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THE EFFECTS OF CHOICES ON PERSON-ENVIRONMENT CONGRUENCE, IDENTITY, & DECIDEDNESS ACCORDING TO DECISION MAKING STYLE AND ANXIETY LEVEL

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# TABLE OF CONTENTS

**ACKNOWLEDGEMENT**

**TABLE OF CONTENTS** ii

**LIST OF TABLES** iv

**LIST OF FIGURES** vi

**INTRODUCTION** 1

**Chapter I: STATEMENT OF THE PROBLEM** 3

1.1 Significance of the study 3

1.2 Objectives of the study 5

1.3 Originality and limits of the study 6

**Chapter II: REVIEW OF RELATED LITERATURE AND THEORETICAL CONTEXT** 8

2.1 Historical perspectives on computer assisted counselling 8

2.2 The effects of computer-assisted counselling: Review of the research 9

2.3 The development of CHOICES 12

2.4 The effects of CHOICES on users 13

2.5 A summary of computer-assisted counselling research and some research needs 14

2.6 Holland's theory of vocational development 15

2.6.1 Congruent person-environment interactions 20

A) Stability of vocational choice 20

B) Maintenance of personal stability 23

C) Satisfaction 25

D) Summary 27

2.6.2 Identity 28

2.7 Vocational decidedness/undecidedness 29

2.7.1. Osipow's model of vocational undecidedness and related research 29

2.7.2 Computer-assisted counselling and vocational undecidedness 31

2.8 Harren's decision making model 31

2.8.1 Process 31

A: Awareness 32

B: Planning 32

C: Commitment 32

D: Implementation 32

2.8.2 Research studies on decision making styles 33

2.9 Computer-assisted counselling, anxiety and vocational decision making 35

2.10 Rationale and definition of terms 37

2.11 Major hypotheses 43

2.12 Secondary hypotheses 44
<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1</td>
<td>Holland's Levels of Consistency</td>
<td>19</td>
</tr>
<tr>
<td>Table 2</td>
<td>Compatibility Index Scale</td>
<td>47</td>
</tr>
<tr>
<td>Table 3</td>
<td>Original Sample in Terms of Sex, Program, and Decision Making Style</td>
<td>49</td>
</tr>
<tr>
<td>Table 4</td>
<td>Correlations Between the Decision-Making Styles Scales and Other Measures of Career Development</td>
<td>55</td>
</tr>
<tr>
<td>Table 5</td>
<td>Final Sample in Terms of Sex, Program, and Decision Making Style</td>
<td>63</td>
</tr>
<tr>
<td>Table 6</td>
<td>Descriptive Results of the Pretests and Posttests for the Rational Decision Making Style Group on the Variables of Identity, Decidedness, and Person-Environment Congruence, and Descriptive Results on the Variable Anxiety</td>
<td>66</td>
</tr>
<tr>
<td>Table 7</td>
<td>Descriptive Results of the Pretests and Posttests for the Intuitive Decision Making Style Group on the Variables of Identity, Decidedness, and Person-Environment Congruence, and Descriptive Results on the Variable of Anxiety</td>
<td>67</td>
</tr>
<tr>
<td>Table 8</td>
<td>Descriptive Results of the Pretests and Posttests for Dependant Decision Making Style Group on the Variables of Identity, Decidedness and Person-Environment Congruence, and Descriptive Results on the Variable of Anxiety</td>
<td>68</td>
</tr>
<tr>
<td>Table 9</td>
<td>Adjusted Posttest Means of the Dependant Variables</td>
<td>69</td>
</tr>
<tr>
<td>Table 10</td>
<td>Results of the Analysis of Covariance for the Variable of Person-Environment Congruence</td>
<td>70</td>
</tr>
<tr>
<td>Table 11</td>
<td>Results of the Analysis of Covariance for the Variable of Identity</td>
<td>71</td>
</tr>
<tr>
<td>Table 12</td>
<td>Results of the Analysis of Covariance for the Variable of Decidedness</td>
<td>71</td>
</tr>
<tr>
<td>Table 13</td>
<td>Results of the Analysis of Covariance for the High/Low Anxiety Group Versus the Moderately Anxious Group on the Variables of Person-Environment Congruence for the Rational Decision Makers</td>
<td>72</td>
</tr>
</tbody>
</table>
Table 14 Results of the Analysis of Covariance for the High/Low Anxiety Group Versus the Moderately Anxious Group on the Variable of Identity for the Rational Decision Makers .................................................. 73

Table 15 Results of the Analysis of Covariance for the High/Low Anxiety Group Versus the Moderately Anxious Group on the Variable of Decidedness for the Rational Decision Makers .................................................. 73

Table 16 Effect of CHOICES on Decidedness, Identity and Person-Environment Congruence in the Total Experimental Group .............................................................. 74

Table 17 Effects of CHOICES on Decidedness, Identity and Congruence in the Rational Decision Making Style Group .............................................................. 75

Table 18 Effect of CHOICES on Decidedness, Identity and Congruence in the Intuitive Decision Making Style Group .............................................................. 76

Table 19 Effect of CHOICES on Decidedness, Identity and Congruence in the Dependant Decision Making Style Group .............................................................. 76
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>Holland's Hexagonal Model</td>
<td>18</td>
</tr>
<tr>
<td>Figure 2</td>
<td>Rational Decision-Making Style Group Identity Scores (Pretest - Posttest)</td>
<td>78</td>
</tr>
<tr>
<td>Figure 3</td>
<td>Rational Decision-Making Style Group Decidedness Scores (Pretest - Posttest)</td>
<td>79</td>
</tr>
<tr>
<td>Figure 4</td>
<td>Rational Decision-Making Style Group Person-Environment Congruence Scores (Pretest - Posttest)</td>
<td>80</td>
</tr>
<tr>
<td>Figure 5</td>
<td>Intuitive Decision-Making Style Group Identity Scores (Pretest - Posttest)</td>
<td>81</td>
</tr>
<tr>
<td>Figure 6</td>
<td>Intuitive Decision-Making Style Group Decidedness Scores (Pretest - Posttest)</td>
<td>82</td>
</tr>
<tr>
<td>Figure 7</td>
<td>Intuitive Decision-Making Style Group Person-Environment Congruence Scores (Pretest - Posttest)</td>
<td>83</td>
</tr>
<tr>
<td>Figure 8</td>
<td>Dependant Decision-Making Style Group Identity Scores (Pretest - Posttest)</td>
<td>84</td>
</tr>
<tr>
<td>Figure 9</td>
<td>Dependant Decision-Making Style Group Decideness Scores (Pretest - Posttest)</td>
<td>85</td>
</tr>
<tr>
<td>Figure 10</td>
<td>Dependant Decision-Making Style Group Person-Environment Congruence Scores (Pretest - Posttest)</td>
<td>86</td>
</tr>
</tbody>
</table>
ABSTRACT

The dissertation has as its first objective the study of the relative impact of CHOICES on the constructs of congruence, identity and decidedness. The second and more specific objective of this research is to investigate whether or not there are certain types of decision makers (rational, dependant and intuitive) that benefit more from CHOICES.

Lastly, this research also investigates whether ones anxiety level has an impact on the relative success rate of CHOICES on its users in terms of congruence, identity and decidedness.

This study's experimental group is made up of 121 first-year, pre-university (CEGEP) male and female students. Based on the results of a classification test, each student is placed in one of three decision making style groups (a. rational; b. intuitive; c. dependant). The rational decision making style group is then placed in one of three anxiety groups (a. low anxiety; b. moderate anxiety; c. high anxiety) based on the results of an anxiety test. All 121 students are pretested for the variables of congruence, identity and decidedness. In addition, these students are then instructed to complete a CHOICES guidebook and to spend one-hour-and-a-half on CHOICES. Six weeks after the completion of the treatment, students are administered posttests.

It is hypothesized that the rational decision makers benefit significantly more from CHOICES than the dependant decision makers and the intuitive decision makers. The results of the analysis of covariance do not support this hypothesis. It is also hypothesized that the rational decision makers characterized as moderately anxious benefit significantly more from CHOICES than those characterized as being part of the high or low anxiety group. The results of the analysis of covariance do not lend support to this hypothesis.

The results of a number of T-tests, however, show that most students improved their scores on the variables of identity and decidedness after using CHOICES. In addition, the use of the temporal deployment technique presented readers with a graphic representation of how each subject responded to CHOICES in terms of congruence, decidedness and identity.
One of the encouraging results of this research is that there is an indication that CHOICES was generally a helpful counselling tool for students.

The discussion of the results attempts to explain possible reasons why the hypotheses are not supported, while at the same time bringing to light some of the positive results using a computerized counselling system such as CHOICES. Lastly, the limitation of the research and the need to pursue more research in this area are also discussed.
RESUME

Le premier objectif de cette thèse consiste à étudier l'impact relatif de CHOIX sur les construits de congruence, d'identité et de prise de décision. Le second objectif plus spécifique de cette recherche consiste à vérifier si ou non certains types de preneurs de décision (rationnel, dépendant ou intuitif) bénéficient d'avantage du système CHOIX.

