Chapter 5
Summary and Implications

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5.1 INTRODUCTION

The world's most successful economies are no longer powerhouses of industry, but rather powerhouses of information. For developing countries to compete in the new, knowledge-based economy, they must provide access to the latest information, regardless of subject. Educators, hence, have a challenging job in their hands. The teaching learning process now cannot be confined within the rigid dimensions of a classroom with the traditional teaching tools. It is becoming imperative to make use of any resource available within the reach of an educator, so as to enhance the teaching learning process. One such resource is that of Information and Communication Technologies (ICT).

Informatics as a science deals with the design, realization, evaluation, use, and maintenance of information processing systems, including hardware, software, organizational and human aspects, and the industrial, commercial, governmental and political implications of these. In other words, ICT is an umbrella term that includes any communication device like: radio, television, computers, and satellite systems as well as the various services and applications associated with them, such as videoconferencing and distance learning. The importance of ICTs lies less in the technology itself, than, in its ability to create greater access to information and communication. Greater is access to information and communication, narrower is the gap between the information giants of haves and have-nots.

With information growing at a mind boggling pace, ICT provides the necessary help and technical support required to keep up with the information growth. In the field of education, ICT provides the teacher with variety of tools which help transform the oft seen teacher centered classroom into a rich, student focused, and knowledge rich environment. ICT demands that the educational systems wake up to the call of transformation in the paradigm of traditional learning. Many educators believe that creating a paradigm shift in the views of the learning process, coupled with application of new information technologies, may play an important role in bringing

educational systems into alignment with the knowledge based information rich societies.

To maintain the learner centered environment it is necessary that the process of learning be well understood. Today learning is viewed as a natural, social and active process that is based on the student's abilities, interest and culture. There is a shift in the role of the teacher from being a knowledge transmitter to a learning facilitator, from a source of information and answers to a collaborator, mentor and knowledge navigator. This shift has not taken place overnight. It has been built on the shift in understanding of the human mind and the way humans learn. It draws from psychological principles and theories which are now shaping the young, interested minds into moulds which are capable of multidimensional capabilities.

Today the learning process is viewed as the process of "meaning making" in a social, cultural, historical and political environment. Learners are active agents who engage themselves in their own knowledge construction by integrating new information into their schema or mental structures. The focus is towards the constructivist view of learning, where it is maintained that the students construct their own knowledge by testing ideas and approaches based on their prior knowledge and experience, applying this knowledge to new tasks, contexts and situations, and integrating the new knowledge gained with pre existing intellectual constructs. ICT, it is argued has considerable potential to catch the tentative nature of knowledge in Constructivism, as the use of ICT involves drafting and redrafting, editing and selecting, making connections and reflecting on the knowledge learnt. The Piagetian Cognitivist and Constructivist theory and Cybernatic theories have contributed significantly in the area of independent construction in the field of ICT.

Some of the educational institutions in India have already been offering ICT in Education either as a core course or as a special area. ICT in Education is offered as core course in B.Ed. at the Department of Education, The M.S. University of Baroda, Vadodara. ICT is offered as a core course in M.A. Education 4th semester at the University of Jammu, Jammu. Also ICT is offered as a core course in B.Ed. at the H.M. Patel Institute of English Training and Research, Vallabh Vidya Nagar, Gujarat. Many colleges of Education in India are offering ICT in Education as an

optional area. Most of these courses find Internet/Intranet as one of the units. The introduction of these courses has initiated the Student Teachers into the areas of Info-Savvy Skills.

In ICT, computer is one part of it. Computer has been used most during the last decade because it is a powerful medium for exchanging information. The use of computer is rapidly increasing. One of the reasons for this is omnipresence of Internet. It is a network of networks which is connecting millions of computers together to form a global network. Any computer can communicate with any other computer connected through Internet.

Internet is most popular network to gather information. Frequent use of the Internet promotes self-efficacy among students (Yang, 2003). So, it is the duty of a teacher to teach students appropriate ways of using Internet. For teaching students the use of Internet, a teacher needs to have clear understanding of usage of Internet. For this reason, now, in many teacher education institutions a course, namely, Information and Communication Technology in Education has been introduced. This course is very helpful to the Student Teachers and especially to those Student Teachers who know little about the computers. In this course, they also learn about the use of the Internet. This course is taught theoretically and practically. Teacher education programme is constituted of various courses, namely, core courses, methods, special field, practical work and practice teaching. They require lots of information. Internet is a very useful medium for information gathering. But every student teacher is not in a position to find out information easily on Internet. Internet requires various skills for seeking information. These skills are known as Info-Savvy Skills which help them in finding suitable information efficiently.

5.2 INTERNET: A LEARNING RESOURCE

The Advanced Research Project Agency Engineers of the US Defense Ministry created Internet in 1969. From its origin it got its name as ARPANET which later developed into Internet. In India, Internet was implemented in 1994.

Now a days Internet is a very common medium for communication and information gathering. It includes so many ways for gathering information. An individual can

acquire and provide information through Internet. An individual can also interact with other individuals through e-mail, chatting, on-line video conferencing etc. These are some of the ways through which an individual can acquire information. There are various useful ways of seeking information, such as, searching divergently, skimming, scanning, skipping, hyper linking, cross validating. By using various ways an individual can get information from anyone, anywhere. Some of the ways are as follows.

- **E-mail**
- **E-Chat**
- **Blog**
- **Twitter**
- **E-reader**
- **On-line video conference**
- **Facebook**
- **World Wide Web (www):** The concept of the www began in March, 1989 and was developed by Tim Berners-Lee of the European Laboratory for Particle Physics in Geneva, Switzerland.

