CHAPTER 5: RESEARCH METHODOLOGY

5.1 INTRODUCTION

With the advent of computers and particularly networking (first Internet and now Web 2.0), supported by a global availability of ICT gadgets it is increasingly becoming possible for the developing countries to adopt new models of education particularly, in HEIs to resolve long standing issues of mass education that have become surmountable due to the miraculous opportunities of new technologies. Thus, ICTs are a mainstream issue in higher education, where efforts are being made to answer the question whether the use of ICT really affected the learning process and outcomes? For this purpose, a wide research is going on in almost every state to understand the role of ICTs in HEIs to position their institutions in a competitive stance by digitizing their pedagogy, learning and educational management (Drinkwater et al.).

Initial research on the critical success/failure factors for e-Learning efforts in HEIs revealed that human contextual (social, organizational) dimensions are more deterministic and decisive than the technological issues. Obviously, the use of computers in education continues without any concrete research-based benefits for learners performance much more research is needed regarding teaching orientations, personal traits and the construction of online learning environments. The research is needed for exploring innovative trajectories to develop and use these new technologies in favor of the local, national and international community’s because many factors complicate the process of educational innovation (Aaron et al.). Therefore, interdisciplinary approaches are commonly applied for the data collection and analysis (Radosevich and Kahn). Likewise, development of e-Learning environment depends on the organizational situation wherein it is to be used therefore; researchers have to unearth contextual backgrounds as they influence the
development and use of e-Learning tools and techniques.\textsuperscript{84}

Given the fact that innovative applications of ICTs in education requires to first understand a number of factors related to the government policies, available educational technologies, development and practices and on the top contextual aspects of the e-Learning system including demographic factors of the users and organizational context this research aims at understanding the context of e-Learning in HEIs of India with data on the above cited variables for analysis and interpretation to reach a set of domesticated guidelines for e-Learning development and use in the native environment. The data have been collected about both the qualitative and quantitative aspects of the issue to triangulate the findings to ensure that results provide deeper and more insightful information. Similarly, through a mixed methods approach, an evaluator can employ triangulation by collecting both quantitative and qualitative data and yield more decisive findings (Shimabukuro).\textsuperscript{95}

5.1.1 Survey Approach

There is a huge data available for both in developed and developing countries about the theories and practices of e-Learning in HEIs and training institutions both from qualitative and quantitative perspectives. The quantitative studies, which used survey approach to access the problem situation are many which has given below (Table 5.1 gives the details of these studies).
<table>
<thead>
<tr>
<th>Sr.No</th>
<th>Researchers</th>
<th>Scale-Used</th>
<th>Theme of the Study</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Radosevich and Kahn (2006)</td>
<td>7p (1=S/Disagree, 7=S/Agree)</td>
<td>Tablet Technology and Recording Software to Enhance Pedagogy</td>
<td>USA</td>
</tr>
<tr>
<td>3</td>
<td>Marcella and Knox (2004)</td>
<td>6P (Below average, Average, Good, Competent, Very good, Excellent)</td>
<td>Systems for the management of info in a university-context: An</td>
<td>UK</td>
</tr>
<tr>
<td>4</td>
<td>Mehra and Mital (2007)</td>
<td>5p (1=S/Disagree, 5=S/Agree)</td>
<td>Integrating technology into the teaching-learning: Pedagogical and</td>
<td>India</td>
</tr>
<tr>
<td>5</td>
<td>Johnson et al., 2006</td>
<td>4p (1=No Confidence, 4=High Confidence)</td>
<td>Improving Computer Literacy of Business Mgt Majors</td>
<td>USA</td>
</tr>
<tr>
<td>6</td>
<td>Martin and Dunsworth 2007</td>
<td>4p (0=Not Useful, 3=Very Useful)</td>
<td>Evaluation of Computer Literacy Course: What and How to Teach?</td>
<td>USA</td>
</tr>
<tr>
<td>7</td>
<td>Garcia and Qin (2007)</td>
<td>4p (1=S/Disagree, 4=S/Agree)</td>
<td>Identifying the Generation Gap in Higher Education: Where Do Differences</td>
<td>USA</td>
</tr>
<tr>
<td>8</td>
<td>Sirkemaa 2001</td>
<td>5p (1=Poor, 5=Excellent)</td>
<td>Information technology in developing a meta-learning environment.</td>
<td>USA</td>
</tr>
<tr>
<td>9</td>
<td>Abrami et al., 2006</td>
<td>-1 to +1 Review of 1,146 Docs</td>
<td>A Review of e-Learning in Canada.</td>
<td>Canada</td>
</tr>
<tr>
<td>10</td>
<td>DiCerbo (2007)</td>
<td>10p Rating of 15 items by (1 = unrelated; 10 = highly related)</td>
<td>Knowledge Structures Entering Computer Networking Students and</td>
<td>USA</td>
</tr>
<tr>
<td>11</td>
<td>Irons et al., 2002</td>
<td>7p (1=S/Agree, 7=S/Disagree)</td>
<td>Distance Learning: Digital Divide and Student Satisfaction.</td>
<td>USA</td>
</tr>
<tr>
<td>12</td>
<td>Thomas and Allen 2006</td>
<td>5p (1=Definitely, 5=Definitely Not)</td>
<td>Gender Differences in Students' Perceptions of achievement. 17+9 Students (Face2Face Group and eGroup)</td>
<td>Australia</td>
</tr>
<tr>
<td>13</td>
<td>Luck and Norton 2005</td>
<td>4p (yes definitely', 'not sure', no definitely not', 'don't understand')</td>
<td>Perceptions of achievement. 17+9 Students (Face2Face Group and eGroup)</td>
<td>UK</td>
</tr>
</tbody>
</table>
Table 5.2 Qualitative Studies on e-Learning in HEIs

