CHAPTER - 5

SUMMARY AND CONCLUSIONS

5.1 STATEMENT OF THE PROBLEM

5.1.1 Importance of career Exploration

India being one of the important players in the global market, has developed a huge infrastructure in the technical education sector with 1265 engineering colleges and Institutes of higher technological learning all over the country. About four lakhs graduates are passing out from these colleges and job placement of these graduates poses a big problem. This process needs to be strengthened by continuous career guidance.

Career guidance as such has several components. One of these components is career exploration where students should be provided with the opportunities to explore their career, mainly with the help of psychological tests and inventories. Once students are aware and convinced about their career they can develop their career according to their potentialities. This type of approach further gives them edge over others in job placement according to their aptitude and interest in the job market. Therefore, career exploration during the period of graduation is one of the prerequisites for reducing the mismatch between career interest and job placement.

Information Technology (IT) is an area where a vast number of professions and jobs are available for all most all engineering graduates. Thus, due to variety of
careers available in Indian and multinational IT companies there is a great need that career counseling programmes in engineering colleges take into account the vital aspect of Career Exploration with respect to IT industries.

5.1.2 Need for the Study

A very limited number of interest inventories and aptitude tests are available to be used for career exploration in IT industries. Again these tests are mostly developed by respective IT industries for recruitment purpose, and are not available to Career Counsellors in the engineering colleges. On the other hand, a variety of personality tests are in existence and the Personnel departments of industrial organizations and Career Counsellors of certain engineering colleges have been using some of these instruments to explore certain personality traits which they believe are the basic attributes of an individual to become successful in a career. But these personality tests as such cannot help in exploring the interest, motive and deep aspirations of the individual with respect to a particular career.

Thus a test on career exploration will be of great use for career guidance. It will be more useful if such career exploration inventory or test can take into account the individual’s hidden aspirations and motives.

This career exploration device can be either a projective type of test or a non-projective type. If it is a projective type of test, the Murray’s (1943) type of approach or Atkinson’s (1958) six picture techniques would be useful. On the
other hand to develop a non projective type of test, the work of Crites (1973) Anne Roe (1969) and Holland (1985) would be useful.

5.1.3 The Problem

Chatterji (1960) developed a Non language preference record form (Form 962) which helps to choose an educational or vocational field. Atkinson (1958) developed a test of imagery to unfold the motive pattern of an individual. Therefore it is assumed that a technique in the line of Atkinson (1958) with a large number of multimedia graphics pertaining to various career fields, may reveal individual’s choice of a career based on his interests, attitudes, feelings, needs, experiences, prior conditioning and thought processes. This technique will take into consideration to the extent possible the other factors such as covert interests, aspirations and motives (Bowers, 1973) which are not considered much in the existing psychometric devices.

Thus the problem of the present research study emerged as “A STUDY ON PROJECTIVE TECHNIQUE BASED SYSTEM FOR CAREER EXPLORATION IN INFORMATION TECHNOLOGY”

5.2. OBJECTIVES

1. To develop a projective technique based system for career exploration in Information Technology

The enabling objectives are

1.1. To identify the major careers in Information Technology
1.2. To develop a series of situational frames (Multimedia Projective Graphics) containing a combination of occupations

1.3. To try out the projective frames on specified samples for their career exploration by paired comparison method

1.4. To standardize the frames

2. To find out the distribution of responses of the subjects with respect to careers in Information Technology

3. To find out the differences in responses of Male and Female Subjects with respect to Careers in Information Technology

4. To find out the differences in the pattern of responses between the subjects studying Information Technology and Computer Science & Engineering programmes

5.3 METHODOLOGY

The main objective of the present study was to develop a Projective Technique Based System For Career Exploration In Information Technology. A series of situational frames in the form of Multimedia Projective Graphics containing a combination of occupations, by using paired comparison method, were developed for this purpose.

5.3.1 Hypotheses

The primary objective of the present study is to develop a projective technique based system for career exploration in Information Technology. For developing a projective technique, formulation of the projective hypothesis is the prerequisite.
For the present study two projective hypotheses were formulated. They are listed below:

1. The Projective technique based system in the form of multimedia graphics has inbuilt capacity to help the subject to explore his or her career preferences in Information Technology.