Enfin, cette recherche veut aussi mesurer si le niveau d'anxiété a un impact sur le taux relatif d'amélioration aux scores de congruence, d'identité et de prise de décision chez les utilisateurs du système CHOIX.

Le groupe expérimental de cette étude est constitué de 121 étudiants, garçons et filles, de première année du CEGEP (niveau pré-universitaire de formation). A partir des résultats à un test de classification, chaque étudiant a été placé en fonction de son style de prise de décision dans un des trois groupes suivants: rationnel, dépendant ou intuitif. Le groupe d'étudiants de style rationnel a été subdivisé en trois sous-groupes selon leurs résultats à un test d'anxiété (anxiété légère, anxiété modérée, anxiété élevée). Les 121 étudiants ont subi les prétests sur les variables de congruence, d'identité et de prise de décision. De plus, ces mêmes étudiants ont dû compléter le Guide de CHOIX et passer une heure et demie en interaction avec le système informatisé CHOIX. Six semaines plus tard, après que le traitement expérimental, soit l'interaction avec le système, fut complété, les étudiants se sont vu administrer le post-test.

Des hypothèses proposent que les preneurs de décision de style rationnel vont bénéficier de CHOIX d'une façon significative, d'avantage que les preneurs de décision de style intuitif et dépendant. Les résultats de l'analyse de convariance ne supportent pas ces hypothèse. D'autre hypothèse proposent que les preneurs de décision de style rationnel et caractérisés comme modérément anxieux vont bénéficier significativement plus de CHOIX que ceux caractérisés comme faisant partie des groupes d'anxiété légère ou élevée. Les résultats de l'analyse de covariance ne supportent pas non plus ces dernière hypothèses.
Les résultats aux tests statistiques T démontrent cependant que les élèves ont amélioré leurs scores sur les variables identité et prise de décision après avoir utilisé CHOIX. De plus, l'exploitation de la technique de déploiement temporel présente aux lecteurs une représentation graphique de la façon par laquelle chaque étudiant a répondu à CHOIX en termes de congruence, d'identité et de prise de décision lors du pré-test et aussi lors du post-test.

Un des résultats encourageant de cette recherche repose sur l'indication à l'effet que CHOIX a été considéré comme un outil facilitant le counseling pour les étudiants.

La discussion des résultats, tout en présentant les raisons qui expliqueraient pourquoi les hypothèses ne sont pas supportées, veut en même temps jeter un peu de lumière sur les résultats positifs à une utilisation du système de counseling informatisé CHOIX. Enfin, quelques commentaires précisent les limites de la recherche et invitent à poursuivre la recherche dans l'exploitation de tels systèmes informatisés en counseling.
ABSTRACT

The dissertation has as its first objective the study of the relative impact of CHOICES on the constructs of congruence, identity and decidedness. The second and more specific objective of this research is to investigate whether or not there are certain types of decision makers (rational, dependant and intuitive) that benefit more from CHOICES.

Lastly, this research also investigates whether ones anxiety level has an impact on the relative success rate of CHOICES on its users in terms of congruence, identity and decidedness.

This study's experimental group is made up of 121 first-year, pre-university (CEGEP) male and female students.

It is hypothesized that the rational decision makers will benefit significantly more from CHOICES than the dependant decision makers and the intuitive decision makers. It is also hypothesized that the rational decision makers characterized as moderately anxious benefit significantly more from CHOICES than those characterized as being part of the high or low anxiety group. The results of the analyses of covariance do not lend support to these hypotheses.

The discussion of the results attempts to explain possible reasons why the hypotheses are not supported, while at the same time bringing to light some of the positive results using a computerized counselling system such as CHOICES. Lastly, the limitations of the research and the need to pursue more research in this area are also discussed.
RESUME

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Enfin, cette recherche veut aussi mesurer si le niveau d'anxiété a un impact sur le taux relatif d'amélioration aux scores de congruence, d'identité et de prise de décision chez les utilisateurs du système CHOIX.

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La discussion des résultats, tout en présentant les raisons qui expliquereraient pourquoi les hypothèses ne sont pas supportées, veut en même temps jeter un peu de lumière sur les résultats positifs à une utilisation du système de counseling informatisé CHOIX. Enfin, quelques commentaires précisent les limites de la recherche et invitent à poursuivre la recherche dans l'exploitation de tels systèmes informatisés en counseling.
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INTRODUCTION

During the past few years, the author of this dissertation has observed a remarkable growth in the amount of counselling centres that make use of computer-assisted counselling systems. A number of authors (Harris, 1972; Katz & Shatkin, 1980; Melhus, Hershenson & Vermillion, 1973) specializing in the counselling area have also made this same observation. In Canada, there is one system that dominates the market, it is called CHOICES. The latter can now be found in over 1000 centers in Canada in both official languages.

In reviewing the literature on the subject, it became immediately apparent that although the area of computer-assisted counselling was growing, very little research was being done. Consequently, the author of this dissertation felt his research would certainly benefit the counselling profession.

In general terms, the author of this dissertation has taken an empirical look at the effects of computer-assisted counselling on its users. The specific variables studied in this dissertation are based on the writings of Holland (1985a), Osipow (1983), and Harren (1979).

Chapter I of this dissertation presents the statement of the problem. This chapter also presents the significance and the objectives of the study. In addition, the study's limitations and originality are explained.

Chapter II presents the theoretical context of the study and the review of the related research. In addition, it will deal with the definition of terms and the research rationale. It ends with a presentation of the major and secondary hypotheses.

The third chapter presents the methodology of the study. The operational definitions of the variables are given, the sample population, the testing instruments, and the testing procedures are all described.
In the fourth chapter, the results of the statistical analyses are presented. The discussion of the results follows in the fifth chapter.

The sixth and final chapter presents the author's conclusion with a number of recommendations.
CHAPTER 1

STATEMENT OF THE PROBLEM

1.1 Significance of the study

Many aspects of our society have been revolutionized by the rapid growth of computer technology (Closs, 1978). There seems to be a general consensus that computer technology is the most significant innovation of the century (Closs, 1978). However, Ryan and Drummond (1979) state that these technological advances have bypassed the educational community. Our educators are not being trained to use the computer in their classroom (Ryan & Drummond, 1979), although recent developments in the field of career counselling have set the stage for the use of computers in counselling.

A number of research studies on the other hand clearly show the need for counselling, and as we will see later, of computer-assisted technology in counselling. Chapman, Norris, Katz, and Pears (1977) conducted a study on six college campuses across the United States. The results indicate that the students surveyed were confused about their career goals, and in fact entered college with very little knowledge of the program in which to enroll. Yaegel (1978) and Crites (1973) stated that career indecision is one of the major difficulties experienced by students today. Super (1960) has clearly stated that sound vocational decisions cannot be made without accurate information about the options available. Ryan and Drummond (1979) went on to say
that what is vitally needed in career counselling is exploration by the students based on precise and comprehensible information.

In a study involving 32,000 students conducted by the American College Testing Program, it was found that 50% of the sample stated that they received little or no help with career exploration in their schools (Prediger, Roth & Noeth, 1973).

Jordaan and Heyde (1979), with regards to the subject of career exploration, stated that the student's sources of career information were inadequate. The career decision making processes were in fact hindered by poor information. Cooley (1969) states that accurate and concise information is a prerequisite to good decision making.

In relation to these facts there seems to be a consensus that traditional counselling practices have not risen to the challenge of helping students with their career decision making needs (Pinder & Fitzgerald, 1984). Many counsellors view career counselling as uninteresting (Devine 1976) and, consequently, refer such cases to graduate students.

In addition to the above mentioned concerns, there is a need for counsellors to investigate the problem of university attrition as it relates to career planning. Tens of thousands of students enter North American universities each year with the intent of graduating. However, roughly 50% of the students entering an American university will not graduate from that institution and 30.1% will not graduate from any college (Green, 1983). It is also worth noting that 60.1% of those who drop out do so during their first year.

Noels (1976) states that «students with nagging questions about the future are likely to be dropout prone» (p. 36). In a study involving 2,311 freshmen in a community college, Hennessy and Loveless (1975) found that 60% of the dropouts said they left college because they were undecided as to a college major. Being undecided about one's college major at the time of entry is considered to be an important trait of the dropout (Green, 1983). In addition, students expressing high levels of dissatisfaction with the chosen program is a condition that differentiates the persister from the dropout (Hamel & Bellerive, 1977). In studying student attrition as it relates to Holland's theory,
Prince (1983) found that person-environment congruence was the best predictor of the completion of studies.

In light of the above-mentioned research projects dealing with student's needs including staggering levels in student attrition on the one hand and weaknesses in our counselling profession in terms of methods to satisfy these needs on the other hand, it would seem imperative that counsellors search for innovative and more effective approaches to career counselling.

