CHAPTER 3

METHODOLOGY

3.1 INTRODUCTION

In the previous chapter, the researcher has given an insight into the literature review on employability and soft skills. This chapter deals with the methodology of research work and design. The investigation of the study has not followed a particular methodology but inclination has been given to the qualitative method. In addition to this, past, comparative and empirical analyses have also been taken up at different points of the research. Keeping in view the concept of heterogeneity, the quantitative analyses have also been graded regarding the enhancing of employability skills of the engineering students and the sample size for different approaches is also relevantly focused.

This study investigates the importance of soft skills and curriculum design, needs and challenges of faculty members of soft skills in engineering institutions, soft skills development through alumni mentoring relationship programme and soft skills assessment using rubrics. Moreover, the research gaps to be addressed in the current research work have been identified. This chapter documents the various views exclusively on the methodology of the examination, based on the given framework to achieve the research aspirations stated in Chapter I.

Every inquiry is designed to solve problems and explore ways of qualifying phenomena. The purpose of the inquest is to understand, explore and predict students’ success in their professional lives. An investigation design in the current study specifies the methods and procedures for collecting and analysing the needed information to structure or solve the employability related issues. The survey is carried out not only by reviewing
the scholarly literature in the areas of employability and soft skills enhancement of various engineering students and conducting an exploratory survey with students, faculty members of soft skills of engineering institutions and industry, and employers but also by conducting semi-structured interviews with industrial experts and discussions with academicians in the areas of employability and soft skills.

The current search uses the primary data, which have been obtained through questionnaires. It is utilised to prepare the data, present the results, analyse and discuss employability and soft skills in the research area.

This chapter describes the procedure followed to gather information for conducting the research and clarifies how the related problems have been solved. This chapter deals with enhancing employability and soft skills assessment models.

3.2 RESEARCH HYPOTHESIS

The research hypothesis is:

Training the students in soft skills like the ability to communicate, solve the problem and think critically, build leadership and team playing skills in engineering institutions maximises the scope for engineering graduates’ employment.

3.3 SOFT SKILLS CURRICULUM FRAMEWORK

3.3.1 Survey Methodology

The main objective of the study is to identify important soft skills and explore the possibilities of incorporating in the curriculum some of the essential skills which the engineering students need in the workplace. With this objective, the researcher has studied related literature and gathered and analysed information on soft skills curriculum to gain realistic insights into the learner needs and the industry expectations. The necessary data for the
study have been collected through an interview schedule. The researcher has prepared two different interview schedules, one for the employers and the other for placement professionals of engineering colleges. In this study, 18 (81%) employers, 29 (80%) placement professionals of engineering institutions, 36 (72%) soft skills trainers of industry and businesses and training institutes, and 78 (79%) faculty members of Technical English and faculty members of soft skills, 64 (72%) alumni of the engineering institutions and 240 (92%) students of engineering institutions have participated. The survey has been conducted for over a 6 month period during the academic sessions 2014-15 ODD Semester.

The collected details are analysed and interpreted objectively. It is necessary to mention that the placement professionals such as placement officers and soft skills trainers of the engineering colleges have participated in the study.

The questionnaire is designed based on three sources: The Programme Outcomes of NBA, employer surveys, and consultations with the experts of soft skills. A questionnaire to analyse 25 different skills has been prepared and employers are asked to evaluate the level of importance of each skill on a five-point scale.

Based on the NBA norms, discussion with academicians and surveys, the questionnaire (3A) has been prepared and it has a list of soft skills that engineering students are typically expected to possess at graduation. Employers are requested to rate on a scale from 5 (extremely), 4 (very), 3 (somewhat), 2 (not very) to 1 (not at all) as to how important each skill is for an engineering graduate to be an effective employee (importance level). The researcher has conducted a survey on the training methods (Questionnaire 3B) among the soft skills trainers of various training
organisations and industries located in South India and collected the details about the training methods adopted.

The researcher has observed over 100 job advertisements in newspapers and websites for job opportunities and listed out the key skills required by the employers. The data have been analysed qualitatively and quantitatively.