Some people use words Internet and the www as same but both are different from each other. Internet is a network of networks, whereas, the www is a way of accessing information through Internet. The www is just one way of sharing information over the Internet. In simple terms the www is the collection of documents and informations that are held on and sent through the Internet. Most popular search engines are Yahoo, Altavista, Excite, GoTo, Google, HotBot, Infoseek, Lycos, Northern Light, and PlanetSearch.

A recent trend in Web searching is the Metasearchers, which search numerous engines simultaneously. This type of new trends increases more and more ways for getting information through the www. So, the www is most popular way to search through the information content of the Internet, the network of networks which has become part of everyday life for millions of people in all sectors of the community. Education is also one of the sectors which use the www on wide bases. Students use

the www for pursuing information for their academic studies. Teachers impart information to students by using the www.

A teacher needs to equip himself with the upto date information. It is important for a teacher to learn Info-Savvy Skills for gathering information from the Internet.

5.3 PRESENT SCENARIO OF TEACHER EDUCATION PROGRAMME

A teacher may be of any level, prepares the future citizen. Teacher's knowledge helps in the progress of the society. Teacher's inefficiency can result in the downfall in the nation. For that reason, teacher has to have well established information.

Teacher Education Programme prepares Student Teachers who are well equipped with the informations. According to the change in the curriculum teachers also update their knowledge. He/she should be able to deal with the innovations made in education. One of the innovation is ICT. In school curriculum ICT is being integrated. So to provide knowledge to teachers about ICT many institutions included ICT as a compulsory course in the Teacher Education Programme. This course helps Student Teachers in gathering information.

In the B.Ed. institutions we find Student Teachers of all streams. They may come from different places like some Student Teachers from urban areas while some Student Teachers from rural areas. Generally, we find that Student Teachers who were from science and commerce streams have some knowledge about computer while Student Teachers who were from arts stream possess less knowledge about computer. Just like that, Student Teachers who were from urban area possess good knowledge about computer as compared to the rural area. So, it is very helpful for those Student Teachers who were from arts stream or from rural area, to know about computer and increase their knowledge. As we call this period as technology period, so, it is essential for every teacher to have some knowledge about computer. And now a days, computer education is compulsory at school level. So that as a future teacher computer knowledge becomes an essential requirement for Student Teachers. This knowledge will also help Student Teachers in their B.Ed. programme.

Thus, Student Teachers required knowledge about the computer and also about the Internet. But every student teacher is not able to get all the information required

because they do not possess all required skills which will help them in finding suitable information. For searching information on the Internet certain skills are required which are called Info Savvy Skills.

5.4 INFO-SAVVY SKILLS

Info-Savvy Skills mean raising problem specific questions analytically, seeking related information from various media, analysing information meticulously, such as, complete or incomplete, authentic or inauthentic, good or bad, fact or opinion, applying the analyzed information in the form of suitable formats to the initially identified problem and then assessing the entire process of asking questions, accessing information, information analysis, its application to the problem and assessment of the entire process spontaneously, cybernitically and naturally. A person who possesses all these skills is called info-savvy. According to Jean-LUC Picard, Approach to solving problems, following are the info-savvy skills.

1. ASKING

The Asking stage is the key to engaging students in the learning process. The teacher introduces a topic and guides the students to generate their own questions related to that topic. This more clearly defines the boundaries for research. Questions posed by students and teachers clarify the information needs and define possible paths for inquiry using the Internet, as well as other electronic or traditional paper-based sources. Asking skill has the following components.

(a) Identification of problem

(b) Identifying key words and forming question around them

(c) Brain storming

(d) Thinking laterally/divergently

(e) Understanding ethical issues

(f) Listening deeply, viewing wisely and speaking critically

(g) Filtering information from noise

(h) Sharing personal knowledge and experience

2. ACCESSING

In the Accessing stage, Student Teachers should engage in the data-collection component of the Info-Savvy process. Now the initial questions have been defined, and the research boundaries narrowed, the time for considering possible data sources and how to access them is at hand. This skill has the following components.

(a) Determining where the information is located

(b) Determining what skills are needed to find information

(c) Using a variety of paper and electronic sources

(d) Prioritizing searching strategies

(e) Skimming and scanning resources for pertinent data

(f) Using filtering skills

(g) Taking smart notes

3. ANALYSING

Analyzing is the organizing stage of the Info-Savvy process. As the data is checked for relevance to the topic, accuracy and authenticity, it begins the process of being turned from data into usable information. Student Teachers determine if the assembled data is sufficient to answer the questions, or whether more research is necessary. Documentation of data is a vital part of the Analyzing stage. It includes the following components.

(a) Differentiating the data into different categories

(b) Identification of relevant data

(c) Establishing authenticity and credibility of the data

(d) Differentiating the facts from the opinion

(e) Finding relationships amongst different data

4. APPLYING

After the material has been organized and analyzed, it must be presented in a finished form or product. During the Applying stage, presentations are created in a variety of ways using combinations of the four formats of information – text, images, video, and sound. As the presentation is developed, it completes the process of turning data into information and usable knowledge.

5. ASSESSING

Assessing is the final stage of the Info-Savvy process. Assessment confirms that learning has occurred, while allowing Student Teachers to make connections to previous experiences, as well as laying the groundwork for dealing with future information problems. It seeks the answers to the following questions.

(a) Is the problem identified in proper manner?

(b) Is related question asked?

(c) Is data collected sufficient?

(d) Is data analyzed properly?

(e) Is information applied usefully?

(f) Is problem solved or remaining?

When a student teacher gives proper answer to all these five stages, he/she is known as Information fluent. So student teacher has to possess these Info-Savvy Skills to become information fluent, i.e., Info-Savvy. But it requires awareness and frequent use of Internet by Student Teachers. Then only they can become Info-Savvy.