The belief that computers will become an important part of the solution to counsellor's and student's difficulties encountered in career planning seems widespread (Harris, 1974; Gallo, 1974).

Loughary, Friesen and Hurst (1966) made a statement which seems very appropriate in the context of computer-assisted counselling.

«In our judgment, it is of the utmost importance that those of us who have assumed the responsibilities and privilege of helping others with their personal problems and aspirations become well enough informed regarding man machine systems to participate intelligently and sensitively in their development. It is only in this way that we can assure that automated systems contribute to, rather than inhibit, the freedom of the individual» (p. 15).

The overriding emphasis of this thesis was to carefully study computer-assisted counselling in terms of how it can contribute to better counselling practice, as will be specified in the next section.

1.2 Objectives of the study

This dissertation had as its first objective the study of the relative impact of CHOICES on the constructs of congruence, identity (as defined by Holland, 1985a) and decidedness (as defined by Osipow, 1983).

The second and more specific objective of this study was to investigate whether or not there are certain types of decision makers (as defined by Harren, 1979) that benefit more from CHOICES. In other words, if a counselling intervention such as CHOICES is beneficial, in terms of its impact on the constructs mentioned above, will it be equally so for all decision making types?
Lastly, another objective of this study was to investigate whether one's anxiety level has an impact on the relative success rate of CHOICES on its users in terms of congruence, identity and decidedness. Such questions have never been studied. It was expected that the results of such a study would possibly help the counselling profession in prescribing interventions that better meet the needs of specific clients. It is imperative for counsellors to be presented with empirical evidence that will help them in deciding whether or not computer-assisted counselling can meet their needs and consequently the needs of their clients.

The following questions were dealt with within the context of this study:

1. Can CHOICES diminish the incongruence that may exist between a student's personality type and the dominant type of his chosen environment?
2. Will CHOICES enhance one's degree of identity?
3. Does the level of student decidedness increase as a result of exposure to CHOICES?
4. Does one's decision making style act as an intervening variable in determining the success of an interaction with CHOICES with respect to the variables of congruence, identity and decidedness?
5. Is there a relationship between anxiety and outcome from work done on CHOICES with respect to the variables of congruence, identity and decidedness?

1.3 Originality and limits of the study

Although there have been a number of studies that have looked at the effect of computer-assisted counselling on career choices, none has studied the constructs of congruence, identity, decidedness, decision making styles and anxiety as they relate to computer-assisted counselling.

In addition, this research marks the first attempt at testing pre-university CEGEP students on the effects of computer-assisted counselling. Moreover CHOICES has been the object of very little
research, most of the research having dealt with student's attitudes towards CHOICES (Reardon, Bonnell & Huddleston, 1982).

In practical terms, it was hoped that the results of this dissertation would help counsellors and administrators in deciding whether or not such a system is a mere gadget or a worthwhile financial as well as a human investment.
CHAPTER II

REVIEW OF RELATED LITERATURE AND THEORETICAL CONTEXT

The following chapter presents a detailed overview of the theoretical bases of this dissertation and a review of the related literature. Specifically, this chapter introduces the readers to the historical development of computer-assisted counselling. CHOICES is fully described with the help of current research in the area.

In addition this chapter presents John Holland's theory of vocational development with particular emphasis on his concepts of person-environment congruence and identity.

The theories of Osipow on decidedness and Harren on decision making styles are presented with the help of related research.

The concept of anxiety is presented with specific reference to how it is related to vocational decision making.

Lastly the chapter will end with the presentation of the research hypotheses.

2.1 Historical perspectives on computer-assisted counselling

There have been approximately 40 computer-assisted counselling systems designed during the late sixties and seventies (Jarvis, 1978; Clyde, 1979). By the mid-seventies over half of these systems were no longer in operation. The withdrawal of federal funding and the poor data base of many of the systems were seen as the major causes for the systems fatalities (Jarvis, 1978; Loughary, 1970).
One of the first computer-assisted counselling systems was the Information System for Vocational Decisions (I.S.V.D.). This system was developed by David Tiedeman and Robert O'Harra (1963) at Harvard University. The authors attempted to program the computer to respond to natural language commands. The high cost of this process resulted in the termination of the ISVD project (Super, 1970).

The Guidance Information System (GIS) was developed in 1971 (Maze & Cummings, 1982). This system understands a limited number of commands and consequently is inexpensive to operate.

IBM funded the development of the Education and Career Exploration System (ECES) which is still being used in parts of the United States. The Computer-Assisted Career Exploration (CACE) system was developed at Pennsylvania State University by Joseph Impelletteri (Maze & Cummings, 1982).

JoAnn Harris-Bowlsbey (Harris, 1971) developed the Computerized Vocational Information System (CVIS). She has made considerable contributions to the field of computer-assisted counselling. In addition to CVIS, Bowlsbey has developed the Discover System (Harris-Bowlsbey, 1976).

Many states are now using the Career Information System (CIS). This system was developed by Bruce McKinlay in 1969 at the University of Oregon (Maze & Cummings, 1982).

In 1967 the Educational Testing Service, under the direction of its senior research psychologist Martin Katz, began developing the System of Interactive Guidance and Information (SIGI). SIGI is one of the most widely used computer-assisted counselling systems (Maze & Cummings, 1982).

Philip Jarvis, with the support of the Canadian Government, developed the Computerized Heuristic Occupational Information and Career Exploration System (CHOICES, 1976).

2.2 The effects of computer-assisted counselling: Review of the research

In 1966, the people responsible for the development of computer-assisted counselling voiced considerable concern as to whether these computer systems would be accepted by the public (Harris, 1974).
As mentioned earlier, many educators are slow in accepting computer technology. However, the present widespread use of computer-assisted counselling systems have proven to many sceptics that these instruments are an integral part of most counselling centers (Haase, 1979). It is important to state, however, that such systems must be welcomed by the counselling profession if they are to be used to their full potential. In Canada alone, there are over 1,000 centers using CHOICES in addition to the other computer programs that exist (Repères, Career Factory). Research by Impelletteri (1968), Harris (1972), Ryan and Drummond (1979), Pyle and Stripling (1977), Katz and Shatkin (1980) and Maze and Cummings (1982) lead these researchers to conclude that computer-assisted counselling users had enthusiastically accepted the various systems. In addition, the users did not express feelings of dehumanization when working with the computer terminals. In fact, the authors report that encounters with the computer-assisted counselling systems were characterized as being rewarding and personal.

Thompson, Lindeman, Clack and Bohn (1971) found parents to be extremely positive in reference to computer-assisted counselling for their children. Parents reported that this innovation in counselling had helped stimulate home conversation concerning their child's career choice. In addition, 80% of the parents felt that computer-assisted counselling should be available to all students.

Evaluation results of CACE (Impelletteri, 1968), CVIS (Harris, 1974), SIGI (Chapman, Norris, Katz & Pears, 1977) and ECES (Myers, Lindeman, Forrest & Super, 1971) and COMPASS (Mallory, Drake & Holder, 1979) indicate similar findings. In all the four above-mentioned studies, students typically reported a greater awareness of the world of work as a result of using computer-assisted counselling systems. They also reported that their career plans were more definite, that they felt more confident about their chosen career path, that they felt better equipped to deal with career choices and, lastly, that they had a preference for computer-assisted counselling over traditional counselling. Myers, Lindeman, Thompson and Patrick (1975) reported that using their respective computer systems stimulated subsequent exploratory behavior in the students as evidenced by the increased use
of the counselling resource center and the increase in interviews with the counselling personnel.

Melhus (1971) studied the effectiveness of traditional counselling as compared to computer-assisted counselling on the specific task of crystallization of vocational planning. This research project used a random sample of 54 high-ability students and 54 low-ability students. Members of these two groups were randomly assigned to either a counsellor or a computer treatment group. The results of the study indicate that in the case of the high-ability group there proved to be no difference between working with the computer and working with the counsellor. The low ability students working with the counsellor showed greater progress than their counterparts working with the computer.

Myers et al (1971) studied the effects of computer-assisted counselling on vocational maturity. The Career Development Inventory (CDI) (Super, 1974) was used to measure the career maturity level of all sophomore students in 24 selected schools in Michigan. Students in the 12 remaining schools formed the control group and had no access to computer-assisted counselling. The results indicated that the students who were part of the experimental group developed increased «Awareness of Need to Plan» and «Knowledge and Use of Resources». Harris (1972) investigated similar variables in a study using a stratified random sample of 130 sophomore students from Willowbrook High School in Illinois, who were assigned to either experimental groups or control groups (4 experimental groups and 4 control groups). Male and female students in the upper and lower class rank quartiles were represented. The experimental groups had access to CVIS, while the control groups did not. Among other results the experimental group demonstrated an increase in «Awareness of the Need to Plan» and «Knowledge of Resources for Exploration». These phenomena were not found in the controls. Pyle and Stripling (1976) found a significant increase in career maturity attitudes in students using the SIGI system as well. Devine (1976) studied 84 community college freshmen students who used SIGI, comparing them with students in traditional vocational counselling groups. The results of his study, however, indicated no significant difference between the two groups in terms of career maturity. Cassie
(1976) on the other hand used a sample of students from grades 9, 10, and 11 divided into an experimental and a control group in studying the effects of SGIS (Student Guidance Information System) on career maturity. The results of the study indicated no relationship between SGIS and career maturity. There was, however, a trend for the experimental (SGIS) members to alter their vocational or educational choices. The experimental group also demonstrated more of a tendency to reflect on their decision than did the control group.