In addition to this, past, comparative and empirical analyses have also been taken up at different points of the research. Keeping in view the concept of heterogeneity, the quantitative analyses have also been graded regarding the enhancing of employability skills of the engineering students and the sample size for different approaches is also relevantly focused.

3.4 THE NEEDS, CHALLENGES AND TRANSFORMATIONS EXPECTED OF THE FACULTY MEMBERS

3.4.1 Pilot study

The researcher has conducted a pilot study with eight senior faculty members of English department in 3 engineering institutions of Tamil Nadu. They have been asked to mention the needs, challenges and transformations of soft skills facilitators in engineering institutions. The investigator has conducted ‘Factor analysis,’ selected 8-10 repeated items and prepared questionnaires.

Factor analysis serves numerous related purposes. One of its main functions is to help an examiner in determining how many latent variables underlie a set of items. Hence, in the case of the 25 items, factor analysis will help the investigator determine whether one broad or several more specific constructs are needed to characterise the item set. Factor analysis can also provide a means of explaining variation among relatively many original variables (e.g., 25 items) using relatively few newly created variables (i.e., the
factors). This amounts to condensing information so that variation can be accounted for by using a smaller number of variables. For example, instead of the requirement of 25 scores to describe how respondents answered the items, it might be possible to compute fewer scores (perhaps even one) based on combining the items.

3.4.2 Participants

The questionnaires (3C, 4D and 5E) are given to faculty members of Technical English and Communication Skills Laboratory, heads of English departments and placement professionals of engineering colleges. As per the data, 112 faculty members, 15 heads of Technical English and Communication Skills Laboratory and 54 placement professionals of 22 engineering institutions of Tamil Nadu have been invited to respond to the questionnaire through Email and in person. Eighty-eight faculty members (78%) responded to the open-ended questions on the requirements. The faculty members in those institutions representing self-financing institutions of the city, urban and rural and two institutions run by the state government have been involved in the study. The entire faculty members (82) have qualified a master’s degree in the English language, 32 faculty members are M. Phil holders and 7 faculty members are PhDs and there have been 7 ESP (English for Specific Purposes) specialists. Seventeen heads of English departments and nine placement Professionals of engineering institutions are involved in this study. Tier I (Urban like Chennai), II (Semi Urban related to Coimbatore) and III (Rural- Dharmapuri) based institutions, faculty members and students have been identified separately and their data have been collected. The survey has been conducted for over a 6 month period during the academic sessions 2014-15 Even Semester

Out of the 15 heads, 12 (80 %) and 44 (81 %) placement professionals have responded to the questionnaires. Faculty members and
heads are requested to rate on a scale from 5 (extremely), 4 (very), 3 (somewhat), 2 (not very) to 1 (not at all) to find out how each training need is important for the faculty members of soft skills in the engineering institutions. The placement professionals are requested to mention the need for soft skills modules and their order of preference using a 5 point scale.

Besides the survey questionnaire, a group interview is also conducted and the interview is used to gather descriptive data on the modules and methods of soft skills. This is done with the intention to record the challenges faced by the faculty members. Data derived from the open-ended question and the interview are then analysed according to the needs of the study. Extensive interviews are held with the heads and placement professionals in the respective engineering institutions. The same method is followed for all the faculty members, heads and placement professionals in obtaining the data.

### 3.4.3 Questionnaires and Interviews

The faculty members, heads and placement professionals have responded to questionnaires and extensive interviews. Questions elicited participants’ perceptions about communication skills and soft skills development needs in the engineering institutions. Questionnaire items on training activities that comprise open and close ended questions are based on senior faculty members’ perceptions of their needs, challenges and transformations.

### 3.4.4. Interview Session Duration

The researcher has prepared two different interview schedules, one for the employers and the other for placement professionals of engineering colleges. In this study, 18 (81%) employers, 29 (80%) placement professionals of engineering institutions, 36 (72%) soft skills trainers of
industry and businesses and training institutes, and 78 (79%) faculty members of Technical English and faculty members of soft skills, 64 (72%) alumni of the engineering institutions and 240 (92%) students of engineering institutions have participated. The survey has been conducted for over a 6 month period during the academic session 2014-15 odd semester. The researcher conducted interviews with the employers and placement professionals for 30 minutes. The interview sessions have been conducted with the faculty members for an hour and with the students for 2 to 3 hours.