5.5 IMPLICATIONS OF THE RELATED LITERATURE REVIEWED FOR THE STUDY

In the light of review of related literature the investigator feels the need to explore the awareness among student teachers regarding the use of the Internet and its utility for their educational work (Joshi, 1999). Professional training in Internet use enhanced the teaching and learning process and contributed to student-centered, multi-sensory and cooperative and collaborative learning (Beaumont, 2006). The study reveals that web-based learning is increasing rapidly so that attention is also given to instructional website design (Zschocke, 2002). Young children are able to navigate and recall some information presented on the web easily (Pfister-Brightman, 2001). Combining traditional information literacy instruction with novel approaches appeals to the confidence and reliance on Internet search engines that college students exhibit (Brown, Murphy and Nanny, 2003). Adolescents were frequent users of Internet and generally they use various technology tools (Eagen, 2008). But the same time there is a need to aware students and parents about Internet safety (Berrier,

2007). It increases the responsibility of a teacher that they should aware their students about risks involved in Internet surfing. For that reason, there is a requirement of trained teachers who are capable of teaching the students about the Internet and WWW. To improve pre-service teachers' teaching experience technology has to be integrated into their instruction (Bansavich, 2005). The pre-service as compared to the in-service teachers revealed a greater level of confidence to integrate technology and more positive beliefs in the benefits of using technology to improve teaching and learning (Spaulding, 2007 and Bakar and Mohamed, 2008). Student engagement and motivation, personal and professional reasons, and teaching 21st century skills were Influencing teachers on using technology (Fowler, 2007). It is increasingly imperative to reach a critical mass of teachers who are capable of using ICTs and teaching multilitaracies in order to equip 21st century citizens with the necessary skills for functioning fully in a global society (Bagwell, 2008). So, at B.Ed. level ICT was introduced as a compulsory course from the year 2002 (Rathod, 2002). It shows the necessity of computer literacy at B.Ed. level. Computers should play only a supplement role in teaching learning process (Amankwatia, 2008). But having only ICT knowledge is not enough, now there is a need of research investigation into classroom teachers' knowledge of information literacy skills and their related pedagogical practice (Probert, 2009).

Use of Internet has increased on rapid way, because new concepts were added on Internet like Wikipedia, Weblog, Facebook and Web 2.0. There was 01 study on Wikis (Coyle, 2007), 02 studies on E-mail (Keane, 2007 and Kilgore, 2010), 03 studies on Weblog (Bloom, 2008, Freeman, 2008, and Kelley, 2008) and 01 study on Web 2.0 (Creighton, 2010). These new ways of searching information save time and energy of a student but the same time it increase dangers also. There was a requirement of Internet safety programs to minimize those risks and to help children to gain the knowledge, decision-making skills, and motivation necessary to make safe and responsible choices when they are using the Internet (Berrier, 2007). At higher education level one of major risks is related to Information Ethics. The literature indicates that students have varied levels of understanding of Information Ethics (IE) issues, and that even at the doctoral level more exposure to IE issues is

needed. If proper training is provided to students then they are able to apply IE concepts adequately in their writing (Jackson, 2008). At higher education level it was difficult to teach students to write ethically (Yates, 2007). It shows emerging need to designing Information Problem Solving Model for searching information on Internet (Brand-Gruwel, Wopereis, and Walraven, 2009). It means there is a need to develop information Literacy Skills.

On the basis of reviews, the investigator felt that there is a need to develop a programme through which student teachers are able to develop their Info-Savvy Skills.

5.6 RATIONALE OF THE STUDY

Now a days we find that the role of teacher is changing very fast. The teacher is a facilitator of knowledge. This can be possible if teacher has enough knowledge about the new ways and means of getting information.

In this age of information explosion it has almost become essential for everyone, particularly teacher and students to develop expertise in the area of information seeking and its timely application. The problem is that inspite of media implosion, Internet and World Wide Web, at times the very much needed information, although readily available is not retrieved by the person who is in dire need. It is because there is lack of technological culture in teacher education institutions and so in schools. Universities having their web portals, educational institutions being on the Internet, sophisticated technology labs have become more of status symbols, but with little educational substance. It is because we have more of media crowd and less of media culture. Inspite of indiscriminant flow of funds from apex agencies and focus on ICT we have information poverty. Is not it a paradox that on one side we have information explosion, on the other side information poverty. How to bridge the gap? The teacher education institutions can contribute significantly in this area by designing developing and implementing programme in the area of Info-savvy skills.

Internet is a very useful medium of getting information from all over the world. According to Joshi (1999) most of the students were eager to know more about the utilization of Internet for their educational work. According to Dhodi and Goel

(2004), students who were aware about Internet adopted different approaches for finding suitable information. Students also felt that there was a need for developing skills through which one can get information easily and precisely.

In this age of Information and Communication Technology it is expected that all the Student Teachers have ICT literacy. It becomes almost an essential requirement that all the Student Teachers have technological aptitude, technological attitude, and Info-Savvy Skills. It is desirable to study the technological aptitude, technological attitude and Info-Savvy Skills of the Student Teachers, so that they are better equipped in the area of information. The enhancement of Info-Savvy Skills in Student Teachers is likely to facilitate better integration of technology in education.

An attempt was made by the investigator to develop a programme for enhancing Info-Savvy Skills in Student Teachers.