2.3 The development of CHOICES

In reviewing the literature on CHOICES it seems important on the outset to point out that this system is relatively young: it was completed in 1979. Consequently, research efforts are only beginning to develop. In view of this fact, research related to CHOICES is certainly needed and must be encouraged.

As mentioned earlier, CHOICES is an acronym for Computerized Heuristic Occupational Information and Career Exploration System. CHOICES is an interactive computer-assisted counselling system which was developed to help people in making career decisions. Individuals are given the opportunity to explore a wide range of careers on the basis of their specific values, interests, educational goals and abilities. The data file found in CHOICES represents 90% of occupations in Canada (Jarvis, 1978). Clients have access to this file through a typewriter-like terminal and are given immediate feedback as to possible career directions (Turgeon, 1979).

Originally a major drawback of CHOICES was the fact that it was out of reach for many Canadian schools (Stahl, 1983). CHOICES was connected to mainframe computers in a few large Canadian cities. The exorbitant cost of long-distance telephone rates made CHOICES financially unfeasible for many rural schools. In response to this problem micro-CHOICES was developed. It is a software package which is compatible with the Apple, Commodore, and Radio Shack micro-computers (Stahl, 1983). In essence, micro-CHOICES is a program which carries most features found in CHOICES.
In the fall of 1984 the company which controls CHOICES, CSG, developed a new system called CHOICES III. The latter has replaced the mainframe system putting all the original features on a program that is available on IBM PC micro-computers.

2.4 The effects of CHOICES on users

Casserly (1978) studied the effects of CHOICES on 263 subjects in five Canada Employment Centers. The results of the study indicate that CHOICES subjects were likely to continue their education more than were subjects who received traditional counselling. Furthermore, CHOICES subjects tended to begin career implementation steps much sooner than the group receiving traditional counselling. The same research project concluded that CHOICES subjects who began new jobs were more satisfied with the new job than they had been with their previous employment.

Guérette (1980) studied the effects of CHOICES on 116 grade-11 and grade-12 students from New Brunswick. These subjects reported that CHOICES definitely helped them in their occupational planning and decision making. They felt that such a system should be used by all senior high school students. Starr (1978) reported improvements in career maturity in her grade-12 sample of CHOICES users. It should be noted, however, that this research effort was based on a small sample of 26 in a single school.

Pinder and Fitzgerald (1984) studied 136 university students who were assigned to either a CHOICES group which was the experimental component of the study or control group which was made of students not utilizing CHOICES. The results of the study indicate that CHOICES improved career decision making as measured by the Career Decision Scale (Osipow, Carney, Winer, Yanico & Koshier, 1976b) and the Occupational Scale of the Assessment of Career Decision Making (Harren, 1976).

In a study comparing CHOICES and the Self Directed Search (Reardon, Bonnell & Huddleston, 1982) it was concluded that the users of both instruments preferred CHOICES. It was also indicated that CHOICES seemed to encourage more students to seek out additional
information about an occupation. The authors point out however that although the difference between the two interventions is statistically significant one must seriously question whether CHOICES is worth the additional cost.

2.5 A summary of computer-assisted counselling research and some research needs

In reviewing the literature on computer-assisted counselling one is faced with the reality that very little is known about the impact of such systems on career development (Cairo, 1983).

To summarize, we can state that the research shows that computer-assisted counselling does promote a greater awareness of the need for planning, increases one's concerns with vocational choice, and helps users in relating information about themselves to a particular career. We also know that the number of occupational choices which clients consider are increased as a result of interactions with computer-assisted counselling systems. The data banks of these systems provide the users with up to date, relevant information. Both counsellors and users report that computer-assisted counselling is a welcomed addition to a career counselling center, and that their system is understandable, helpful and enjoyable to use (Cairo, 1983).

Specific research on CHOICES seems to indicate that it is a system which was developed with much thought and effort. This particular research project has favored CHOICES because its Canadian content makes research efforts appropriate for our Québec population.

It is also the system that is the most utilized in Québec and Canada.

The overall issue of what type of person benefits most from an interaction with computer-assisted counselling has been relatively unexplored by researchers (Cairo, 1979). After reviewing the research on a number of personological variables, it was decided that for this specific dissertation a number of variables would be retained.

The following section will study these variables with reference to their theoretical base and their relative importance in terms of computer-assisted counselling.
2.6 Holland's theory of vocational development

Holland's theory of career development is certainly one of the most researched areas in vocational counselling today. Literally hundreds of research projects have looked at some aspects of Holland's work (Holland, 1985a). The empirical evidence from these studies, for the most part, supports the work done by Holland (Osipow, 1983). It is not the intent of this chapter to review all the research related to Holland's theory. On the one hand, this would be an impossible task and more importantly it would not respond to the objectives of this study. This review will be limited to specific research stemming from Holland's theory which is related to the theoretical boundaries of this dissertation.

The primary concern of Holland's theory of career development is to explain vocational behavior and to give practical suggestions to help people of all ages in their selection of careers. As Holland writes:

«The theory provides explanations for three common and fundamental questions:

1. What personal and environmental characteristics lead to satisfying career decisions, involvement and achievement and what characteristics lead to indecision, dissatisfying decisions, or lack of accomplishment?

2. What personal and environmental characteristics lead to stability or change in the kind and level of work a person performs over a lifetime?

3. What are the most effective methods for providing assistance to people with career problems?»

(Holland, 1985a, Page 1)

At the onset, Holland observed that the majority of people view the occupational world in terms of occupational stereotypes. He hypothesized that in the case where a person possesses little knowledge of a specific career field it is the stereotype that is revealing, very similarly to the way a projective test exposes personality dynamics (Osipow, 1983). «Consequently Holland has set out to develop a list of
occupational titles that would be useful as a device onto which a person could project a preferred lifestyle» (Osipow, 1983, page 82).

One of the major characteristics of Holland's theory is its simplicity, yet within it there are a number of complex elaborations (Holland, 1985a).

One of the major assumptions underlying Holland's theory is that in our culture, people can be characterized by the way they are similar to a specific personality type. Each model type is a product of interactions between a variety of personal and cultural forces. Holland describes six personality types: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional. Basically the six types are models that can be used in categorizing the real person. Each type has specific characteristics (e.g. attitudes and skills) that help the person cope with environmental problems and tasks. It is by comparing a person's characteristics with those of the model types that we can evaluate which type a person adheres to. The following is a description of each of Holland's six types.

The Realistic type prefers activities that are ordered and explicit. The person in this type is characterized as being mechanically inclined. Consequently, this person, because of his/her basic abilities becomes more competent in areas such as mechanics, agriculture and electricity. The Realistic type personality tends to avoid social activities for he or she sees himself or herself as lacking the basic skills of human relations.

The Investigative type prefers activities that encompass creative investigation of physical, biological and cultural phenomena. In many ways people who are part of the Investigative type want to understand and control the sciences. These tendencies are conducive to the acquiring of skills in the sciences and mathematics. People of this personality type lack persuasive skills and consequently tend to be poor leaders.

The Artistic type enjoys careers such as writer, musician, actor/actress and interior decorator. More specifically the Artistic type has a preference for the esthetic qualities of the world. Holland describes this personality type by using the following adjectives: complicated, disorderly, emotional, expressive, idealistic, imaginative,
impractical, impulsive, independent, intuitive, nonconforming and original (Holland, 1979, page 3). The Artistic type has an aversion to business or clerical competencies.

The Social type is characterized as being populated by people who have interests for activities that entail the manipulation of others in order to better serve society. Basically the social type enjoys helping others.

The Enterprising type prefers activities that enable him or her to manipulate others to attain economic gain or business goals. The interests inherent in this type enable one to acquire competencies in the area of leadership. People in this type have a dislike for symbolic and systematic activities.

The Conventional type prefers activities that involve the systematic manipulation of data. Careers in the area of bookkeeping, banking, and accounting are of interest to people in the Conventional type.

There are obvious problems with attempting to categorize a person in a single type. It is for this reason that Holland suggests that people be categorized in terms of how they resemble each type. The three-letter summary code which is currently used (i.e. RIA) takes into account the complexity of human behavior.

In Holland's (1985a) second primary assumption he postulates that there are six types of occupation-environments: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional. Each environment has the property of being populated by individuals of similar personality types. Thus, it is feasible to assess the environment in the same terms as one measures personality types.

