) Kruskal Wallis One Way Analysis of Variance by Ranks was used to find out the difference among colleges of education in awareness, attitude, internet utilization and internet usage problem scores of information and communication technology.

vi) Factor analysis was resorted to 'attitude' data by employing Principal Component Analysis Technique for identifying the underlying factors in the attitude scale.

18. Delimitations of the Study

Delimitations are the boundaries of the study (Best, 1992). The following are the delimitations of the study:

1) The study was confined only to the Government and Aided colleges of education in Tamil Nadu. The self-finance colleges of education were not at all included within the purview of the study.

2) Data were collected only from the regular teacher educators and student teachers of colleges of education. The student teachers of distance education modes / open university mode (Student Teachers of Indira Gandhi National Open University and Tamil Nadu Open University) were left out.

3) Eventhough other methods are available, because of suitability, only survey method was employed and the questionnaires were used to collect data from the teacher educators and student teachers.
4) The university college of education and the university departments that offered B.Ed. course were not included within the limit of the present study.

19. Major Findings of the Study

The following are the major findings of the study:

1) There is a fair availability of ICT tools in the colleges of education. All the colleges of education have desk-top computers, but the ICT tools such as palm-top and WAN are not available in such colleges. The Lap-Top, Web-Camera and Video Phone are available only in few colleges of education.
2) The teacher educators and student teachers in the colleges of education have greater awareness about ICT and more favourable attitude towards ICT. Their utilization of internet services and the extent of internet utilization are not encouraging. They experience more problems while using internet.
3) Among the internet services, e-mail is utilized by majority of teacher educators. Next to e-mail, the www is utilized to a greater extent by the teacher educators. The overall conclusion points out that internet services are not utilized to a greater extent by the teacher educators.
4) The teacher educators who are classified on the basis of variables such as government and aided college teachers, men's colleges, women's colleges, co-education, male and female teacher educators, urban and rural colleges, arts, science and education faculties, teaching experience upto 10 years, 11 to 20 years and above 20 years have greater level of awareness and positive attitude towards ICT. But their internet services and the extent of internet utilization are not encouraging. They experience more problems in using internet.

5) The same findings are arrived at in the case of student teachers studying in the colleges of education in the five aspects of ICT.
6) Both e-mail and world wide web are extensively used by the student teachers. The other internet services are not utilized to a greater extent by the student teachers.
7) The teacher educators working in the government colleges of education have more favourable attitude towards ICT than that of the teacher educators working in the aided colleges of education. The two groups do not show any difference in ICT awareness, internet utilization, extent of internet utilization and internet usage problems.
8) There exists no significant difference among the teacher educators working in men's college, women's college and co-education colleges of education in the five ICT aspects.
9) The male and female teacher educators do not differ in the five ICT aspects.
10) The geographical location of the colleges of education is not a variable in influencing the five ICT aspects.
11) The subject discipline of teacher educators is not a variable in influencing the five ICT aspects.
12) The teaching experience of teacher educators is not a variable in influencing the ICT related aspects.
13) The student teachers studying in the government colleges have greater utilization of internet than that of the student teachers of aided colleges of education.
14) The women student teachers have greater ICT awareness than that of the male student teachers.
15) The men student teachers utilize the internet to a greater extent when compared with women student teachers.
16) The student teachers of urban colleges of education have more positive attitude towards ICT than that of the student teachers of rural colleges of education.

17) The student teachers of science faculty have greater ICT awareness than that of the student teachers of arts faculty.
18) The student teachers of literature discipline use more internet services and they use the internet to a greater extent when compared with the student teachers of science discipline.
19) The colleges of education differ among themselves on the basis of the ICT awareness and ICT attitude of teacher educators.
20) The colleges of education do not differ among themselves in utilizing internet and experiencing internet problems by the teacher educators.
21) The colleges of education differ among themselves on the basis of ICT awareness and ICT attitude of student teachers, their internet utilization and the problems they face while utilizing internet.
22) The analysis of attitude data of both the teacher educators and student teachers reveals three significant, but independent dimensions of ICT – i) ICT mediated quality education, ii) ICT mediated educational empowerment, and iii) ICT mediated instructional effectiveness.

20. Implications of the Study

On the basis of the outcomes of the study, the following recommendations are made :

The present study indicates that there is a fair availability of ICT tools in the colleges of education for the teacher and learner usage. But, it is noted that tools such as palm-top computers and WAN are not available in the colleges of education. The lap-top computers, web-camera and video phone are available only in few colleges of education. The present information society warrants availability of all ICT tools in the colleges of education. Since information and communication technology is the order of the day, the educational system expects all the teachers to be well versed in the application and usage of ICT tools. For this purpose, the ICT tools must be adequately available in the teacher preparation programmes so as to enable the student teachers understand the importance of ICT tools in the teaching – learning

process in the present competitive educational scenario. It is the responsibility of the college management and the government to purchase such ICT tools for the colleges of education and make the ICT laboratory of each college of education viable and strong. No doubt, availability of ICT tools in the colleges of education may facilitate greater application of such ICT tools in the teaching – learning process. Therefore, it is recommended that the government should allocate adequate financial resources for the purchase of such ICT tools which have not been purchased by the colleges of education so far. The government should come out with a technology policy in this regard in order to strengthen the ICT base of the colleges of education. Such a bold step on the part of the government may lead to better instructional delivery in the teacher preparation programme.