5.7 STATEMENT OF THE PROBLEM

DEVELOPMENT AND IMPLEMENTATION OF A PROGRAMME FOR ENHANCING INFO-SAVVY SKILLS IN STUDENT TEACHERS

5.8 OBJECTIVES OF THE STUDY

1. To assess the level of Info-Savvy Skills in Student Teachers.
2. To develop a programme for enhancing Info-Savvy Skills in Student Teachers.
3. To study the effectiveness of the developed programme in terms of:
   a) Gain on Info-Savvy Skills by Student Teachers,
   b) Narratives of Student Teachers, and
   c) Reactions of the Student Teachers towards the developed programme.

5.9 HYPOTHESES

1. There will be no significant difference in the observed frequencies and the frequencies expected against equal probability against various points of the rating scale.
2. There will be no significant difference between the pre-intervention rating and post-intervention ratings against various statements of the rating scale.

3. There will be no significant difference in the observed frequencies and the frequencies expected against equal probability against various points of the Reaction Scale.

5.10 OPERATIONALISATION OF THE TERMS

Info-Savvy Skills: The Info-Savvy Skills in the context of present study mean the following skills

1. Skill of Asking
2. Skill of Accessing
3. Skill of Analysing
4. Skill of Applying
5. Skill of Assessing

(The skills have been differentiated into components as mentioned earlier.)

Programme for Enhancing Info-Savvy Skills:

The programme has the following components-

1. Theoretical inputs on Info-Savvy Skills through PowerPoint presentation
2. Demonstration on Info-Savvy Skills through surfing on the www
3. Surfing on the www by the Student Teachers
4. Focussed Group Discussion on the Info-Savvy Skills functionally employed while surfing

5.11 DELIMITATION OF THE STUDY

The present study was delimited to-

1. B.Ed. students
2. The Info-Savvy Skills employed by Jean-LUC Picard Approach to solving problems

5.12 NATURE OF THE STUDY

The present study was descriptive-cum-experimental type.

5.13 EXPERIMENTAL DESIGN

Single group Pre-test Post-test Experimental design was employed for the present study.

5.14 POPULATION

The population of the study was all the Student Teachers of India for academic year 2009-2010.

5.15 SAMPLE

For the present study, purposive sampling technique was employed. Sample for the study constituted of all the B.Ed. Student Teachers of the Department of Education, Faculty of Education and Psychology, The Maharaja Sayajirao University of Baroda of the academic year 2009-2010.

5.16 TOOLS AND TECHNIQUES FOR THE STUDY

1. A five point scale was constructed by the investigator to assess the level of Student Teachers on the Info-Savvy Skills.
2. Focussed Group Discussion was done periodically problem wise.
3. Content analyses of narrations.
4. A five point reaction scale was constructed by the investigator to study the reactions of the Student Teachers.
5. Intervention Programme

   The syntax of the intervention program was as follows:

   i. Theoretical inputs on the Info-Savvy Skills were provided through PowerPoint presentation.

   ii. Demonstration on the Info-Savvy Skills was given through www.

   iii. The Student Teachers had hands on experience on the Info-Savvy Skills as follows:

      a. They identified problem.

      b. They sought information for finding out the solution of the identified problem on the Internet employing all the Info-Savvy Skills.

c. They produced a scenario of the entire process of employing Info-Savvy Skills (problem based)

iv. It was followed by FGDs.

5.17 DATA COLLECTION

1. The Info-Savvy Skills Rating Scale constructed by the investigator was administered on group before administering the programme and also after administering the programme.
2. The FGDs were conducted by the investigator periodically.
3. Narratives of Student Teachers were gathered.
4. The reaction scale was administered on the experimental group post intervention.

5.18 DATA ANALYSIS

1. The data were analysed by employing chi-square test.
2. Qualitative analysis of the data gathered through FGDs and narrations of Student Teachers was done.

5.19 FINDINGS

The findings of the study have been presented objective wise.

1) Assessment of the level of Info-Savvy Skills in Student Teachers

The entry status of Student Teachers on Info-Savvy skills was found to be encouraging as evident through the values of chi square against all the 36 statements of the Rating Scale. The null hypothesis that there will be no significant difference between observed frequencies and frequencies expected against equal probability has been rejected against all the statements of the Rating Scale at 0.01 level.

2) Development of a Programme for enhancing Info-Savvy Skills in Student Teachers

Investigator assessed status of Info-Savvy skills in Student Teachers and then on the basis of that prepared Power Point Presentation on Info-Savvy Skills.

- To provide theoretical input to Student Teachers a power point presentation was prepared by the investigator on the basis of Info-Savvy Skills. To provide theoretical input 04 periods were required.
- After theoretical input, demonstration of Info-Savvy skills was given live in the class room by the investigator. To show demonstration on Info-Savvy skills 02 periods were required.
- During first phase hands on experience were provided to Student Teachers by giving them one problem. One week time period was given to Student Teachers for surfing on www. After one week Student Teachers presented their searched information and share their experiences in the general classroom. Focussed group discussion was conducted during 04 periods. Narrations on Info-Savvy skills were also collected from Student Teachers.
- During second phase of hands on experience Student Teachers chosen problem according to their method subject. One week time period was given to Student Teachers for surfing. After one week method wise Student Teachers presented their searched information and shared their experiences in the method classroom. Focussed Group Discussions were conducted during method classes, or else whenever Student Teachers were free during that time also Focussed group discussion were conducted.
- Developed programme was implemented on Student Teachers in the entire IInd semester.