3.4.5 Sample Size and Sampling Strategies

A stratified sampling from FICCI and NASSCOM’s member database (ficci.in/member-zone-corporate.asp and memberdirectory.nasscom.in) of over 60 firms of 7 different sectors are considered for the survey (Questionnaire 1A). Some employers have been directly contacted to participate in the survey. Due to a low response rate, E-Mail communication based survey has been conducted in the last few weeks of the survey to all firms that visited the engineering colleges for training and placement events (Source: College websites). This slightly increased the sample size and to meet a 90% confidence level, it is reduced from 60 to 30 firms.

3.4.6 Selection of Placement Professionals, Faculty and Students

The researcher as an English faculty and soft skills trainer at an institute of engineering and technology in Dharmapuri, Tamil Nadu, has come in contact with placement professionals, faculty members and students who have had the experience of undergoing placement training, campus recruitment and attending interviews. The placement professionals who are working in the industries over 3 years and faculty members with Post Graduation in English with M. Phil and 3 years service have been considered for the survey and interview. The students who are doing their in the third year B. E and B. Tech have been invited for the survey. The placement
professionals, faculty members and students have been invited through phone and mail communication.

This study shows the key characteristics of successful mentoring schemes across the engineering and management students. This is extremely important because in the current economic climate, roles are changing due to industrial and business re-structuring and there is more pressure to meet managerial targets by developing high-performance employees. This mentoring programme is a genuine recruitment and retention tool for colleges. Additionally, colleges are able to strengthen ties to alumni mentoring programmes. Kerry and Sarah (2014) found that mentees felt better prepared regarding their future career or goals, expanded their network, and made ‘real world' meaning of their leadership education through mentoring programme. Placement professionals need to actively pursue the development of a student/alumni mentoring programme within their premises. Working with the alumni association, placement professionals can build a programme that provides unique mentoring opportunities.

3.5 MENTORING CONNECTIONS
3.5.1 Participants

This study is carried out to explore the development of soft skills of engineering students through student mentees and alumni mentoring relationship programme. Twenty students of final year bachelor of engineering and 13 students of final year management are invited to the mentoring programme. Fifteen (75%) students of engineering and 10 (76%) students of management are involved in the programme. In this study, the engineering students representing branches like Civil Engineering (4), Mechanical Engineering (4), Computer Science Engineering (2), Information Technology (1), Electronics and Communication Engineering (4) and Business Management Administration (both Human Resource and Finance Management Courses) have participated. There are totally 55% male students
and 45% female students from Jayam College of Engineering and Technology. The survey has been accomplished for over a 6 month period during the academic sessions 2015-16 Odd Semester.

Seven alumni of Jayam College of Engineering and Technology are invited for the mentoring programme. Five (71%) alumni mentors who have graduated from the same college have taken part in this study. Three mentors have the engineering background and 2 mentors have Human Resource and Finance Management background. Pseudonyms are assigned to maintain confidentiality. All the mentors who have studied in the same college and who are working for Industry with businesses in India and abroad with 3 to 5 years of work experience have accepted the invitation for the mentoring programme.

3.5.2 Instrumentation

The above student mentees and alumni mentors are invited to their mentoring relationship programme through Email communication and open invitation during alumni meet. Student and alumni are finalised through a selection process based on, for example, their professional interests or objectives, and the desire to be students and mentors. They are asked to describe the strengths, they believe, will bring to a mentoring relationship programme and how they can enhance the skill. The Director of training and placement department and placement professional of the college have served in the roles of mentor advisors and student counsellors.

The advisors and counsellors have facilitated the programme and presented the session on the expectations, principles and mode of the mentoring programme in the beginning of the semester. They share a brief overview of the roles and responsibilities of the students and mentors. They discuss the modules of professional skills, delivery through online and offline once in a way. Exclusive online resources like video clippings, audio files,
power point presentations and e-materials have been provided to the students and mentors by the advisors and counsellors.