A third assumption mentioned by Holland (1985a) is that people seek environments which are amenable to their skills, receptive to their attitudes and values.

Lastly, Holland (1985a) states that a person's behavior is determined by an interaction between his personality characteristics and those of the environment. Specific behaviors depend a great deal on the quality of reinforcement provided by the environment. Our knowledge of the personality types and environmental models can be used to predict future outcomes of such pairings.
The above mentioned assumptions are supplemented by five secondary concepts. These concepts explain some of the predictions made by Holland.

In order to understand Holland's concepts it is important to state that all 6 types have a specified place on a crude hexagon. (Figure 1)

Figure 1
Holland's Hexagonal Model

The relationship between these types or their psychological resemblance is defined through the use of a simple formula: the shorter the distance between two types, the greater their similarity. To find the distance one must always refer back to Holland's hexagon. The calculus, one of Holland's secondary concepts, refers to the fact that we can always determine the relationship that exists between types with the help of a hexagonal model. Another concept in Holland's theory is consistency. This concept is also defined by using the hexagonal model. It refers to the relationship between the first and second letter in a personality or environment pattern. If when referring to the hexagon, we see that the first letter in a pattern is adjacent to the second letter then we can state the person or environment is consistent. If on the other hand, the letters are opposite on the hexagon then we would state that the person or environment is
inconsistent. An example of a consistent person would be one that has been classified as Realistic-Investigative (RI). As the hexagon shows the Realistic type is adjacent to the Investigative type. There are three levels of consistency: high, middle and low (Holland, 1985a, p. 28), as can be seen in table 1.

**TABLE 1**

Holland's Levels of Consistency

<table>
<thead>
<tr>
<th>LEVEL OF CONSISTENCY</th>
<th>PERSONALITY PATTERNS</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>RI, RC, IR, IA, AI, AS, SA, SE, ES, EC, CE, CR</td>
</tr>
<tr>
<td>Middle</td>
<td>RA, RE, IS, IC, AR, AE, SI, SC, EA, ER, CS, CI</td>
</tr>
<tr>
<td>Low</td>
<td>RS, IE, AC, SR, EI, CA</td>
</tr>
</tbody>
</table>

Differentiation is another secondary concept. Basically this concept explains that some persons or environments are more clearly defined than others. A differentiated person is one that is dominated by a single type and shows virtually little similarity to other types. In the same view a differentiated environment is one that is dominated by a single type. In many ways a differentiated pattern is very similar to a consistent pattern. However, differentiation is more concerned with the range of scores in the whole profile.

In Holland's latest statement of his theory, Holland (1985a) introduces the readers with the secondary concept called identity. Holland feels that consistency and differentiation are indirect ways of seeing how one defines himself or herself. Identity on the other hand is seen as a direct and more viable way of measuring and defining oneself (Holland, 1985a).

Identity is operationally defined in terms of how one scores on the 18-item Identity scale of *My Vocational Situation* (Holland, Daiger, & Power, 1980).

Congruence is another secondary concept. As mentioned earlier in this paper, it is of major interest to this dissertation. Holland (1985a)
refers to congruence as the matching of personality with environment. He believes that specific personality types require specific environments to provide them with the necessary experiences which are compatible with them. Incongruence is a term used to depict the situation whereby a person is in an environment which provides reinforcements which are incompatible with the person's competencies and preferences. Holland (1973) suggests that person-environment interactions can be assessed according to the degree of congruency. The degree of congruency can vary from situations where the personality type is in a matching environment to situations in which a personality type is in the opposite environment.

2.6.1 Congruent person-environment interactions

According to Holland (1985a), congruent person-environment interactions, in contrast with incongruent interactions, lead people toward three general situations: (a) more stable vocational choice, (b) better maintenance of personal stability, and c) greater satisfaction. Holland's hypotheses have been challenged and researched in a number of studies. This part of the chapter will examine the empirical evidence which supports and/or contradicts these hypotheses.

A: Stability of vocational choice

Brown (1968) found that stability of vocational choice was related to living in a university residence hall with students who had similar college majors. His study investigated the effects of having residence hall floors dominated by students with similar academic majors. Brown defined congruence in terms of scientific and nonscientific types. The assignment of the rooms were arranged in such a way that there be a 4 to 1 ratio of freshmen science students to freshmen nonscience students on two floors in the residence. Two other floors in the hall had the same ratio of 4 to 1; however, the dominant type was reversed (nonscience to science). The results of this study indicate that a significantly greater proportion of the minority group, in either type, changed their major to choices which were similar to the majors
represented by the majority groups on each of their hall floors. In addition, Brown found that even if the students in the minority clusters did not actually change their majors, they tended to, on the average, become less certain of their vocational choice.

Holland and Nichols (1964) studied a sample of National Merit finalists made up of 332 males and 181 females. In this one year longitudinal study the authors were interested in showing that students would remain in a field of study if they resembled the typical students in the field in terms of aptitudes, achievement and personality. Conversely, it was hypothesized that a person leaving a field would be unlike the typical student in the field. The typical student in each field was assumed to have the attributes outlined by Holland's six personality types. The students were assessed at the end of their final high school year. A personality inventory measuring 17 personality factors was administered to them.

Personality factors such as femininity, socialization, social presence, persistence, superego, strength, radicalism, dogmatism, intolerance for ambiguity, risk taking and complexity versus simplicity were included in the 17 personality factors. Using the results of these personality measures, the authors studied the relationship between change in major and the specified personality factors. For example, it was observed that realistic male students who left their initial field appeared to be irresponsible, original, tolerant of ambiguity whereas students who stayed in realistic fields tended to be characterized as responsible, non-original, intolerant of ambiguity. The inclusion of the 17 personality factors helped extend the knowledge concerning what type of person changes university programs, and which type of student stays in a program.

The students also ranked a number of occupations in terms of personal preference. Their preferences were compared with those that they expressed at the end of their freshmen year in college. If the student indicated a preference for the same occupation both times then he/she was referred to as a «non-changer.» If the student changed his or her major but remained within the same environment model as the original major then he or she was classified as an «intra-class changer.» In studying each category of changers, it was concluded
that students tend to sort themselves into fields which are congruent with their personal traits, interests, aptitudes, and achievements.

In a more recent follow-up study, Peisner and Meir (1978) used a sample of 158 males and 202 females who had responded to the Ramak Interest Inventory (Meir, 1975) seven years earlier. The similarity of Ramak's classification with Holland's has been substantiated in several studies (Meir & Ben-Yehuda, 1976; Lunneborg & Lunneborg, 1975). This sample represented 75% of the original group who had been tested 7 years earlier as twelfth graders. Congruence was operationally defined as existing if a subject was either studying or working in a field related to his/her highest interest score on the first administration of the Ramak. The stability of vocational choice was defined by making a comparison of the first and second administrations of the Ramak. The stability score was the rank order score in the second administration of the highest field in the first administration: «8» if it was the field with the highest score to «1» if the highest in the first administration was the lowest in the second. The Pearson product moment correlation between congruence and stability of vocational choice was .27. Although this is a low coefficient score it is a statistically significant finding (p is less than .01) that supports the hypothesis that congruent individuals tend to experience stability of vocational choice.

Holland (1963) explored the congruence-stability hypothesis by using a 4 point stability score. A student would receive 1 stability point for each of the following characteristics he/she had: a high point code congruent with the college or university; possessing a consistent college code; enrolled as a science major; and having a consistent 2 digit code. If a student met all of the above criteria he/she would receive four points. The sample was made up of 238 males. The results showed a strong relationship between 4-point stability scores and stability of vocational choice. In fact, no student who scored «4» changed vocational choices, and only 13 of the 53 students in the 3-point category changed majors.

In a study using a sample of 2347 college students at twenty-seven colleges and universities, Holland (1968) tested various hypotheses regarding stability of vocational choices and congruence. Several statistical analyses showed weak support for the congruence/
stability hypothesis. Although weak, the findings show that students tended to have stable vocational choices when they were in universities dominated by students whose choices were of the same general type.

B: Maintenance of personal stability

Williams (1967) studied the reported degree of conflict among congruent and incongruent freshmen male roommates. In this specific university setting all entering freshmen were administered the VPI. Williams located 39 roommate pairs who were reported to be «in conflict» according to the university housing office. A non-conflict group was randomly chosen from a population of 131 non-conflict pairs. Using a 2 x 2 design it was concluded that congruence of students VPI code was statistically positively associated with lack of conflict (p is less than .05). In addition it was found that among the «in conflict» pairs the most common pattern of VPI codes was investigative-enterprising (8 out of 39).

Walsh and Russel (1969) studied the differences in personal adjustment problems experienced by freshmen male and female students who made congruent college choices and students who made incongruent choices. The Mooney Problem Checklist (Mooney & Gordon, 1950) was used to operationally define personal adjustment. A student was said to be congruent if his or her college major was consistent with his or her primary personality type as identified by the VPI. The findings indicate that the congruent students were experiencing fewer personal adjustment problems than those who had been defined as incongruent. These findings were statistically significant for males and approached significance for females.