2. Career preferences thus explored by administering the Projective technique Based System are distributed over the identified careers due to individual differences.

Apart from the two primary projective hypotheses, three more hypotheses also have been formulated. These Hypotheses are presented in the next section.

5.3.1.1 Hypotheses relating to the difference in the responses of subjects with respect to careers in Information Technology.

There is significant difference in responses of the subjects with respect to each of the following pairs of careers in information technology:

1. Programming and Networking
2. Programming and Computer Hardware & Software Support
3. Programming and Internet Technologies & Web Design
4. Programming and Database Design & Administration
5. Programming and Education & Training
6. Programming and Sales & marketing
7. Programming and IT Research
8. Programming and Graphics & Multimedia
9. Networking and Computer Hardware & Software Support
10. Networking and Internet Technologies & Web Design
11. Networking and Database Design & Administration
12. Networking and Education & Training
13. Networking and Sales & marketing
14. Networking and IT Research
15. Networking and Graphics & Multimedia
16. Computer Hardware & Software Support and Internet Technologies & Web Design
17. Computer Hardware & Software Support and Database Design & Administration
18. Computer Hardware & Software Support and Education & Training
19. Computer Hardware & Software Support and Sales & marketing
20. Computer Hardware & Software Support and IT Research
22. Internet Technologies & Web Design and Database Design & Administration
23. Internet Technologies & Web Design and Education & Training
24. Internet Technologies & Web Design and Sales & marketing
25. Internet Technologies & Web Design and IT Research
26. Internet Technologies & Web Design and Graphics & Multimedia
27. Database Design & Administration and Education & Training
28. Database Design & Administration and Sales & marketing
29. Database Design & Administration and IT Research
30. Database Design & Administration and Graphics & Multimedia
31. Education & Training and Sales & marketing
32. Education & Training and IT Research
33. Education & Training and Graphics & Multimedia
34. Sales & marketing and IT Research
35. Sales & marketing and Graphics & Multimedia
36. IT Research and Graphics & Multimedia

5.3.1.2 Hypotheses relating to the difference in the responses of Male and Female subjects with respect to careers in Information Technology.

There is significant difference in responses of male and female subjects with respect to each of the following careers in information technology:

1. Programming
2. Networking
3. Computer Support
4. Internet Technologies & Web Design
5. Database Design & Administration
6. Education & Training
7. Sales & marketing
8. IT Research
9. Graphics & Multimedia
5.3.1.3 Hypothesis relating to the difference in the responses of subjects studying Information Technology (IT) and Computer Science & Engineering (CSE) with respect to careers in Information Technology.

There is significant difference in responses between the subjects studying Information Technology (IT) and Computer Science and Engineering (CSE) with respect to each of the following careers in Information Technology:

1. Programming
2. Networking
3. Computer Support
4. Internet Technologies and Web Design
5. Database Design and Administration
6. Education and Training
7. Sales and marketing
8. IT Research
9. Graphics and Multimedia

5.3.2 Sample

To support the need for this present study, a Need Analysis Questionnaire was administered on 50 Information Technology and Computer Science & Engineering students from two engineering colleges, 25 students from each college.

For validation of the Multimedia Projective Graphics, the Multimedia Projective Graphics in the form of a test was administered on 18 Informational Technology
professionals, two from each of the 9 career areas of Information Technology. This was followed by discussion with each expert on each frame with respect to their areas of work.

The try out of the device was done on 30 fifth semester CSE and IT students. The test-retest reliability data was obtained from 30 fifth semester CSE and IT students.

The final test was administered on 400 students from 8 engineering colleges in Tamil Nadu undergoing IT and CSE programmes. The sample consisted of 238 (59.5%) Male students and 162 (40.5%) Female students. In terms of the programme of study, 195 (48.75%) students were studying IT programme and 205 (51.25) students were studying CSE programme. The Alpha reliability data was obtained from 400, fifth semester engineering college students undergoing Information Technology (IT) and Computer Science and Engineering (CSE) courses.