3.5.3 **Survey of Finding the Methodologies for Soft Skills Training**

The researcher conducts a survey (3F) with the faculty members of Technical English and Communication Skills Laboratory and placement professionals of engineering institutions of Anna University, Coimbatore Region, Tamil Nadu on the methodologies for soft skills development. The results reveal that coaching and mentoring are one of the highest priorities among the ten methods of career skills development. (Table 3.1)

**Table 3.1: The Highest Priorities among the Ten Methods of Career Skill Development**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Methods</th>
<th>Percentage</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Coaching and mentoring</td>
<td>84</td>
<td>I</td>
</tr>
<tr>
<td>2.</td>
<td>Brainstorming sessions</td>
<td>76</td>
<td>II</td>
</tr>
<tr>
<td>3.</td>
<td>Role plays</td>
<td>72</td>
<td>III</td>
</tr>
<tr>
<td>4.</td>
<td>Seminar skills</td>
<td>70</td>
<td>IV</td>
</tr>
<tr>
<td>5.</td>
<td>Projects</td>
<td>68</td>
<td>V</td>
</tr>
<tr>
<td>6.</td>
<td>Video/Audio listening</td>
<td>64</td>
<td>VI</td>
</tr>
<tr>
<td>7.</td>
<td>Real life examples</td>
<td>62</td>
<td>VII</td>
</tr>
<tr>
<td>8.</td>
<td>Visuals</td>
<td>54</td>
<td>VIII</td>
</tr>
<tr>
<td>9.</td>
<td>Students collaboration</td>
<td>52</td>
<td>IX</td>
</tr>
<tr>
<td>10.</td>
<td>Mock interviews</td>
<td>50</td>
<td>X</td>
</tr>
</tbody>
</table>

From Table 3.1, it is clear that the brainstorming sessions are helpful in understanding the students’ various thought processes. Role play, seminar skills and projects are also some of their priorities in developing the career skills. Real life examples also play a vital role in making the students understand about industry.
3.5.4.  THEORETICAL FRAMEWORK

3.5.4.1  The First Phase of Meeting between Students and Mentors

The students and mentors introduce among themselves and exchange their contact details in the first phase of the meeting in the college. The advisors and counsellors ask the students and mentors to have a discussion on establishing the mutual understanding, boundaries between mentors and students, basic rules, setting some expectations and a master plan. The mentors ask the students to respond to the questions that will help them understand their values, motivations and passions better.

3.5.4.2  The Second Phase of the Study: Students’ Growth and Development

The result as shown in table 3.1 highlights the value of the mentoring process from both the students and alumni mentors’ perspective, in particular, the impact of the process on the participants’ growth and development. The mentors help the students to broaden their horizons creatively and realistically about what they want to do, where they want to go, and why. They explore the ‘portfolio of options’ and ideas to investigate. The students should think about high risk/high reward options, as well as some big aims which are suggested by the mentors. They have a brainstorming session on career choices and job titles and their pros and cons. The sessions also concentrate on the career that students can excel and how they differ from professional and personal perspectives. They are encouraged to evaluate their needs, plans and executions.

3.5.4.3  The Third Phase of the Study- College to Corporate

The mentors invite the engineering and management students to one of their workplaces and the human resource professionals of the industry are requested to interact with the students on industry’s expectations, job
interviews, selection procedures, and corporate culture. All the participants are invited to participate in the study of feedback and evaluation. All the students and mentors are divided into five batches with 5 students each. To collect the data, the researcher conducts a survey using a 5 point Likert Scale from 1–5, ranging from (1) strongly disagree to (5) strongly agree separately for students and mentors. The researcher conducts a series of two semi-structured interviews in person with each of the participants (at the beginning and the conclusion of the programme). Besides this, reflective interviews are allowed for an exploration of students’ perceptions of the mentoring programme and process, and the narrative data contribute to a deeper understanding of their experiences (Rossman and Rallies 2003).