3) Effectiveness of the developed programme

- Against 11 statements of the Rating Scale out of 36 statements, the null hypothesis that there will be no significant difference between the observed frequencies and the frequencies expected against the equal probability hypothesis was rejected either at 0.01 level or at 0.05 level, whereas, against remaining 25 statements the null hypothesis was not rejected.
- Post-intervention content analysis of the narratives by the Student Teachers reveals that 38% of Student Teachers were found to be excellent in Info-Savvy Skills, 56% Good, 4% Moderate, whereas, 2% were found to be very poor.

help from their friends who were having knowledge about Internet surfing. Now they were able to check authenticity of data and ethical issues. One student teacher found information about 'Kabir' from images. Most of Student Teachers tried to check authenticity but they checked it by cross validating with other websites. Now they knew that through domain name also we can check authenticity of data. They knew that in some websites references were given. Now they knew that when there was difficulty of over load of information then they have to use surfing skills. They were found to have theoretical knowledge about Info-Savvy skills and also tried to use it practically.

- **Teaching of Mathematics**

Student Teachers of Mathematics method were Net-Savvy. They searched information in mathematician on history of numbers by surfing Internet. To search formula or example they never surfed Internet. One student teacher searched on Vedic Maths but when she entered the same key word she did not get any relevant information. So she changed key word and then she was able to collect relevant information. All the Student Teachers always searched information from Google search engine. Before implementing the programme Student Teachers did not know about Metasearch engines. Student Teachers never saw how many results they found. Even they did not know that by change in key words numbers of results also change. Student Teachers agreed on that they were not Info-Savvy. They used surfing skills but without knowing how useful they were. They did not know that to cope up with overload of information these surfing skills were useful. After implementation of the programme they were found to have knowledge about Info-Savvy skills. They found that it was easier to find out information by using Info-Savvy skills. After knowing Info-Savvy skills Student Teachers tried to check authenticity of data and examine ethical issues. They found that some of the books which were available in the library can be read on Internet freely. And if latest books they want to read on internet then they have to pay for it. Student Teachers were able to search information through images and videos. Student Teachers used collected information in their assignment and during test lessons. They were able to organize collected information in proper

manner. A few Student Teachers tried to surf information through meta-search engine and were happy with that because it given less results. Student Teachers expressed their views by saying that for mathematics normally they did not prefer to search information through Internet but now they readily prefer Internet. Student Teachers agreed on that now they are using Info-Savvy skills.

- **Teaching of Science**

Student Teachers of Science method were Net-Savvy. Before implementing the programme it was found that they were regular user of Internet. They very often used Google search engine. They were using different key words and surfing skills. They never heard about Metasearch engines. They never checked authenticity of data. They were not observing information ethics. They never tried to read references given below the page. They did not know about domain used in the URL (Uniform Resource Locator). They did not know that through images also we get information. Some Student Teachers were not knowing about Wikipedia. After implementation of the programme there was found change in their searching patterns. Student Teachers are able to use different key words in different search engines. They are able to check authenticity of data on the basis of currency of data, authors' name, and objectivity. They are able to identify ethical issues. Student Teachers of Mathematics method found that as compared to Mathematics they found more number of results in Science. Some of the Student Teachers searched video results showing experiments on science subjects. One student teacher found video result by searching on images. She was able to correlate data. Student Teachers are using meta-search engines to surf. They are able to organize collected information in proper manner. They have developed Info-Savvy Skills.

- **Teaching of Physics**

Student Teachers of Physics method were almost at the same level as that of Science method. Before implementing the programme it was found that Student Teachers were Net-Savvy. Student Teachers used different surfing skills and key words but without knowing. They always searched information on Google search engine. They never heard about Metasearch engines. They never tried to check

authenticity of data and observe information ethics. They did not know about Wikipedia. After implementation of the programme it was found that Student Teachers are able to smoothly surf information from Internet. Student Teachers are able to use different search engines and meta-search engines. They are able to find book results and journals available on internet. They found that when key word is specific then it provides more accurate results. One student teacher has downloaded one video and tried that experiment seen in the video at home. One student teacher whose medium of instruction is Gujarati was not able to find out related and relevant information in Gujarati language. He tried to surf in Gujarati language. He found results in English language but was not able to understand it. Student Teachers were found to possess Info-Savvy skills.

- **Teaching of Chemistry**

Student Teachers of Chemistry method were Net-Savvy. Before implementing the programme it was found that the Student Teachers used different key words and surfing skills but unknowingly. They never saw that how many results were found. They always searched through Google search engine. They were regular users of internet. They never heard about meta-search engines. They were not checking authenticity of data. They were not aware about information ethics. They had seen Wikipedia results but never gave that much of importance. After implementation of the programme it was found that they are able to surf through Info-Savvy Skills. They use different surfing skills to cope up with over load of information. One student teacher searched on 'Pollution'. He collected information and used it for test lesson and assignment. He searched through meta-search engines and other search engines also. They found development in their surfing skills.

- **Teaching of Biology**

Student Teachers of Biology method were found to be Net-Savvy. Student Teachers used Internet many times during their post graduation because of that reason they were Net-Savvy. Before implementing the programme it was found that Student Teachers unknowingly used Info-Savvy skills but to some extent only. Student Teachers used Google search engine only. Even few Student

Teachers thought that yahoo search engine was useful for mailing only. All of them agreed on that they never heard anything about meta-search engines. Student Teachers were able to use different key words. Student Teachers used surfing skills but unknowing. Student Teachers never checked ethical issues and they thought that if they got information related to textbook then their problem was solved. After implementation of a programme it was found that they were able to use surfing skills in proper manner and they believed that it saves their time. Student Teachers were able to check number of results found by changing the key words. Even a few Student Teachers used meta-search engines also. Student Teachers found that mostly first 3 pages were providing relevant information others may be repetition or copy of it. After knowing Info-Savvy skills they tried to check authenticity of data on the basis of other criteria and also checked ethical issues. Student Teachers normally established authenticity of data on the basis of textbooks. They tried to check references given below of the document or an article. Few Student Teachers were not aware about Wikipedia but after knowing about it they tried to surf it first. One student teacher searched video results but many times it did not open. It may be because of non-availability of software in computer, so, she never tried to search it again. But now she got an idea that on other search engines it may be available in other software. One student teacher wanted to search on cartoon pictures of immunity. She searched through images and used different key words but other than cartoon images also she got information which created difficulty of over load of information. It happened because she was not aware about that if one would like to see cartoon pictures only then he/she has to write that key word. Student Teachers were able to oragnise collected information in proper manner. They used collected information in their test lessons and assignment. After knowing Info-Savvy skills they realized the importance of smart notes. They were able to search information through images also. They were able to brainstorm. They normally spent one hour for surfing. They have developed Info-Savvy skills.