5.3.3 Tool construction

To establish the need for the present study a Need Analysis Questionnaire was prepared to find out the career exploration needs of the engineering college students in Information Technology.

The Projective Technique Based Career Exploration Systems was developed containing 36 Multimedia Graphics, representing 9 career areas in Information Technology. These areas are
1. Programming
2. Networking
3. Computer Hardware & Software Support
4. Internet Technologies & Web Design
5. Database Design & Administration
6. Education & Training
7. Sales & marketing
8. IT Research
9. Graphics & Multimedia

This device was validated through 18 Information Technology professionals working in the above areas. Further the reliability of this instrument was established by administering the tool on 30 subjects by using test-retest reliability method. Further, the reliability coefficient Alpha ($\alpha$) was also found out for 400 subjects.

5.3.4 Administration of the tool

The Need Analysis Questionnaire was administered on 50 students undergoing degree programmes in Information Technology, Computer Science and Engineering (CSE), from two engineering colleges, 25 from each colleges.

After developing 36 Career related Situational frames of the Projective Technique Based Career Exploration System, it was presented before 6 Experts to get their responses on each of the 36 cards. Further modifications of the picture cards were made on the basis of their comments.
The final validation of the Projective Technique Based Career Exploration System was done by administering and in consultation with 18 Information Technology professionals working in 9 Information Technology professional areas. Thus, through the process of validating the system, out of 285 Multimedia Projective Graphics only 36 were maintained. These 36 Multimedia Projective Graphics form the Final Form of the Projective Technique Based Career Exploration System (PTBCES).

The edited final form of the Projective Technique Based System was administered on 30 fifth semester IT and CSE students from one engineering college in TamilNadu as a measure of tryout of the device.

The Projective Technique based Career Exploration System was administered twice on 30 IT and CSE students from one Engineering College, to find out the test-retest reliability.

Finally, the PTBCES was administered on 400 students from 8 Engineering Colleges of TN undergoing graduate (Bachelor’s Degree) programmes in Information Technology, and Computer Science & Engineering. The Alpha Coefficient of reliability was found out from the final data of 400 Engineering College Students.

The data thus collected were analyzed for qualitative and quantitative interpretation purposes.
5.3.5 Data Analysis

The testing of projective hypotheses were done with the help of frequency distribution tables and bar diagrams.

To test the level of significance, t-test and F-test were used for other hypotheses.
To determine content validity, percentages of inter judge agreements were calculated.

To determine reliability coefficients, Cronbach's Alpha and test-retest reliability coefficients were calculated.

5.4. MAJOR FINDINGS

1. Although the present study emerged out of the felt need, the need for the present study was further established by Need Analysis. It may be inferred that Self Interest plays an important and major role in the selection of the career by students. It appears Academic Achievement, Parent's Influence and Pay, does not play a major role in opting for a career.

2. Subjects were not aware of Job survey programmes and they felt the need for career exploration programs in Information technology and they also felt that it should be multimedia based. Subjects showed interest to switch to software career selected by the career exploration tool.
3. The Identification of 9 careers in the field of Information Technology, i.e., Programming, Networking, Computer Hardware and Software Support, Internet Technologies and Web Design, Database Design and Administration, Education and Training, Sales and Marketing, IT Research, Graphics and Multimedia were in congruence with the observation of the IT experts in the field.

4. Research data were available to identify an exhaustive list of IT careers and they have converged into nine professional IT areas.

5. The try out of the tool showed the effectiveness of the tool with respect to career exploration of the subjects.

6. The reliability coefficient and validity index shows that the tool is highly reliable and valid. The reliability coefficient (Alpha), career wise test-retest reliability coefficients and content validity indexes were established for Projective Technique Based System For Career Exploration in Information Technology.

7. The career profile of each subject clearly shows the preferences of a Subject with respect to careers in Information Technology and their preferences are based on the covert and overt interest and their motives.