Walsh and Lacey (1969, 1970) examined in two studies how male and female students change over four years of college. The first study's sample consisted of 151 men while in the second one a sample of 157 females was used. In both cases the subjects were asked to estimate how they had changed, using rating scales of adjectives, abilities and traits. The hypothesis was that college students would change in a direction consistent with the environment of their vocational choice. Although the results held true for only 3 personality types for
men and four personality types for women, the authors concluded that
the evidence supported the hypothesis that a student of a given type
will become more like that type with time.

Walsh and Lewis (1972) studied the personality variables of
congruent and incongruent students. Students classified as congruent
were identified by the compatibility between their college major-field
choices and their dominant personality types as measured by the VPI.
The incongruent group was made up of students who chose majors
inconsistent with their dominant personality type. Students who did
not report a major or who reported to be undecided were categorized
into the «undecided groups.» Personality variables were measured
using the Omnibus Personality Inventory (Heist & Yonge, 1962). In the
analysis of main effect of groups, Impulse Expression, Personal
Integration, Anxiety Level and Response Bias were found to be
statistically significant. The results of the study imply that congruent
males, when compared to males who were incongruent or undecided,
report «few attitudes associated with social alienation or emotional
disturbance,» few feelings or symptoms of anxiety, and many responses
associated with attempting to make a good impression on the inventory
(response bias scale). Therefore, at least for the male congruent
students, the results of this study tend to support Holland's theory
that congruence is related to personal stability.

Spokane and Derby (1979) studied the differences in congruent
and incongruent college women on factors of ego strength, locus of
control, satisfaction with present major, certainty of vocational choice,
and perceived congruence. A participant was classified as congruent if
there was a match between her stated preference and high point code
on the VPI. All other students were classified as incongruent. Four
testing instruments were used in this study: The VPI (Holland 1965),
a Locus of Control Scale (Levenson, 1972), Barron's Ego Strength Scale
(Barron, 1953), and a bio data questionnaire (Spokane & Derby, 1979).
The results of the investigation indicate that congruent subjects were
found to be more consistent exhibited higher on perceived congruence
and were more certain of their choice than their incongruent counter-
parts. Although the results on the Ego Strength and Locus of Control
Scales were statistically nonsignificant, they were in the expected direction in every case.

C: Satisfaction

In the last ten years researchers interested in the subject of person-environment congruence have investigated the hypothesis that congruent individuals tend to be more satisfied than incongruent individuals. Werner (1969), using a sample of male and female technical high school students, found that the congruent students reported a higher level of satisfaction with their program when compared to the incongruent sample.

One of the most complete and definite research efforts in the area of congruence and satisfaction was done by Holland (1968). In this study, 2,347 students from two college samples were asked to check one of the following items: this is only a fair college, and there are many others which would probably suit me better; this is a good college for me but there are a few others that I think are better; this is the best possible college for me that I know of. The participants in this experiment reported two satisfaction ratings (8 months apart in one group and 12 months apart in the second group). The results for the men did not support the hypothesis: satisfaction with their chosen college was as much associated with incongruency as with congruency. It was found, however, that for women, there was a significant association between congruence and increase in satisfaction with their chosen college for both the 8 or 12 month time interval.

Rand (1968) used a sample of 7,275 males and females from 24 colleges in order to investigate the basic proposition that a student will be more satisfied with a chosen college if he or she chooses a college or university where the student population is similar to his or her personality. Satisfaction with college was assessed using a 3 point scale (very satisfied, satisfied, and dissatisfied). The personality type was measured using the VPI. The results of the study showed that satisfaction was only minimally associated with congruence. These findings contradict those of Brown (1968) which were stronger and more
positive. As previously mentioned, Brown (1968) investigated the effects of having certain residence hall floors dominated by students with similar majors. It was concluded that satisfaction was positively related to living on a floor where the majority of students had similar college major-field choices.

Nafziger, Holland and Gottfredson (1975) studied the satisfaction-congruence hypothesis using a sample of 1,878 college students from one college and one university. In this study, environment was defined in terms of a student's major-field. In previous studies (Rand, 1968; Holland, 1968), environment had been defined in terms of the total college. Using the major-field as a representation of environment was believed to make this study methodologically stronger than previous studies (Nafziger et al, 1975). The authors of this study found that there was a statistically significant relationship between satisfaction with the college and congruence. One of the most interesting findings indicated that there was a positive relationship between levels of congruence and satisfaction: The higher the congruence (perfect match personality-environment), the greater the satisfaction.

Spokane (1979) investigated the satisfaction-congruence hypothesis with a sample of 1,007 college males and females. Each of these individuals took the Strong-Campbell Interest Inventory (Campbell, 1977) during their freshmen orientation period. Follow-up data were received from 232 females and 386 males in their senior year. Congruence was said to exist if there was a match between the high-point code of the stated preference at the time of entry into college and the high-point code on the Strong Campbell Interest Inventory. All other cases were considered to be incongruent. The satisfaction score was based on responses to four items in the Hoppock Job Satisfaction Blank (Hoppock, 1935). The results of this study supported the assumption that congruent students would be more satisfied (p is less than .05). Spokane (1979) also studied the hypothesis that congruent students would seek counselling less frequently than incongruent students. The findings, however, did not support this hypothesis.

A series of research efforts coming out of Tel-Aviv University (Peisner & Meir, 1978; Melamed & Meir, 1981; Hener & Meir, 1981; Meir & Erez, 1981) have aimed at investigating the satisfaction-congruence hypothesis. These authors specifically studied job satisfaction as it relates to congruence of person-environment interactions. All these studies led to the conclusion that there was a positive relationship between job satisfaction and person-environment congruence (p is less than .01). It is certainly worth noting that two of these studies (Meir & Erez, 1981; Hener & Meir, 1981) defined environment in terms of the specific characteristics found within each occupation or professional specializations. Previous studies tended to define occupational environments without taking into account the diversity of jobs found within the occupations.

Whether the research studies investigated focused on program satisfaction or job satisfaction, there seems to be strong support for Holland's hypothesis that congruent person-environment interaction is related to satisfaction. If as counsellors we can in any way improve our clients' degree of congruence then, as the above mentioned research suggest, we have come closer to helping those people who come to us hoping to find a way of life that is more satisfying.

D. Summary

Huebner (1980) states that philosophers since Aristotle have struggled to understand the relationship between environment and personality. As the present review indicates, many of today's most prominent behavioral scientists have researched the domain of person-environment congruence. Results from these studies tend to suggest that there is a positive relationship between person-environment congruence and satisfaction, vocational stability and personal stability.

Melamed and Meir (1981) found that 56% of their male sample and 66% of their female sample made vocational choices in incongruent fields.
In both cases 7% of the sample were in fields which were described as «completely incongruent.» Holland (1985a) mentioned when comparing adolescents with working adults that higher levels of incongruence were found in adolescents.

In light of the research findings on person-environment congruence one can conclude that it is a construct that must be studied when trying to research areas related to career choice. Consequently, the counselling profession must seriously evaluate its current counselling methods in order to identify weaknesses and continue to search for innovations by which to assist students in choosing a career which is congruent with their personality.

2.6.2 Identity

The concept of identity as used in this dissertation is presented in Holland's latest statement of his theory of careers (1985a). Having a clear and stable picture of one's goals and interests is seen as synonymous with identity. In turn «this characteristic leads to relatively untroubled decision making and confidence in one's ability to make good decisions in the face of inevitable environmental ambiguities» (Holland, Daiger & Power, 1980, page 1).

Holland (1985a) found positive correlations between identity and the ability to make vocational decisions. In addition, Holland and Holland (1977) found significant relationships between identity and decidedness. The results clearly imply that students characterized as undecided lack a clear sense of identity.

Research on Holland's concept of identity is fairly limited. However, there is some indication, up to now, that it plays an important role in vocational decision making.

2.7 Vocational decidedness/undecidedness

A significant number of college students can be characterized as undecided, or in a state of indecision with respect to their vocational
choice (Astin, 1977). It is these very students who often present themselves to the counselling centers asking for help in deciding on a career. Very often it is these students that carry reduced academic work loads and are lower achievers academically (Chase & Keene, 1981). In addition these students, if offered no help, may eventually quit school altogether (Beal & Noel, 1980; Astin, 1975). The problems of undecidedness among college students is thus worthy of further study.

The terms vocational indecision and vocational undecidedness are used interchangeably in most research (Gordon, 1984). Consequently, this dissertation follows this same use of the terms. In addition, when the terms decidedness or undecidedness are used in the present study, they refer to vocational decidedness and vocational undecidedness respectively.