- **Teaching of Psychology**

Student Teachers of Psychology method were only three students. All of them were not Net-Savvy. Before implementing the programme it was found that these Student Teachers were not using Internet for their subject. Two of them never surfed Internet. So they did not know much about Internet. After implementation of a programme it was found that they tried to surf Internet with the help of their friends. Even though they were new users then also they searched related information because of Info-Savvy Skills. They tried to observe information ethics. They tried to check authenticity of data and currency of data. They found it difficult to differentiate facts and opinions. They used related links given in the websites but were not able to get relevant information. They were able to use different key words. They know about surfing skills and name of search engines. They have less ICT literacy. They are not able to present information in proper manner with pictures and videos.

- **Teaching of Social Science**

Before implementing the programme it was found that most of Student Teachers were Net-Savvy. Student Teachers were aware about surfing skills but did not know their names. Student Teachers were not knowing about meta-search engines. They always searched information through Google search engine. They never saw how many results were found. They were not able to use different keywords. They never identified ethical issues. A few Student Teachers never used Internet. Student Teachers always thought that if they got information exact to the textbook then their problem was solved. After implementation of the programme Student Teachers were able to use different keywords and also noticed that how many results were found. They tried to check authenticity of data and ethical issues. Most of Student Teachers are using Wikipedia. Most of Student Teachers used Internet for History and Geography. One student teacher searched on 'Types of drainage system'. She searched on the basis of information given in the textbook. She prepared presentation on it for students of 8^{th} standard for test lesson. One student teacher searched on 'Terrorism'. He collected information and pictures and shown to students during test lesson. One student teacher searched lot

of information on 'Cultural Heritage of India'. She thought as a student of history she got that much of information on the basis of which she can conduct Doctoral Research on this topic. Student Teachers have knowledge about Info-Savvy Skills and they try to use these practically because their subject is such where they have to update their knowledge when required.

- **Teaching of Commerce**

Student Teachers of Commerce method have knowledge about Internet. All of them were surfing through English language. Before implementing the programme it was found that some Student Teachers were able to use key words and were able to use surfing skills. Student Teachers searched information on Google search engine only. All of them were not aware about Metasearch engines. They never checked information ethics and never saw how many results were found. They never heard about smart notes. They never bothered about that whether information available was fact or opinion. Student Teachers never saw references given at the end of page. Student Teachers thought that if they got data related to textbook then their problem was solved. After implementation of the programme Student Teachers were aware about use of different search engines, key words, surfing skills, use of Wikipedia, and how to filter information. One student teacher searched on 'definition of commerce' but she did not get definition which she wanted. The reason she had given was that she was not using different keywords, nor other search engines because she did not know Info-Savvy skills. Student Teachers tried to find out information on meta-search engine also. One student teacher never used any search engine for educational purpose but she regularly chats with her friends on face book. Some Student Teachers did not know about face book. Student Teachers surfed on general problem they were not able to identify whether problem was solved or not. But when the problem was specific at that time they were able to assess the extent to which the problem was solved. Student Teachers normally surfed upto 10 to 12 pages of results found. For, test lessons Student Teachers surfed Internet and collected information presented in organized manner. Student Teachers were able to use Info-Savvy

skills while surfing on Internet. One student teacher had shown her problem that during skimming it may be possible that one can skip relevant websites.

- **Teaching of Accountancy**

Student Teachers of Accountancy method were same as Commerce method. So no difference found about using Info-Savvy skills. They normally don't use Internet for Accountancy. They surf Internet to find out definition or history of Accountancy and Book Keeping. They don't have their method book. So they tried to get information from websites, but, they were not able to find it. One student teacher found information on 'New Innovations in Accounting Standards'. She checked authenticity of information by websites name. One student teacher found information on 'Subsidiary Account'. She also used Info-Savvy skills and she used Google search engine.

- **Teaching of Economics**

Student Teachers of Economics method sometimes surfed Internet. Before implementing the programme it was found that half of the Student Teachers were Net-Savvy and others were having some knowledge about Internet. Like other method students a few Student Teachers used Internet for mailing purpose. They used Google search engine. They were having no idea about meta-search engines. Student Teachers used Info-Savvy Skills to some extent but without knowing. Student Teachers never saw how many results were found. Even they did not know that by change in key words number of results also changed. Student Teachers never checked authenticity of data by its author's name or currency of document or objectivity. Student Teachers were not aware about information ethics. After implementation of the programme Student Teachers were able to check authenticity of data and ethical issues. One student teacher searched on 'Inflation'. She checked authenticity of website by its name. After knowing about meta-search engines she likes to use it because it shows less number of results. One student teacher searched on 'Budget' for the submission of assignment. She got all the relevant data from the website which was developed by government of India. By knowing domain she checked authenticity of data. Student Teachers

were able to organize collected information in proper manner. Student Teachers agreed on that Info-Savvy skills were really helpful.