The career profile of 400 subjects thus developed by administering the device shows the effectiveness of the Projective Technique Based Career Exploration System in Information Technology.
8. From the responses of the subjects it has been observed that the highest preference opted is for IT Research. The rank order of preferences for careers in Information Technology found out is as follows:

I. IT Research
II. Networking
III. Education and Training
IV. Computer Hardware & Software Support
V. Internet Technologies & Web Design
VI. Sales & Marketing
VII. Database Design & Administration
VIII. Graphics & Multimedia
IX. Programming

It is interesting to note that the creative art of Programming has found to be in the last place.

9. It has been observed that the responses of the 400 subjects were marked by spontaneity and interests.

10. From the responses of the subjects for each of the pairs of professions depicted in the picture cards, the following observations can be made:

1. Subjects have higher preference to
   - Networking than Programming career
   - Computer Hardware and Software Support than Programming career
   - Internet Technologies and Web Design than Programming career
   - Database Design and Administration than Programming career
   - Education and Training than Programming career
   - Sales and marketing than Programming career
   - IT Research than Programming career
   - Networking than Database Design and Administration career
   - Networking than Sales and marketing career career
• Networking than Graphics and Multimedia career
• Computer Hardware and Software Support than Database Design and Administration career
• IT Research than Computer Hardware and Software Support career
• Computer Hardware and Software Support than Graphics and Multimedia career
• Internet Technologies and Web Design than Database Design and Administration career
• IT Research than Internet Technologies and Web Design career
• Internet Technologies and Web Design than Graphics and Multimedia career
• Education and Training than Database Design and Administration career
• Sales and marketing than Database Design and Administration career
• IT Research than Database Design and Administration career
• Database Design and Administration than Graphics and Multimedia career
• Education and Training than Sales and marketing career
• IT Research than Education and Training career
• Education and Training than Graphics and Multimedia career
• IT Research than Sales & Marketing
• Sales and marketing than Graphics and Multimedia career
• IT Research than Graphics and Multimedia career

2. Subjects have equal preference for

• Programming, and Graphics and Multimedia careers
• Networking, and Computer Hardware and Software Support careers
• Networking, and Internet Technologies and Web Design careers
• Networking, and Education and Training careers
• Networking, and IT Research careers
- Computer Hardware and Software Support, and Internet Technologies and Web Design careers
- Computer Hardware and Software Support, and Education and Training careers
- Computer Hardware and Software Support, and Sales and marketing careers
- Internet Technologies and Web Design, and Education and Training careers
- Internet Technologies and Web Design, and Sales and marketing careers

3. From the responses of Male and Female Subjects, it is observed that

- There is no difference between Male and Female Subjects with respect to preference for careers in
  - Programming
  - Education & Training
  - Graphics & Multimedia

- Males showed higher preference than females for careers in
  - Networking
  - Computer Hardware & Software Support
  - Internet Technologies & Web design
  - Database Design & Administration
  - Sales & Marketing
  - IT Research careers

4. The pattern of responses between the subjects undergoing Information Technology (IT) and Computer Science and Engineering programmes were observed. It was observed that subjects studying IT and CSE indicated
A. No difference in preference for careers in
   I. Programming
   II. Networking
   III. Computer Hardware and Software Support
   IV. Database Design and Administration
   V. Education and Training
   VI. IT Research

B. CSE Subjects prefer careers in
   I. Sales and Marketing, and
   II. Graphics and Multimedia more than IT Subjects

C. IT Subjects prefer Internet Technologies and Web Design career more than CSE Subjects.

It may be inferred that there is not much difference in the career preferences of IT and CSE Subjects. It may be assumed that either curriculum IT or CSE do not play a role in career selection or there are no differences in the curriculum which play considerable amount of role in the selection of career.

11. The developed PTBCES device can be used to explore the career preferences of Engineering College students scientifically in 9 different career areas in Information Technology.

12. The present Projective Technique Based Career Exploration System appear to be an unique device which can be used extensively by Teacher Counsellors, and Career Counsellors in helping their students to explore their career in Information Technology and, IT industries to recruit IT professionals and in career development in IT.
The Projective Technique Based Career Exploration System needs to be revised periodically i.e. at least once in five years due to the ever growing career fields in Information Technology.

