CHAPTER 3
RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter outlines the conceptual model of ICT and its antecedents. The model is intended to depict the supportive drivers of ICT. In this research, ICT outcomes are measured in terms of the increase in number of students within the institutes. A conceptual model has been built that captures the learning behavior of the institutes. All of these variables are controllable by management. Practice application of this research can help to create an environment for implementing learning environment for the students.

3.2 CONCEPTUAL FRAMEWORK OF LEARNING FOR THE STUDY

3.2.1 Components of the Model and their Interrelationships

Authors have also identified the need to understand relationship between infrastructure and education which could be pivotal for future public and academic policy efforts. Focusing on identifying specific collaboration strategies among regions or countries that lead to the growth of entrepreneurial ventures and economic development would be another critical contribution to the field (Arthur, Hisrich, Cabrera, 2012).

*Part of this chapter has been published as:


There has been a massive growth in Indian Education Industry since the introduction of Computers as an Aid for Education. In country like ours where providing basic education to all is a big challenge, using Computer and Information Communication Technology ICT based techniques shows a promising future. Even Government of India has been trying to promote the use of ICT for education not only at the basic level but also at higher level for better and specialized researches and knowledge distribution. With a large pool of technologically educated population, Government has been trying to implement ICT for
better education through various five year plans starting from the school level. With the benefit of lower labour and infrastructure cost, India has the ability to implement ICT at all levels of Education and later produce a technologically educated manpower. As the growth and education starts at the school level, its better we educate and implement greener management practices which students of today and professionals of tomorrow can carry on with them and make the world a healthier place to live. The primary objectives of the research are to find ways to implement greener management practices in Indian Education System. The contribution through this research is to develop methods to use ICT for better education system and better, greener environment.

Learning discretion explains the degree of autonomy provided to the learning ers in terms of decision making and learning methods. Institutes allow students to make decisions about their learning processes and avoid criticizing students for making mistakes.

Flexible Boundary defines the degree of flexibility in terms of roles, responsibilities, resource mobility and inter-departmental collaboration. These are the boundaries, real and imagined, that prevent students from looking at problems outside their own jobs. Institutes have standard operating procedures for major jobs and too narrow job descriptions and rigid standards of performance.

Intelligence generation refers to the design of specific processes to enhance intelligence generation among various departments.

Intelligence dissemination includes various processes to assimilate intelligence about the market intelligence. This is also critical for successful implementation of learning pursuits.

Time availability refers to the availability of time for pursuing innovative ideas. Institutes moderate the learning load, avoiding time constraints and allow students to learning with others on long-term problem solving.

On the basis of literature review, the conceptual framework of learning for research has been developed (Figure 3.1). Pearce et al. (1997), Floyd and Woolridge (1990, 1992, 1994), Ginsberg and Hay (1994), among others, recognized the importance of students in enhancing and cultivating such autonomous behavior using ICT and thereby fostering
learning environment. Research has been conducted to identify specific role of ICT on students' learning behavior.

Kuratko, Montagno, and Hornsby (1990) found three factors—management support, organizational structure, and rewards—to be among the most important antecedents of students' learning behavior. Hornsby et al. (1993) partially replicated and extended the earlier study and study materialized the existence of five antecedents of students' learning behavior. With the growing demand of computers, laptops, printers, CDs, DVDs, mobile phones, etc. for providing better education, threat to environment is increasing too. As it is important to understand the ill-effects of such technologies on the environment, role of education and its impact on the students, faculties and the entire society can not be ignored. This paper plans to discuss at length and derive some techniques to provide best ICT based education with emphasis on green practices within the campus and later around the globe.

Till now a lot of learning has been done in the field of developing and implementing —Green management techniques— by industries and organizations in different areas but still no substantial step has been taken to understand its role and impact on environment in the field of education. This project proposes to find such ways to initiate some methods which can provide valuable inputs to the educated generations to come.

Applying Moore's Law which is now considered as a guideline for the IT industry, it can be easily predicted that e-waste in India will rise by 500% by the year 2020 (UNEP study material feb,2010). Such alarming facts force us to think about environment by every means. Hence, contribution by the education industry is equally important as we, as education providers play an important role in shaping our future generations.