<table>
<thead>
<tr>
<th>Sr.No</th>
<th>Researchers</th>
<th>Scale-Used</th>
<th>Theme of the Study</th>
<th>Country</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sasseville (2004)</td>
<td>Discourse-Analysis of secondary sources</td>
<td>To reach the conclusions about the integration of ICTs in the classroom</td>
<td>Canada</td>
</tr>
<tr>
<td>2</td>
<td>Valdez et al., (2004)</td>
<td>Content analysis of the data from each of the six individual case studies</td>
<td>Effective Tech-Integration in Teacher Education</td>
<td>USA</td>
</tr>
<tr>
<td>3</td>
<td>Davey and Tatnall (2007)</td>
<td>36 Interviews; 16 Universities, 11 Countries 171 questions Semi-structured interview, Narrative Analysis</td>
<td>The Lifelong Learning of IS Academics – A Study of Formal and Informal Learning by Academics(Australia, UK, Netherlands, Spain, USA, Canada, Japan, China, Sweden, Norway and Finland)</td>
<td>11 Countries</td>
</tr>
</tbody>
</table>

Table 5.1 provides enough inspiration to select survey approach to study the theories and attitudes of students, teachers/trainers/administrators about e-Learning development and use practices in HEIs. A self-constructed structured questionnaire was derived from an extensive literature survey of both quantitative and qualitative studies.
5.2 DATA COLLECTION

5.2.1 Primary Data Collection

Primary data will be collected through the various survey methods as listed as below-
1. Through Unstructured Interviews
2. By observation method
3. By personal interviews with the help of structured questionnaire
4. By mailing of questionnaire
5. Discussions and experts opinion
6. Through telephonic interviews.

5.2.2 Secondary Data Collection

Literature survey was conducted to examine the existing research on the topic and extract variables, the relationships between the variables as identified by the researchers. Literature survey also helps the researcher in adopting the appropriate research methodology for the topic. As discussed in the literature review, FOSS has opened a flood of knowledge resources to the world researchers by giving access to the world libraries, databases and data sources. Following data sources were used to conduct literature survey for the topic:

1. Books (hard copies)
2. eBooks (off-line on CDs and online particularly, Wikipedia eBooks)
3. Free and Open Source Systems (FOSS), i.e., eJournals. We used the Directory of Open Access Journals (doaj.org) as a search-engine to locate and access open-sources.
4. The websites of United Nations e-Learning Programs for higher education.
5. The websites of Universities around the world.
6. Social software websites. We used Wikipedia.org, Blogs, Social Networking sites.
7. The websites of the Government of India
8. The websites of the Universities in Pune, Mumbai, Hyderabad, Banglore, Gao, New Delhi.
5.3 RESEARCH DESIGN

These interactions will help in gathering insights about E-Learning implementation in HEI’s. In the pilot study, interviews will be conducted to identify the major problems ahead of education sector. This will help in hypotheses formulation. Several challenges will be identified and discussed with the subject experts. Questionnaire will focus upon these challenges and data will be collected. SPSS will be used to analyze the data, the tools used would be Correlation regression, Factor Analysis, ANOVA and chi square. The findings from the research will be compared with the hypotheses to draw relevant finding and conclusion.