All the interviews are recorded and transcribed. Students are communicated through Email and the copy of their interview transcript for review and feedback is based on Member Checking Process (Maxwell 2013). NVivo software is used to qualitatively code and analyse all of the case study documents (applications and transcripts). As the researcher reads through the documents, he makes notes and identifies an initial categorical coding scheme, but allows for additional codes to emerge while looking for patterns of connectivity between codes (Corbin and Strauss 2008). The codes are grouped into descriptive categories, and then organised into themes representing the over-arching outcomes of the mentoring programme and also answering the research questions.

3.6 MEASUREMENT OF SOFT SKILLS AND RUBRICS

3.6.1 Participants

The objective of the study is to find out the development of engineering students’ communication skills using rubrics. The study is conducted in Jayam College of Engineering and Technology. Over 72 students of final year engineering undergraduate students are invited to
participate in the study. The modules of evaluation and quality criteria with marking system are delivered to 64 (88%) students of 2014-15 academic sessions. In this study, 10 from Computer Science Engineering (CSE), 14 from Information Technology (IT), 10 from Mechanical Engineering, 10 from Civil Engineering, 12 from Electronics and Communication Engineering, and 8 belonging to Electrical and Electronics Engineering have participated. Of them, 64% of the students are male and 36% students are female with an age group ranging from 21 to 25. The students are organised into groups comprising 15-20 students with a trainer who is responsible for feedback and assessment.

The rubrics (Questionnaires 3G, 3H, 3I and 3J) are designed using generic assessment criteria for qualitative based work of the researcher and faculty members. Twenty-seven Technical English and Communication Skills Laboratory faculty members who are working in engineering colleges of Anna University, India, and are involved in teaching and soft skills training for over 5 years have been contacted by Email. The faculty members are asked to recommend criteria and indicators using a 3 point Likert Scale: Excellent (5), Very Good (3), Satisfactory (1) based on the performance of the students. Twenty-three (85%) faculty members have responded to the questionnaire. These are then contextualised within the specific requirements for the pieces of coursework titled ‘Communication and Soft Skills’ (GE6674) of Anna University.

The course work has an oral presentation component. The main objective of the course is to enhance the engineering students’ communication skills from the perspectives of industries and businesses. The oral presentation rubric is piloted with the CSE students and three faculty members of the institution and then minor modifications are made to the quality criteria prior to implementation with all the students. The students have been facilitated on oral presentations by the researcher and faculty
members of Jayam College of Engineering and Technology affiliated to Anna University, Chennai. The study has been carried out for over a 6 month period during the academic sessions 2015-16 ODD Semester. The students are asked to listen and involve in the training programme. The faculty members explain the rubrics, criteria and assessment through the feed-back system and they are asked to assess themselves without rubrics in the beginning and with rubrics scores during the last stage.

3.6.2 Procedure

A detailed session on training modules and methods of assessment is presented in groups to the students. The criteria stated in the rubrics are presented and discussed. In order to disseminate the rubrics’ application to the students and facilitate its comprehension, and eliminate any reluctance from the students, it is first used and discussed in assessing two previous presentations by the faculty. Subsequently, fourteen work groups develop and perform their presentations, which are evaluated by the faculty members. Finally, the questionnaire on the use and the perception of the validity of the rubrics are filled out individually and anonymously after all the presentations are made.

3.6.3 Measures

The questionnaire that is used has been designed to evaluate the usefulness and validity of the rubrics. Along with its application in assessing the students’ performances, the rubrics enable the researcher to obtain the scores on the different variable considered in the study.

Perception of usefulness and validity: Following the principles and orientations of prior research (e.g., Moskal & Leydens, 2000) a questionnaire is designed to assess the usefulness of rubrics in developing the work presentations (10 items) and its validity (11 items). A five-point Likert-type
response scale is used, from ‘absolutely inappropriate’ (1) to ‘absolutely appropriate’ (5).

Faculty members and students evaluate the quality of the performances using the rubrics, both from an analytical and a holistic point of view. The analytical rating makes it possible to determine the level of agreement, criterion by criterion, between faculty and peers. The holistic score makes it possible to determine the existence of a significant relationship between the global ratings made by both. Thus, Chapter 3 has dealt with the research methodology and research design adopted for the study and also the hypotheses framed in the study. Chapter 4 presents the analysis and interpretations of the collected data.