The private college management on their part, should take measures to strengthen the ICT laboratory of the college. They should find out ways and means for the purchase of those ICT tools which have not been purchased so far. In the event of financial burden for the colleges, the help and cooperation of the Parent – Teacher Association may be sought to raise funds for the purchase of such tools.

The present study reveals the greater ICT awareness and ICT attitude shown by the teacher educators and student teachers in the colleges of education. This indicates the fact that the importance of ICT is realized by the general academic community in recent times. ICT is the order of the day. ICT revolution is found out in all the parts of the world. It pervades all walks of human life. It is proved beyond doubt that ICT has accelerated the process of socio-economic development in the country. Hereafter, the development of a country may be measured in terms of ICT development. In education, ICT ensures optimum result in the teaching – learning process and the management of institution, through e-governance. Therefore, the favourable and positive attitude developed by the teacher educators and student teachers must be consolidated and further strengthened. The ICT awareness that they have developed, must be

consolidated through organizing conferences, seminars, debates and other co-curricular means.

The present study indicates the lesser utilization of internet by the teacher educators and student teachers. Internet plays a very crucial role in the teaching – learning process at higher education level. The present web-based learning and on-line learning are possible only through internet. Through internet services, the teacher educators and student teachers may contact any person in the world for exchange of information. Since the internet possesses a repertoire of knowledge, it is more beneficial for the learners and teachers to acquire desired knowledge and update their knowledge in order to cope with scientific and technological advancement. The present globalization warrants greater utilization of ICT by the teachers and learners. The present educational system is moving towards virtual environment. Learning takes place anywhere as a result of internet. Instruction has become more individualized rather than mass centred due to internet revolution. Therefore, the teacher educators who have lesser opportunity to make use of internet services should be trained in the usage of internet services.

The University Grants Commission of India has given bigger thrust in its X Plan for greater use of internet. In its communication dated August 12, 2003, it has requested the Academic Staff Colleges in India to organize refresher and orientation courses exclusively on ICT in order to create among teachers 'Internet literates' as well as 'persons familiar' with use of various tools to create e-content "assemblers" and "creators". The facilities extended by the Academic Staff College should be utilized by the teacher educators. They should enthusiastically participate in the programmes organized by the Academic Staff College so as to develop skills and competencies in handling internet services.

Internet plays a significant role in research. Almost all researchers use internet for their research purpose. Such researchers require continuous retraining related to internet. Special training programmes may be organized either by the University Departments or by the Academic Staff Colleges to impart training in handling internet services. This type of training may strengthen the

research base of the universities. The UGC may provide financial resources for the conduct of such training programmes. For the benefit of student community, the UGC may arrange training programmes on internet.

Human – internet interaction is available to everyone regardless of ability or disability. The recent wireless communications enable the communication between any two wireless devices and from one wireless device to many such devices. This facility helps researchers, scholars and teachers save their precious time and energy. It is recommended that the colleges are advised to avail this sort of facilities for the benefit of teachers and students.

At present, students are connected through internet and one can listen to the classes over thousands of kilometers through wide area network. Many institutions offer classes through on-line. A personal computer with internet collection is enough to get into this on-line classes. This facility may help those who want to continue their studies further at their own time and place.

The National Council for Teacher Education (NCTE), a statutory body established by an act of Parliament, has the madate to plan and co-ordinate development of teacher education in the country. The NCTE plays a catalytic role in improving the quality of teacher education. Recently, the NCTE has made information and communication technology literacy a compulsory component of the secondary pre-service teacher education. With the implementation of this decision, students of B.Ed., B.P.Ed., M.Ed., and M.P.Ed., will acquire ICT literacy and experience of preparing lesson plans in multimedia, accessing off-line resources, document creation and of communication using e-mail etc. For all these to happen, it will be essential that teacher educator himself/ herself is an ICT literate and feels confident in using ICT in teacher education.

In order to help teacher educators in becoming ICT literates, the NCTE has developed a self – learning CD-ROM. The ICT literacy CD-ROM has been produced with English and Hindhi commentaries. In addition, the NCTE has produced several other CD-ROMs, particularly, for education in human values. When the teacher educators become ICT literates, they would be able to use the rich digital resources on teacher education. On-line resources can be accessed

from the NCTE website, http//www.ncte.in.org. The NCTE is giving to its recognized teacher education institutions off-line digital resources on CD-ROMs.

In order to provide hands – on experience on use of its CD-ROMs, one day ICT awareness camps for teacher educators are being organized by the NCTE throughout the country. These camps are planned to cover teacher education institutions by arranging them in clusters. From each cluster of teacher education institutions, the principals and one teacher from each institution are invited to attend the one-day camp. The teacher educators may be deputed to such hands – on experiences organized by the NCTE.