a. Pilot Study

The researcher tries to gather first hand insights by conducting unstructured interviews with three experts: Dr. Rajpal S. Hande, DIRECTOR, Board of College and University Development (Mumbai University), Mr. Hemant Vandekar, Program Coordinator, Digital University Business Development Program, MKCL. Mr. S. Subramanian, Master Trainers, C-DAC Hyderabad. Kushark Jaiswal, CEO/ Partner- Edulight Global Business Subsidiary, Mumbai. These interviews will give good insight about the problem identification, major issues pertaining with the sector and contemporary scenario. Based upon secondary data exploration and unstructured interviews pilot study will be conducted. This will help in defining the management problem and subsequently the research problem. Any problem or opportunity never comes in isolation; it always has a background to understand. Thus the various factors posing challenges in front of education sector are identified.

b. Exploratory Research

Initially it will be an exploratory research as researcher does not have much of an idea about the problem. Exploratory research is mainly used to explore the insights of the general problem. It is also used to identify the relevant variables to frame the theoretical framework. The exploratory research is helpful for both formulating the problem and defining it
precisely. This process is unstructured, qualitative and flexible so that researcher can understand the challenges. Since researcher didn’t knew much about the field, thus exploratory research will be used to explore the different dimensions of the study. This will also help in developing the hypotheses. The methods used to carry out exploratory research will include experts interview, secondary data analysis and expert survey. This research is used to obtain background information, research problem formulation, identifying the key research variables and finally in developing hypotheses. Thus it will help in clarifying problems and its components through unstructured processes. But the research findings of exploratory analysis are mostly inconclusive. This needs a further on analysis.

c. Validity

Validity is the ability of an instrument to measure what it is designed to measure. The major responsibility of researcher is to ensure the validity of their measuring instrument. The first step used for measuring validity is by ensuring Content Validity: the content validity includes, but is not limited to, careful specifications of constructs, review of scaling procedures by content validity judges, and constructing with experts and the members of the population (Vogt et al.). Here researcher ensures that all relevant dimensions are covered to address the objectives of the study. Since it is mostly subjective in nature, it should be followed by Criterion Validity.

Criterion Validity may include demographic and psychographic characteristics, attitudinal and behavioral measures, or scales obtained from other scales (Bondarouk). Here researcher ensures that criterion used are valid and it has concurrent validity. For example the problem related to implementation and using E-Learning in education and training institutions can be resolved it would enhance the learning quality.16

Criterion Validity is followed by Construct Validity. The construct validity is the initial concept, notion, question or hypothesis that determines which data is being generated and how they are to be gathered Golafshani, (2003). 102 121.39
d. Reliability

A measure is said to be reliable when it elicits the same responds from the same person when the measuring instrument is administered to that person successively in similar or almost similar situations. The internal consistency reliability is used to assess the reliability of summated scale by which several items are summated to form a total score. For checking reliability coefficient, Cronbach’s alpha is used. Cronbach’s alpha is actually a mean reliability coefficient. The value of Cronbach’s alpha should be more than 0.7 for a narrow construct and 0.55-0.7 for a moderately broad construct. Researchers have used coefficient alpha or Cronbach’s alpha as a measure of internal consistency reliability for multi-item scales.

5.4 POPULATION AND SAMPLING

a. Population

The main stakeholders in e-Learning are the teachers, students, and trainers in any educational setup. Similarly, HEIs have these three constituents for the development and use of ICTs in their respective functions in the background of higher education. These computer-users have different academic backgrounds particularly with reference to their digital literacy. Those who have a certificate, diploma, bachelor, masters, MPhil and PhD in computer science or any stream of ICTs and those whose subjects are either physics, chemistry, medical or public and business administration, economics, journalism or employee of the organization. The second group of users either has some formal training in computer applications or learning them informally. The research reveals that most of these users are adopting computer technologies informally and learning from friends, peers and themselves (Roknuzzaman). 85

The researcher select fifteen institutes, including universities, other educational institutes, companies. These institutes are offering education in all the subjects of pure and social sciences as well as degrees in computer-literacy. All the institute-constituents (students, teachers, and trainer) are using computers to their respective
levels of computer-proficiency. The Target-Population of the project consists of forty three (7) universities, Five (25) private institutions with three (11) corporate training institutes from Pune, Mumbai, Hyderabad, Goa, Bangalore, New Delhi cities.