2.7.1 Osipow's model of vocational undecidedness and related research

Osipow, Carney and Barak (1976a) reported that freshmen seeking vocational counselling tend to have a higher level of vocational indecision than those not seeking help. Although these findings may seem obvious, it leads one to question the differences that may exist between the vocationally decided and vocationally undecided students. Holland and Nichols (1964) found that in a group of National Merit Finalists the vocationally undecided subjects tended to be those who were more creative, more intellectually curious and who seemed to have an inability to narrow their interests. Baird (1969) reported that in comparing 43,000 decided students with 13,000 undecided it was found that there was no significant difference in academic abilities between these two groups. In addition, Ashby, Wall, and Osipow (1966) and Baird (1969) found no significant differences between vocationally «decided» and «undecided» students on college achievement, background variables and strong vocational Interest Blank Scores.

On the other hand, a number of researchers (Angers 1961; Elton
& Rose, 1971) have reported a higher rate of student drop out in the undecided population. Elton and Rose (1971) state that about 290 vocationally undecided males entered the University of Kentucky in September 1966. Of this number 205 left the college before graduating. It was postulated by these researchers that the dropouts could be characterized as fitting what Erickson (1968) describes as acute identity confusion.

Osipow, Carney and Barak (1976a) have stated that most studies in the area of vocational undecidedness have been unable to clearly indicate the various antecedents of vocational indecision. It is believed that one of the major weaknesses of research in this domain is the fact that the construct of indecision is dealt with as a totality. Osipow et al (1976a) suggest a model that divides the construct of undecidedness into a number of components. In turn, this would help researchers in interpreting and manipulating the concept of undecidedness.

Osipow's model attempts to:

«increase our capacity to make diagnostic statements about the nature of an individual's particular decision problem. Second, enhance the adequacy of the resulting program or individual counselling intervention and third provide a criteria by which the efforts might be evaluated».

(Osipow et al, 1976a, p.234)

Based on interview experience with clients, Osipow et al (1976a) developed a questionnaire measuring 16 distinctive antecedents of vocational indecision. It is assumed that one's ability to make a sound vocational choice is in many ways dependant on the absence of these 16 aspects of indecision (ie. not knowing ones abilities, need for more information, and need for certainty). It is not uncommon to experience the stresses of more than one of these antecedents. It is important to note that these 16 antecedents have been found (Osipow et al, 1976a) to be independant of each other and together make up his Career Decision Scale (Osipow, 1980).

In testing the validity of the model (Osipow et al, 1976) it was reported that students exposed to an intervention designed to help them with specific problems of indecision did in fact have lower decision scores after their treatment.
2.7.2 Computer-assisted counselling and vocational undecidedness

In relationship to the present study, thus it was judged important to question whether computer-assisted counselling could in fact lower the score on the scale of vocational undecidedness. It would seem, based on the above mentioned research, that lowering a student's level of undecidedness would help him or her with making more appropriate vocational decisions.

The previously mentioned research on computer-assisted counselling seems to partially support the argument that changes with respect to one's level of undecidedness will be positively related to one's use of a computer-assisted counselling system.

McGowan (1977) found that the Self Directed Search was an effective instrument in reducing career indecision. This finding is important when one refers back to Reardon, Bonnell and Huddleston (1982) who report the superiority of CHOICES over the SDS on specific career decision making skills. The next logical step would be to conclude that CHOICES should do better than the SDS in reducing vocational undecidedness.

2.8 Harren's decision making model

2.8.1 Process

Harren's model of decision making is applicable solely to undergraduate college student populations. It is therefore a model that conveniently fits the student population studied in this research project.

At the heart of Harren's model (1979) of decision making is a concept called Process. It is postulated that individuals go through a four-stage sequential process when making or carrying out a decision. In order to progress from stage to stage a person must resolve certain issues and concerns within each specific stage. The four stages are Awareness, Planning, Commitment and Implementation, and are characterized as follows:
A: Awareness:

«During this stage, the individual attends to the present self-in-situation and expands one's time perspective to include part of the past and the future in one's psychological present.» (Harren, 1979, page 21).

Within the awareness stage individuals become aware of such things as their present degree of success and satisfaction with decisions they have already made and also develop an awareness of consequences of their present situation. Individuals will, in response to feelings of anxiety and dissatisfaction, recognize a need to explore alternatives. It is at this point that individuals move to the next stage.

B: Planning:

«This stage is characterized by an alternating expanding and narrowing process of exploration and crystallization.» (Harren, 1979, p. 122).

At this stage individuals search and subsequently process information. It is only when an individual has settled upon a particular alternative that he/she will progress into the commitment stage.

C: Commitment:

This stage is «first a private subjective conviction, and then a «try-out-on-others» process for feedback, with gradual progression from reversibility to irreversibility. Progression to the Implementation occurs if closure is achieved in Commitment. Closure involves: integration of the commitment into the self-concept system; reduction of post commitment dissonance; and reduction of anticipatory anxiety through awareness of one's assets and resources to implement through planning specific action steps» (Harren, 1979, p.123).

D: Implementation:

This is the last stage in Harren's process parameter. During this stage the individual enters a new context to later be assimilated into the context. Within this stage there exist specific sub aspects where the individual may move back and forth. In response to low
satisfaction success levels the individual may then consider other alternatives with a consequent need to recycle through the process.

Harren (1979) presents us with two decision making characteristics that influence the «Process.» These characteristics are: Self Concept and Style. Harren's self concept construct is very similar to what was earlier described in Holland's theory (1985a) as identity, differentiation or consistency. Simply said, the self concept gives one the sense of who he or she is.

Style, on the other hand, tells us in what manner a person makes a decision. Harren (1979) identified three styles: Rational, Intuitive and Dependant.

2.8.2 Research studies on decision making styles

The Rational style of decision making is found in individuals who recognize the consequences of earlier decisions on later ones (Harren, 1979). He or she must be able to see ahead and make decisions that will consider the means to reach a specific end. There is logic in most decisions made by these individuals. In fact this style has been characterized as being the ideal decision making style.

The Intuitive style decision maker, like the one who uses the Rational style, accepts the responsibility for making a decision. The Intuitive style decision maker, however, unlike the Rational, tends to make decisions based on gut feelings. He or she spends little time searching out information and logically weighting the possible alternatives (Harren, 1979). The basis for decision making in this style is: present feeling and emotional self awareness. It is felt, however, that because an individual's internal state is often changing the decisions made are not as effective as those made by the Rational style decision maker.

Lastly, the Dependant style decision maker denies any responsibility for making decisions. This individual tends to make decisions based on what other people are perceived as feeling. In addition the Dependant style decision maker needs the approval of authorities or peers before making a decision. This style is
characterized as being passive and often leads one into making decisions that have very few positive consequences.

Although Harren died shortly after introducing his theory to the counselling profession, the interest in his writings continued to grow. The topic of career decision making styles has been the focal point of many research projects. This section presents the essence of these studies.

The benefits of making a vocational choice based on rationality have been addressed in a number of career development theories (Harren, 1979; Super, 1974; Tiedeman & O'Hara, 1963). In many ways, Rational decision making has been a central issue in vocational theory and practice (Philips, Pazienza & Walsh, 1984b). Rational decision making strategies have been represented in research through the use of the Harren's (1979) decision making styles (Philips et al, 1984b).

Research shows that the Rational decision making style is conducive to more effective decision making (Tiedeman, 1961; Miller & Tiedeman, 1972). It is also felt that there is a positive relationship between Rational style and vocational maturity (Dilley, 1965). Harren (1979) showed that the Rational decision maker tends to progress better in terms of specific decision making tasks. Rational decision making has also been conceptually related to active planning and information gathering (Jepsen, 1974).

Lunneborg (1978) found positive correlations between self concept crystallization and the use of a Rational style. In addition, he found a negative correlation between self concept crystallization and the use of a Dependant style. Lastly, he noted that Rational decision making was also found to be linked to progress in choosing a college major. Negative relationships were found between choice of major and Intuitive and Dependant styles (Harren, Kass, Tinsley & Moreland, 1978).

Other researchers (Philips et al, 1984b) have stated that recent investigations have shown that there is conflicting evidence about the validity of the assumption that the Rational decision making style is the preferred mode of vocational functioning. In particular, their (Philips et al, 1984b) research failed to show that a rational style was more effective. However, this conclusion was based on a small sample of 70.
A number of researchers have studied the relationship between individual decision making style and the model of intervention used to help the individual. Subjects who were primarily intuitive decision makers made poorer decisions after receiving instructions in rational type intervention (Krumboltz, Scherba, Hamel, Mitchell, Rude & Kinnier, 1979). Rubinton (1980) found the greatest gains in vocational maturity in the Rational and Intuitive decision makers who had been matched in a model of intervention that was similar to their particular styles (i.e. Rational intervention or Intuitive intervention). It is also interesting to note that this same researcher found that in fact interventions of both rational and intuitive design hindered the progress of the dependant decision makers. Leong, Leong and Hoffman (1987) suggest that of the three types of decision makers the rational decision makers would derive more benefits from computer administered counselling, for the rational types see the counselling process as a «logical and intellectual process».