3.3 CONCEPTUAL MODEL AND VARIABLES FOR THE STUDY

The role of ICT identified from the literature survey is presented in the conceptual framework of learning given in Figure 3.1. These institute level role of ICT have been identified for empirical investigation.
Figure 3.1: Conceptual Framework of Research

To avoid repetition of table these have been marked with asterisk (*) sign in the table. The mapping is done on the basis of the interviews. The respondents were asked to rate these factors on the scale of one to ten. The overall mapping is done on the basis of aggregate rating. Based on the detailed literature review and the continua study, the various ICT variables for investigation in the study have been identified (see Table 3.1). These variables have been measured with the help of scales developed by different researchers.

The definitions of different variables for the purpose of this study are placed at Appendix–I. These variables have been used for data collection for the questionnaire based survey study and also for the case studies. These have also been used in the empirical testing of data. The previous studies were based on the five variables including risk-taking, management support, learning discretion, rewards, and institutes boundary for predicting the middle students’ learning behavior.

Besides the above-mentioned variables, the study also includes two other variables including intelligence dissemination and intelligence generation. It is also important to note that if there is no continuous emphasis on ICT, the institutes may become bureaucratic even after pursuing ICT for a long time.
3.4 HYPOTHESES FORMULATION

Based on the conceptual framework of learning developed in section 3.3, the set of macro hypotheses formulated is given in Table 3.2. The micro hypotheses are formulated for each variable and are given below.

The micro variables describe the macro variables which are the drivers of the student's process.

Table 3.1: Hypotheses for Research

<table>
<thead>
<tr>
<th>Variables</th>
<th>Hypotheses</th>
<th>Hypotheses Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management Support</td>
<td>Management support influences ICT positively.</td>
<td>HMS</td>
</tr>
<tr>
<td>Learning Discretion in accessing the</td>
<td>ICT provides learning discretion to students.</td>
<td>HWD</td>
</tr>
<tr>
<td>study material</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flexibility in accessing education</td>
<td>ICT provides flexibility to students and faculty.</td>
<td>HOFB</td>
</tr>
<tr>
<td>Intelligence Generation by ICT</td>
<td>ICT helps in Intelligence generation by the students positively.</td>
<td>HIG</td>
</tr>
<tr>
<td>Intelligence Dissemination by ICT</td>
<td>ICT enables knowledge sharing positively.</td>
<td>HID</td>
</tr>
</tbody>
</table>

The intelligence dissemination, management support and learning discretion has been studied through quantitative methodology.
3.5 RESEARCH METHODOLOGY

The study is divided into three phases: (i) the pilot study to identify the role of ICT, (ii) questionnaire study to establish relationships among role for ICT. The framework of learning of research methodology is given in Figure 3.2. The framework of learning shows the structural variables and supportive environmental variables which help motivate the learning activities within the institute. The framework of learning also shows the relationship between new product development and learning outcomes which are the two characteristics undertaken in the study.

The Figure 3.2 mentioned below describes the methodology in detail. It shows the various steps taken to do the research and also shows the how the conceptual framework of learning was developed.

3.5.1 Methodology for the Pilot Study

The empirical/pilot study aims at developing understanding about different practices of ICT by institutes. Institutes from education sectors were selected for the empirical study. The data has been collected through questionnaire survey, observation and interview method.
3.5.2 Methodology for the Questionnaire Study

This part of the study aims at establishing relationships between the research variables involved in the study problem. It uses questionnaire survey method, in which the unit of analysis is the institute. The questionnaire was developed and pre-tested before mailing to the selected institutes. To understand the correlation among the different variables, correlation analysis has been used. Further, to identify the difference between education sectors, cross case analysis has been used. Based on the conceptual model evolved in this chapter, the hypotheses have been tested statistically through stepwise multiple regression technique and the results have been synthesized to identify the role impacting ICT outcomes. The multivariate statistical tools are used including moderator method and structural equation modeling to identify the inter relationships between the different role on CE outcomes.

3.5.3 Implementation of Research Methodology

A sample has to be true representation of population. In case of present research problem, the population or the universe is a bit ambiguous, as the detailed information about product/service/market development activities undertaken by various institutes were not available. Further, it was not practically feasible to prepare such a reliable and accurate list of institutes within reasonable cost and time.

In view of the above-mentioned facts, empirical/pilot study was carried out by selecting institutes on the basis of purposive sampling after ascertaining that the selected institutes fully qualify for inclusion in the sample. The institutes were selected on the basis of (i) number of courses being offered, (ii) number of students, (iii) number of markets they are present in Distance Education (Sathe, 2005). The institutes can be classified on the basis of location, market share or total number of students. The present study has selected the institutes on the basis of the location of operation and number of students enrolled.