**b. Sample and Sampling Procedure**

The Sample-Population for the study included the universities, other educational institutes, corporate training centers in the cities of Pune, Mumbai, Hyderabad, Goa, Bangalore, New Delhi. These six cities were selected on the basis of their following unique attributes for being selected as true samples of students, teachers and trainer from the HEIs in the province:

- a. Pune, Mumbai, Hyderabad, Goa, Bangalore, New Delhi cities has strong educational base in the province.
- b. All the cities host oldest universities of the province.
- c. The cities have both the oldest as well as new universities (pre-2000 and The post=2000)
- d. The cities also host both the public and private sector institutions.
- e. These institutions are populated with students, teachers and administrators from almost all cities and areas of the province.

For the development of research project (synopsis), a pilot study was conducted to test the instrument and research variables and determine the appropriate sample size using a standard procedure.

Since low response rate was expected therefore over 500 questionnaires were distributed to the teachers, students and administrators out of which I got 492 responses from students and 413 responses from Teachers/Trainers/Administrators. The data was collected from Nov 2013 to Dec 2013.
5.5 QUESTIONNAIRE DESIGN

To gather opinion and to conduct survey good questionnaire is required. Formulating a well-balanced questionnaire is one of the most important steps in research design. In the present study, since education and training are located all over India and meeting them one to one is not possible, building a comprehensive questionnaire covering critical factors is needed. The pilot study conducted initially helped greatly in this process. A questionnaire consists of formalized and pre specified set of questions design to obtain information from potential customers. It should cover all objectives and should be free from bias.

5.5.1 Pre-Construction Phase

Here the major objectives are defined in the light of available information. The different problems that a students and teachers in institutions faces are identified. This stage also covers other research components such as building theoretical model, research question and hypotheses. Decision regarding selecting an appropriate survey technique was also decided.

5.5.2 Construction Phase:

The present study uses a structured question technique. In the pilot study lot of unstructured questions were used. Those open ended questions provided good information on the basis of which structured questions were incorporated in the questionnaire. The choices offered to respondents were in the form of rating system or a set of response alternatives. Initially multiple choice questions are used. The first six questions of the present study give general information about the respondents. This is followed by questions using Summated Scaling Technique or Likert Scale. In this each item response has five rating categories ranging from “strongly agree to strongly disagree”. Questions are also based upon Numerical Scale wherein different ratings were given by respondents for different questions. Special care was taken to ensure that questions would not include any ambiguous or vague words. A simple and easy to understand language was used. Leading and loaded questions were avoided. Thus several precautions to make questionnaire simple, crisp and relevant were exercised.
5.5.3. Post Construction Phase

In the first stage, pre testing of questionnaire was administered by sending it to few students, teachers, trainers and their feedback was taken. Based on the inputs the questionnaire is revised. Corrections based on those feedbacks are incorporated in the questionnaire. Some questions which exporters are not able to understand are modified. The final draft of questionnaire is revised and the questionnaire is administered over the population.

5.6 PROFILE OF RESPONDENTS

<table>
<thead>
<tr>
<th>Total Number of Institutions Covered</th>
<th>43</th>
</tr>
</thead>
<tbody>
<tr>
<td>Area Covered</td>
<td></td>
</tr>
<tr>
<td>Pune</td>
<td>10</td>
</tr>
<tr>
<td>Mumbai</td>
<td>12</td>
</tr>
<tr>
<td>Goa</td>
<td>03</td>
</tr>
<tr>
<td>Banglore</td>
<td>07</td>
</tr>
<tr>
<td>New Delhi</td>
<td>06</td>
</tr>
<tr>
<td>Hydrabad</td>
<td>05</td>
</tr>
<tr>
<td>Designation of Respondent</td>
<td></td>
</tr>
<tr>
<td>Students</td>
<td></td>
</tr>
<tr>
<td>Teacher/Trainers</td>
<td></td>
</tr>
</tbody>
</table>

Table 5.3: Profile of Respondents
5.7 SAMPLING DESIGN

Sampling is the most important tool for gathering useful information from the population. Selecting a small portion of population for study is known as sampling. As it is difficult to cover entire population, sampling is used. Sample is a part of a population, or a subset from a set of units, which is provided by some process or other, usually by deliberate selection with the object of investigating the properties of the parent population or set (Beri, 2008). Sampling can be defined as the “deliberate choice of a number of people, the sample, who are up to provide you with data from which you will draw conclusions about some larger group, the population, whom these people present”. The sampling process consists of following steps (Tull, Donald, and Hawkins.1984) –