The present study reveals that teacher educators working in the government colleges of education have more favourable attitude towards ICT than that of the teacher educators working in the aided colleges of education. Moreover, the study reveals that the student teachers of government colleges have greater internet utilization than that of the student teachers of aided colleges of education. The authorities of the aided colleges should make note of this fact and they should initiate measures to develop ICT attitude among the teacher educators. There is a notion in the academic circle that the authorities of the aided colleges do not want to depute their staff for such ICT based programmes. Perhaps this may be the reason for their lesser attitude towards ICT when compared with the teacher educators of Government Colleges of Education. A management philosophy with flexibility and human relations approach may be followed in such aided colleges. The teacher educators may be encouraged to contribute their share to ICT world by means of attending and participating in conferences, seminars and symposia. Such a step on the part of the management may keep the teacher educators of aided colleges of education at par with the teacher educators of government colleges of education as far as ICT attitude is concerned.

The authorities of the aided colleges of education should create internet facilities in their institutions so as to enable the student teachers make use of internet to a greater extent. The internet facilities available in the aided colleges of education may be provided to the student teachers during lunch

interval and holidays. The aided college authorities should initiate measures in this direction.

The study reveals that the women student teachers have greater ICT awareness than that of the men student teachers. But the men students utilize the internet to a greater extent than their counterparts. The parents of the women student teachers should understand the importance of computer literacy in modern times. The womenfolk must be encouraged to attain computer literacy from social point of view. The computer literacy will definitely help the womenfolk develop individuality, self-confidence and economic self-reliance. Therefore, the parents of the women teacher educators should take steps in this direction. The women student teachers may be encouraged to make use of internet during evening times, by ignoring the unwanted societal norms. Such a step on the part of the parents may lead to greater involvement of women student teachers in the net based activities. A support from home will certainly lead to greater utilization of internet by the women student teachers.

The study reveals more positive ICT attitude shown by the student teachers of urban colleges of education than that of the student teachers of rural colleges of education. In rural areas, the ICT development is rather slow; many browsing centres are found only in urban areas. The student teachers of rural areas do not have adequate exposure to ICT unlike their counterparts. Hence a variation in the attitude is found out. The Ministry of Rural Development and the Department of Science and Technology may take steps to strengthen ICT infrastructure in rural areas. This step on the part of the government agencies may ameliorate the socio-economic conditions of the rural masses to a greater extent.

The present study reveals many problems experienced by the teacher educators and student teachers while utilizing internet for their teaching – learning activities. The management of the college should find out ways to eliminate those problems experienced by the teacher educators and student teachers. In each college of education, a computer technician may be appointed

to take care of the internet in the college. The UGC may provide financial sanction for the post.

The computer literacy should be integrated in all the curricula of a university. Since internet is an indispensable and educational tool, it must find a place in all courses of study. The policy makers and curriculum planners should take appropriate measures for the integration of internet with educational system.

The effectiveness of an educational system largely depends upon its management functioning. The integration of ICT with management may facilitate effective governance of the system. The college management may ensure better e-governance through ICT integration with educational system.

21. Suggestions for Further Research

Based on the findings, the following topics are suggested for further exploration of research activities in the area of study :

i) In the present study, only five aspects of ICT are examined. For further research, other aspects of ICT may be included for investigation.

ii) The universities have greater potentials for large scale application of ICT. A similar study may be replicated in universities.

iii) The Academic Staff Colleges are organizing ICT based programmes under orientation and refresher programmes. A study may be planned to find out the effectiveness of the ICT based programmes organized by the Academic Staff Colleges in India.

iv) The development of multimedia web-based courseware is gaining momentum in recent times. The researchers can turn their attention towards this vital area of interest. After the development of the coursewares, their effectiveness may also be examined.

v) A global networking in wider application of ICT is a reality. As a result, individualized learning can be shared with learners in different colleges. In this context, it is possible to test the effectiveness of such networking.

22. Conclusion

ICT plays a dominant role in the society and education system. ICT based instruction may lead to effectiveness and efficiency of education in general and teacher education in particular. In India, the University Grants Commission and the National Council for Teacher Education have initiated appropriate measures for the creation of ICT infrastructure facilities. Sensitizing the relevance and importance of ICT in teacher education, an attempt is made to study the information and communication technology in colleges of education. For the present study, five aspects namely, ICT availability, ICT awareness, ICT attitude, internet utilization and extent of internet utilization and internet usage problems experienced by the teacher educators and student teachers while using internet are identified and studied. The study reveals that i) there is a fair availability of ICT tools in the colleges of education; ii) the teacher educators have greater ICT awareness and more favourable attitude towards ICT; their utilization of internet services and the extent of internet utilization are not encouraging; the teacher educators experience more problems while utilizing internet; iii) the student teachers have greater ICT awareness and more favourable attitude towards ICT; their utilization of internet and the extent of internet utilization are low; the student teachers face more problems while using internet; iv) the colleges of education differ among themselves in the five aspects of ICT. Based on the findings, appropriate recommendations are made and the scope for further investigation in ICT area is suggested.