‗Presence in the Distance Education market‘ is measured in terms of market share and its operations in the Distance Education market. Out of 580 total number of education institutes from all over India, those institutes were selected which served largest number of business areas, had largest number of business units, and were also present in Distance Education market. The institutes which have been selected from Bharati Vidyapeeth University, was taken up at the pilot scale study to identify the issues of students education. This is
demonstrated through the institutes’ efforts to establish its presence in large number of rural areas enabled by ICT. These institutes have also designed the various systems, processes and structures which have helped these institutes to sustain ICT efforts. The study aimed to understand these supportive environmental factors and the findings have been mentioned in Chapters 5&6.

The unit of analysis for questionnaire study was the students. As the information regarding the population or the universe was not fully available, the questionnaire study was carried out using snowball random sampling technique.

**Table 3.2: Description of Research Methods and Sampling Techniques Used**

<table>
<thead>
<tr>
<th>Study Phase</th>
<th>Objective of the study</th>
<th>Research Method Used</th>
<th>Sampling Technique Used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilot study</td>
<td>To bring out the issues of ICT</td>
<td>Interview methods</td>
<td>Purposive sampling</td>
</tr>
<tr>
<td>Questionnaire Study</td>
<td>To bring out the relationships among different variables and ICT outcomes</td>
<td>Questionnaire based survey method</td>
<td>Snow-ball random sampling</td>
</tr>
</tbody>
</table>

Experts from different institutes and representatives of sector associations provided the names and relevant details of institutes implementing ICT. The snowball inquiry was started from two eminent/renowned experts in this area. They in turn provided names of further experts who were consulted to identify institutes implementing student students. Finally, a random sample was drawn from the list of institutes implementing ICT, prepared from this exercise. The survey-questionnaire was mailed to all institutes included in the sample. The investigations were conducted at two levels, namely (i) the institute-level, and (ii) the service level (Yin, 1994; 2002).

The questionnaire contained 30 likert-type questions that assessed the institute’s supportive learning environment. The measurement properties of questionnaire, including a factor
analysis and reliability assessment were determined. The data was analyzed statically using univariate, bivariate and multivariate analyses techniques (Barret and Weinstein, 1997a, 1998). The literature suggests that students at all levels play important roles in institutes' success (Floyd and Lane, 2000; King et al., 2001; Hornsby et al., 2002; Ireland et al., 2002). Hence, the study included respondents from almost all levels. During the detailed questionnaire study, 381 questionnaires were collected including respondents from 39 institutes across the country. Finally, the synthesis has been presented as interpretive matrix (Sushil, 2005).

3.6 CONCLUDING REMARKS

The students' practices that affect learning outcomes fall into six general categories, namely, challenge, freedom, resources, learning-group features, supervisory encouragement, and institutional support. To find out the links between learning environment and education, we have used three methodologies: experiments, interviews, and surveys. While controlled experiments allowed us to identify causal links, the interviews and surveys gave us insight into the richness and complexity of education within business institutes. In each research initiative, our goal has been to identify which students' practices are definitely linked to innovative outcomes. For instance, in our research, we interviewed students from these institutes and asked them to describe in detail the most innovative events in their institutes.

We then closely studied these transcripts of interviews, noting the students' practices which created the environment – or other patterns that appeared repeatedly in the successful innovative event and, conversely, in those that were unsuccessful. Our research has also been bolstered by a quantitative survey instrument developed through pilot study. The questionnaire (Appendix-II) consisted of 30 questions used to assess the supportive environment of the institutes, such as management support for student learning efforts. This survey was taken by students at top, and middle level of an institute.

For learning revitalization, the institutes need to implement CE at business level. The study aims at understanding the antecedents of CE to stimulate CE behavior within the institutes. The problem attributes have been mapped on different continua to generate in-depth understanding of the issues and to evolve appropriate research methodology for the unique nature of the research problem. The strategy dimensions of the research problems and the micro strategy variables involved therein have been identified. Based on the research
evidences from the literature, a ICT conceptual frame learning has been evolved. Based on this frame learning, research hypotheses have been formulated for statistical testing through quantitative data collected using the questionnaire survey study. The findings have been further enriched through the case studies. The research plan has also been presented. Thus, the study as a whole has been divided into three parts. Questionnaire study was done through survey and pilot and micro variables’ were studied through case studies. The next chapter presents the analysis and findings.