1. Define the population
2. Identify the sample frame
3. Specify the sampling unit
4. Specify sample design
5. Determine sample size
6. Select the sample unit
7. Collect the data from sample units

Different statistical tools are used on the collected sample to get useful information. It is a time, cost and efforts saving method. In the present study, target population. It is followed by selecting sampling frame. Sampling is carried on this sampling frame. In this study, sampling frame is decided on the basis of geographical spread of the education and training sector. The states where most education and training institutions occur like Pune, Mumbai, Hyderabad, Bangalore, Gao and New Delhi are covered. Sample size is then adjusted with respect to the factors such as eligible respondents and the completion
Finally 63 final questionnaires are for students and 63 final questionnaires for teachers/trainers identified as verified and authenticated one.

5.8 ADMINISTRATION OF QUESTIONNAIRE

The questionnaire is administered into selected states as already mentioned. The areas covered are Pune, Mumbai, Hyderabad, Bangalore, Gao and New Delhi. The E-Learning education and training centers are identified through the information provided by Dr. Rajpal S. Hande, DIRECTOR, BCUD (Mumbai University), Dr. V. B. Gaikwad, DIRECTOR, BCUD (Pune University), Mr. Hemant Vandekear, Program Coordinator, Digital University Business Development Program, MKCL. Mr. S. Subramanian, Master Trainers, C-DAC Hyderabad. Kushark Jaiswal, CEO/Partner- Edulight Global Business Subsidiary, Mumbai. The information was also provided by Mr. S. M. Shivdas Jt. Secretary Higher and Technical Education Department, Maharashtra State. This all helped researcher to identify potential respondents. The recommendation provided by my guide Dr. P. N. Razdan, Vice Chancellor, Dr. D. Y. Patil University, Pune and Ex. Adviser-I of All India Council for Technical Education opened the door of several respondents. In the first stage telephonic conservations had established with the center heads. The intention and purpose of research work was explained. It was then followed by sending the questionnaire via google docs. In the next stage, researcher personally visited to the Pune, Mumbai, Hyderabad, Bangalore, Gao and New Delhi.
5.9 ANALYSIS

The analysis of data involves two types of statistical analysis i.e. Factor analysis and ANOVA test. SPSS is used for data analysis. Factor analysis tries to identify the underlining constructs that influence the responses on a number of measured variables. It is a data reduction tool which removes redundancy or duplication from a set of a correlated variable. It’s applied to identify and screen variables.

A. Factor Analysis

It is a collection of methods used to examine how underlying constructs influence the responses on a number of measured variables. There are two types of factor analysis:

1. Exploratory
2. Confirmatory

Exploratory factor analysis discovers the nature of the constructs influencing a set of responses. While, Confirmatory factor analysis tests whether a specified set of constructs is influencing responses in a predicted way. However, both of these types depend on Common Factor Model. This model proposes that each of the observed responses is influenced partially by underlying common factors and partially by underlying unique factors. Thus it’s exploratory when one does not have pre-defined idea of the structure or how many dimensions are in a set of variables. In confirmatory, in a data set there may be more than two dimensions which one wants to test.

B. ANOVA

Analysis of variance is a collection of statistical models used to analyse the differences between group means and their associated procedures developed by R.A. Fisher. The purpose of an ANOVA test is to determine the existence of a statistically significant difference among several group means. The test actually uses variances to help determine if the means are equal or not. The one way analysis of variance is used
to determine whether there are any significant differences between the means of two or more than two independent groups. ANOVA is used in present study for hypotheses testing. F test is used to check the significance of the variable and to accept or reject the hypothesis (Mathur)\textsuperscript{68}

C. CHI-SQUARE TEST

Chi-square is a statistical test commonly used to compare observed data with data we would expect to obtain according to a specific hypothesis. Were the deviations (differences between observed and expected) the result of chance, or were they due to other factors. How much deviation can occur before you, the investigator, must conclude that something other than chance is at work, causing the observed to differ from the expected. The chi-square test is always testing what scientists call the null hypothesis, which states that there is no significant difference between the expected and observed result (Mathur)\textsuperscript{68}