- **Further on the basis of analysis of the narratives the findings are presented as follows**

Narratives were collected from the Student Teachers to study the status of Student Teachers on Info-Savvy Skills. For that reason 10 criteria were decided by the investigator. Total 159 Student Teachers produced Narratives. Further on the basis of content analysis the findings are presented as follows

- **Search Engines Used**

  5% of Student Teachers were not able to write the names of search engines. 60% of Student Teachers used only one search engine. 29% of Student Teachers used two to three search engines. 5% of Student Teachers used four search engines while only 1% of Student Teachers used more than 5 search engines.

- **Keyword identified**

  4% of Student Teachers were not able to identify a keyword. 62% of Student Teachers used only one keyword. 21% of Student Teachers used two to three keywords. 12% of Student Teachers used four different keywords. 1% of Student Teachers used five keywords.

- **Surfing Skills Used**

  16% of Student Teachers did not know about surfing skills. 24% of Student Teachers just knew the names of surfing skills. 38% of Student Teachers used surfing skills, namely, skimming, scanning, switching and they have written briefly about the skills. 20% of Student Teachers explained about surfing skills used by them in detail, namely, skimming, scanning, switching, randomization and skipping. 2% of Student Teachers also used another skill of surfing, namely, hyperlinking.

- **Difficulty encountered**

  11% of Student Teachers did not express the difficulties they encountered. 22% of Student Teachers found difficulty of over load of information. 54% of

Student Teachers faced various difficulties, like page could not be displayed, meta-search engines and yahoo search engine could not be opened, and over load of information. 13% of Student Teachers could not link the web page, and open copyright act, and privacy policy. They could not find out author's name.

- **Data Analysis**

  14% of Student Teachers were not able to analyse the collected data. 26% of Student Teachers were able to write name of author and date of modification. 41% of Student Teachers were able to check whether data were authentic or not and were also able to differentiate relevant data and irrelevant data. 16% of Student Teachers were able to differentiate facts and opinions. 3% of Student Teachers were able to establish links, that is, they were able to correlate data.

- **Information Ethics observed**

  35% Student Teachers were not able to observe information ethics. 20% of Student Teachers were able to observe copyright given in the article. 32% of Student Teachers knew that if a document is in PDF format then it contains copyright. 11% of Student Teachers were able to open privacy policy and read it. 2% of Student Teachers saw and read copyright act and privacy policy in two or more than two websites.

- **Information Application Format**

  14% of Student Teachers did not know about information application format. 27% of Student Teachers observed only text format information on websites. 39% of Student Teachers used Microsoft Word format even they saved images and pictures also in that. 17% of Student Teachers found audio and videos from the websites and they downloaded it. 3% of Student Teachers used power point and organized collected information with the help of pictures and videos.

- **Educational Immersion**

  14% of Student Teachers did not understand the meaning of it. 19% of Student Teachers searched information but were not able to write it. 42% of Student Teachers used this knowledge for their students and also uploaded their knowledge. 23% of Student Teachers used this knowledge for their assignment

and examination. 2% of Student Teachers collected and organized information in such a way that they can use it in future also.

- **Problem Solved**

  5% of Student Teachers were not able to know whether problem was solved or not. 22% of Student Teachers have just written problem solved. 47% of Student Teachers have written percentage of problems solved. 20% of Student Teachers have written that there were many questions which were not answered. 6% of Student Teachers solved their problem by searching on different search engines.

- **Recycling Info-Savvy Skills**

  13% of Student Teachers did not recycle Info-Savvy Skills. 26% of Student Teachers have just written the names of Info-Savvy skills. 33% of Student Teachers have written in details about Info-Savvy Skills. 22% of Student Teachers recycled Info-Savvy Skills once. 6% of Student Teachers again and again searched on websites with different key words or search engines.

Reactions of the Student Teachers towards the developed programme

The Reactions of Student Teachers on Info-Savvy Skills Programme were found to be encouraging. The null hypothesis that there will be no significant difference between observed frequencies and frequencies expected against equal probability has been rejected against all the statements of the Rating Scale at 0.01 level except the statement Info-Savvy Skills are useful only for Internet surfing.

Overall scenario on the Info-Savvy Skills

Info-Savvy Skills of Student Teachers were developed significantly through Info-Savvy Skills programme. All the Student Teachers agreed on that by enhancing Info-Savvy Skills, they were able to search information accurately and easily. Student Teachers learnt about Metasearch engines. All the Student Teachers started taking care of ethical issues. Most of the Student Teachers started using different keywords. Search engines other than Google search engine were also used by Student Teachers. A few Student Teachers first time used Wikipedia. 7 Student Teachers used Google

search engine in their mother tongue for the first time. All the Student Teachers started checking authenticity of information by checking author's name and updation date. All the Student Teachers learnt the meaning of skimming, scanning, and skipping and how to use them. Most of the Student Teachers were able to apply collected information in suitable format. Some Student Teachers come to know that some books also available on websites for free. One student teacher used Internet through his mobile phone. Some Student Teachers used Internet for the first time but because they knew about Info-Savvy Skills they didn't find much difficulty during surfing. Language Student Teachers also started using Internet. Student Teachers started using Info-Savvy Skills during their assignment work, practice teaching and for their core subjects.

Sanskrit Method students first time used Internet for Sanskrit. Some Gujarati Method Student Teachers first time come to know about availability of audios of different poems on Internet. Psychology Method Student Teachers first time used Internet. English Method Student Teachers were able to identify facts and opinions more clearly as compared to Student Teachers of other Methods. Mathematics Method Student Teachers were started using Internet frequently for Mathematics. Hindi Method Student Teachers were able to search information in Hindi language. Social Science Method students were able to cross validate data and check updation of webpages. Science Method Student Teachers were able to use videos and images for their presentation of lesson plan. Science Method Student Teachers were already using Internet but after learning Info-Savvy Skills they were able to save their time and energy. Chemistry Method Student Teachers started using Metasearch engines.