The present study opens a new dimension in career exploration with the use of projective hypotheses and the projective technique, to help the individual explore his/her career preference in IT in a novel way.

5.5 RECOMMENDATIONS

5.5.1 Recommendations to Institutions

1. Since the device may be administered to the students in the fifth semester of the Undergraduate Engineering Programme, this will help to explore student’s career preference. The elective subjects in the last 2 semesters and the Project work in the last semester can be allotted according to their career preference which include their interest and motive.

2. Career Exploration Workshops in Information Technology may be organised from time to time and this device can play a crucial role in career identification.

3. Student Counsellors should be equipped with Career Exploration tools.
4. Female students may be given more career orientation as the study shows their limited preference in IT careers compared to male subjects.

5. Constant interaction with industry needs to be made to ascertain the status of career areas.

5.5.2 **Recommendations to Directorate of Technical Education and AICTE**

1. One of the striking findings of this study is that in most of the IT related careers there are no differences in the career preferences of IT and CSE Subjects. The Research throws light on the type of curricula to be followed to enable them to have job/interest oriented curriculum.

2. Demarcation of IT and CSE need to be further ensured in consultation with Industry experts.

3. Curriculum developers should take into consideration the job market status vis-a-vis students interests and preferences.

4. Facilitating institutions to take up career exploration Survey/Studies.

5. Facilitating Institutions to take up Sandwich type programmes in which students can work with an industry based on their interest.

6. Inclusion of a subject relating to social science in the curriculum of IT related courses in order to enable the students to develop a broad view of world of work.
5.5.3 Recommendations to Industries

1. Career Exploration tools should be used in the recruitment process.

2. Provide feedback to institutions on the basis of their assessment of college pass outs so that students can develop themselves towards a particular career while undergoing professional courses, specially IT and CSE.

3. Motivating HRD department in their industries and Researchers to develop career exploration devices.

5.5.4 Recommendation to Parents

Parents should be advised to encourage their wards to explore various career options and develop their career according to their interest and motive as depicted by the Projective Technique Based Career Exploration System.

5.5.5 Recommendations to Student Counsellors

1. Should update themselves with the knowledge of Job Survey programmes in IT and other Disciplines.

2. Must facilitate the student to select the career suggested by Career Exploration tools.
3. Arrange Career workshops for Students.

4. Make career Exploration tools available to students.

5. Enhance Liaison with the industry to know emerging careers and to use career exploration devices effectively.

5.6 SUGGESTIONS FOR FURTHER RESEARCH

1. The present study as such need to be undertaken once in five years as new careers in Information Technology are bound to emerge and the device need to be revised.

2. A number of studies can be conducted with the purpose to develop Projective Technique Based System for Career Exploration in other professional careers such as Medicine, Instrumentation, Biotechnology, Structural Engineering, Oceanography, Aeronautical Science and Engineering, Space Technology, Environmental Engineering and the like.

3. A similar study can be undertaken for exploring the career choices of students undergoing Diploma Programmes in computer related areas at the Polytechnics in India.
5.7 CONCLUSION

The study has established the need for the development of a Projective technique based System for Career Exploration in Information Technology. The study facilitated the identification of nine career areas in Information Technology. The research enabled the identification of Picture frames used in the study. Projective Technique Based Career Exploration System (PTBCES) Software was developed. The developed software was tried out on specified samples. The PTBCE System was standardised. The PTBCES was administered to 400 Subjects studying undergraduate degree programmes in Information Technology and Computer Science and Engineering.

Career Profiles generated out of the study clearly showed the specific preferences of the subjects with reference to particular careers in IT. The study enabled the identification of similarities and differences in the responses of Male and Female subjects studying IT and CSE programmes towards careers in Information Technology. The study enabled the identification of similarities and differences in the responses of subjects studying IT and CSE programmes towards careers in Information Technology.

All the four objectives of the study have been fully achieved. A Projective Technique Based Career Exploration System Software has emerged out of the study. The study will help future researchers in developing projective technique based systems for career exploration in other areas of Engineering.