5.20 DISCUSSION

According to Brown, Murphy and Nanny (2003) student have a misconception that techno-savvy is synonymous with Info-Savvy. Through the Entry status on Info-Savvy Skills tool also it was found that Student Teachers were not able to differentiate between Net-Savvy and Info-Savvy. Student Teachers thought that only computer knowledge was required to search information from the Internet. An

enhancement was found in Student Teachers after Info-Savvy Skills programme was implemented.

To improve pre-service teachers' teaching experience technology has to be integrated into their instruction (Bansavich, 2005). Student Teachers who developed Info-Savvy Skills used these skills during their practice teaching phase and did better performance as compared to earlier practice teaching phase. To search information they used different technologies. Knowledge of ICT also helped them in developing Info-Savvy Skills. Student Teachers who already possessed Info-Savvy Skills developed Info-Savvy Skills faster than new users. New users were developing at strategic way because they were new for computer technology also. But then also they were developing Info-Savvy Skills it shows that they were having theoretical knowledge about Info-Savvy Skills.

It was found that Science method Student Teachers developed Info-Savvy Skills faster. It is because on Internet Science subject related lots of information is available in different formats. At Graduation and Post Graduation level they had submitted many projects and assignments because of which they were regular user of Internet. They already used Internet for searching information or downloading documents.

Commerce method Student Teachers were developing Info-Savvy Skills at moderate rate. It was because they very less used to Internet for educational purpose at their Graduation and Post Graduation level. They used Internet for e-mail and chatting.

Hindi method Student Teachers were developing Info-Savvy Skills. Just like Commerce method they also used Internet less during their Graduation and Post Graduation level. They used Internet for e-mail and Chatting. Most of Student Teachers had fear of English language because of which they avoided using Internet for educational purpose.

Sanskrit method Student Teachers were developing faster than Hindi method. They never used Internet for Sanskrit method. During implementation of Info-Savvy Skill Programme they came to know that NASA (National Aeronautics Space Administration) and Howard University also have given importance to Sanskrit language. It generated interest of Student Teachers to use Internet for Sanskrit method.

Gujarati method Student Teachers were developing Info-Savvy Skills at the rate of Hindi method. They also possessed fear of language because of which they avoided using Internet. During implementation of Info-Savvy Skills Programme they came to know that Wikipedia also offered Gujarati language option which developed their interest in using Internet. To search Gujarati poems the grammar Student Teachers started using Internet. They searched pictures of poem and story writers. They also searched history or biography of writers.

Student Teachers developed their searching strategy. Because of language fear Student Teachers did not try to search information from the Internet. They also started searching on Internet in their own language. They learnt to formulate keywords and started to do brain storming. They started using Metasearch engines. They were taking care of ethical issues related to document and websites. They started checking authenticity of data available on websites.

They were able to clarify the difference between Net-Savvy and Info-Savvy. They were able to know that only computer knowledge was not enough to search information from Internet. As a whole there was a marked development in the level of Info-Savvy Skills amongst Student Teachers.

5.21 IMPLICATIONS OF THE STUDY

The present study comes up with few implications on Teacher Education for developing Info-Savvy Skills. The implications of the study are given as follows.

- The Info-Savvy Skills Programme needs to be developed for different levels of Student Teachers.
- The in-service training need to be provided to the school teachers at different levels for enhancing their Info-Savvy Skills.
- There is need to check pre-status of Student Teachers at the time of entering in pre-service teacher education programme and accordingly training needs to be provided to develop their Info-Savvy Skills.
- Info-Savvy Skills can be integrate in the syllabus of pre-service education programme.

☞ A period in the time table of student teacher be allotted for enhancing their Info-Savvy Skills.

☞ Such kind of assignments be given to Student Teachers were Info-Savvy Skills are employed.

☞ Info-Savvy Skills can be taught to Student Teachers in the first semester.

5.22 SUGGESTIONS FOR FURTHER STUDY

The present study has come out of with few suggestions to further explore Info-Savvy Skills. The suggestions for further study are as under.

☞ The investigator strongly feels that research should focus on the status of Info-Savvy Skills possessed by Student Teachers and their development.

☞ The research should be carried out to study the status of Info-Savvy Skills at school level.

☞ The research should be carried out to develop a programme for enhancing Info-Savvy Skills in in-service teachers.

☞ The research should be carried out for integrating Info-Savvy Skills in the methods of Student Teachers.

☞ The research should be carried out to study status of Info-Savvy Skills at higher education level.

☞ The research should be carried out to enhance Info-Savvy Skills in teacher educators.

5.23 CONCLUSION

The Entry Status of the Student Teachers was found to be encouraging to take off with. Student Teachers could build a reasonably sound theoretical knowledge base through computer enabled power-point presentations made by the investigator. They were well initiated into web surfing by the investigator through demonstrations on web surfing employing Info-Savvy Skills in the classroom situations. The home assignments on Cultural Heritage of India and Buddhist Heritage of India, and the Focussed Group Discussion on them developed further confidence in employing

Info-Savvy Skills. The teaching method wise surfing by the respective method groups developed the Info-Savvy Skills in the Student Teachers reasonably.

Now the Student Teachers have started employing Info-Savvy Skills in the life like situations. Not only they have started using various search engines, also they are using meta-search engines. They have started giving preference to Wikipedia for searching information. Student Teachers of Science and Sanskrit have been found to have made significant difference in employing Info-Savvy Skills. As a whole, the programme developed by the investigator has been found to enhance Info-Savvy Skills of Student Teachers.