Based on the review of the literature dealing with decision making style and in light of this specific research, it seemed important to investigate the relationship between styles and effectiveness of computer-assisted counselling, and to search for answers to the following questions: Will computer assisted counselling be more effective for certain styles? Are certain styles negatively effected by interventions with a computer-assisted counselling system? In asking our students to use CHOICES should we assume that CHOICES help students no matter what decision making styles characterize them? These questions had never been formally adressed in empirical research.

2.9 Computer-assisted counselling, anxiety and vocational decision making

It was the belief of this researcher that any research effort dealing with career decision making must seriously take into account the fact that a person's degree of anxiety has an important effect on how well a particular form of counselling intervention will do. This belief is
shared by a number of researchers as the following paragraphs will endeavour to demonstrate.

Crites (1974) believes that anxiety may possibly be the primary negative effect charge present in students who continuously avoid making vocational decisions. Other investigators (Hawkins, Bradley & White, 1977; Janis & Mann, 1977; Fuqua & Hartman, 1983; Fuqua, Seaworth & Newman, 1987) have stated that there is ample evidence showing that anxiety is directly or indirectly related to a student's inability to make a vocational choice.

The undecided student has been found to be more anxious than the decided student (Gripka, 1970; Lyon, 1959; Hall, 1963). Kimes and Troth (1974) found that students who were completely undecided about their career choice were significantly more anxiety prone (trait anxiety) than students who had decided on a career. The anxious student may avoid risk taking and value the security associated with indecision (Miller, 1956; Ziller, 1957).

Hawkins, Bradley and White (1977) studied a group of liberal arts students in order to examine the relationship of vocational decisiveness to general and vocational anxiety. Vocational anxiety was found to be a good predictor of vocational indecisiveness, whereas no relationship was found in the case of general anxiety. Harren (1979) proposes that there is a curvilinear relationship between decision making and anxiety. In other words both high and low anxiety inhibit sound decision making. High anxiety levels tend to encourage an individual to retract to certain defensive avoidance behaviors. A low anxiety level tends to keep a person in a cycle of little decision making. A moderate anxiety level, however, will act as motivator in getting an individual to progress through the decision making process.

There is evidence that «Anxiety (both pre- and post-test) increased with increasing use of Dependant and Intuitive decision making styles, as well as with decreasing use of Rational decision making style.» (Berger-Gross, Kahn & Weare, 1983, p. 318)

Knowing that anxiety may have a detrimental effect on career planning warns counsellors that there is a need to seriously consider this variable, possibly before deciding on a counselling strategy. It may be vital to help a client with his anxiety level before trying to
solve problems related to vocational choice. This research thus investigated if the level of anxiety has an impact on how students react to one specific intervention, namely CHOICES, the implication being that it could be worth pre-testing for anxiety before asking them to work on CHOICES.

2.10 Rationale and definition of terms

Cooley (1969) voices in simplistic terms what many have stated (Katz, 1963; Caplan, Ruble & Segal, 1963) when he says «Good decisions require good information». These findings are very important when one reads the following statement:

«Both educational and occupational information have meaning only insofar as such data are evaluated within the framework of what an individual knows about himself. Self-information is crucial to an individual's seeing the relevance of the educational and/or occupational data which he receives.»

(Herr & Cramer, 1972, p. 278)

It would seem important at this point to reiterate the basic philosophical orientation of CHOICES. The latter begins with the individual's personal attributes and then searches and finds vocational opportunities that relate to the specific person-centered information. In this way individualization has been accomplished through the use of the computer. CHOICES is attentive and responsive to individual differences and needs (Katz & Shatkin, 1980). In addition, computer-assisted counselling systems involve students in a career search that is characterized as being multi-dimensional and flexible. The information contained in CHOICES has been arranged in a well-organized fashion.

The counselling profession should be concerned with whether or not it is in fact improving the quality of its clients' lives (Peavey, 1984). This dissertation was an attempt to verify if computer-assisted counselling will be of benefit in improving one's quality of life.

For the purposes of this study the term «benefit» was measured in terms of positive changes experienced by the client in the areas of congruence, identity and decidedness. It was assumed that if clients
increased their level of congruence, identity, and decidedness, the treatment (computer-assisted counselling) had been beneficial. An equally important factor in this dissertation was the investigation of how possible changes in congruence, identity and decidedness from exposure to CHOICES are related to one's specific decision making style and one's anxiety level, i.e. to differentiate the effects of decision making style and level of anxiety.

The constructs of identity, congruence, decidedness, decision making style and anxiety were retained because of their relevance to the research question concerning the benefits derived from exposure to CHOICES. The following pages should provide a better understanding of the relationships that might exist between computer-assisted counselling and the above mentioned constructs.

CONGRUENCE

Holland (1973) refers to congruence as the matching of personality with environment. Like most of Holland's constructs, the construct of congruence has been the centre of much research. In one of his earlier works, Holland (1966) mentions that congruent person-environment interactions are positively related to vocational stability, personal stability and greater satisfaction.

Studies conducted after Holland's original statements have for the most part supported his conclusions.


In light of the above-mentioned results, counsellors should seek to find innovative interventions in order to enhance personality-environment congruence. The task of pinpointing a counselling intervention of this kind must begin with discovering what specific variables determine why some people choose congruent environments while other do not. Holland and Gottfredson (1976) stress the importance of self knowledge as the variable which is necessary if one hopes to make a
choice of environment which is congruent with his or her personality. People with well-defined personalities will tend to be good decision makers (Holland, Gottfredson & Nafziger, 1975).

Taking into account what the above authors have found, it would seem important to favor a form of intervention that helps individuals in gaining knowledge about self and the world of work. Computer-assisted counselling has been found to be successful in doing such a task (Harris, 1974). Cairo (1979) goes one step further when he states that users of computerized counselling make choices that are closely related to their personalities. Holland and Gottfredson (1976) suggest that one of the reasons why impersonal interventions such as computer-assisted counselling is so successful may be because many people can use well organized and clear information. The strength of computer-assisted counselling seems to lie in its ability to give back to individuals vocational alternatives that are congruent with their self-perception.

The above mentioned literature clearly demonstrates the importance of the construct of congruence in the area of vocational counselling. In addition these research studies have shown that computer-assisted counselling has been designed in a way that is likely to enhance one's level of congruence.

IDENTITY

Holland (1985a) describes identity in terms of how one scores on an 18-item Identity Scale (Holland, Daiger & Power, 1980). This scale estimates the clarity of one's vocational goals and self-perceptions. The role computer-assisted counselling plays in the development of one's identity has been the object of some research (Katz & Shatkin, 1980; Cairo, 1983; Harris, 1974). More specifically, Maze & Cummings (1982) have stated that clients of computer-assisted counselling systems have tended to demonstrate more confidence in their career decisions than clients who receive only conventional counselling. These authors also state that the users of computer-assisted counselling systems have been shown to know significantly more about occupations than non-users. Arutunian (1973) indicated that users of computer-assisted counselling systems learned more about themselves, occupations, and the relationship that exists between the two. Mallory, Drake and Holder
(1979) found that computer-assisted counselling helped clients increase the quantity and quality of occupational knowledge and gain more confidence in their career knowledge when compared to those not using the system.

CHOICES makes all attempts to provide its users with accurate and complete information about self and the world of work (Katz & Shatkin, 1980).

Every user of CHOICES must fill out a guide which gives him or her an opportunity to carefully reflect upon 18 dimensions of self. The user is given the opportunity for self-evaluation based on specific questions incorporated in the guide. These questions are similar to those found in conventional pencil and paper personality and interest inventories. Once the user has completed the guide he or she is given the opportunity to enter this information into the computer. The relative importance of each factor is made clear to the individual by the computer. The user is also given the opportunity to observe certain inconsistencies which may have been entered. Perhaps this is the first time in a client’s career planning that he or she is given the opportunity to be an active participant in career decision making. The immediacy of feedback offered by CHOICES enables the user to re-examine some of his or her personality dimensions. Once the client has explored careers related to his or her personality dimensions, he or she is encouraged by the computer program to ask for very specific information on careers.

DECIDEDNESS

The importance of understanding the differences that exist between the decided and undecided student cannot be underestimated, especially when one is trying to measure the appropriateness of specific counselling interventions. Nevertheless, research efforts dealing with the undecided student tends to present a «confusing picture» (Harman, 1973). Probably one of the major reasons for the discrepancy in research findings is the fact that indecision is defined and understood in different ways by different researchers (Gordon, 1984).

For the purposes of this research and for reasons of clarity, the term undecided describes those students who are unwilling, unable or
unready to make a vocational or educational choice (Gordon, 1984). The counselling professions should be concerned about helping these individuals because they represent a significant number of students. There are estimates stating that 20 to 50 percent of students entering college are undecided (Astin, 1977; Berger, 1967; Crites 1969). Gordon (1984) feels that such estimates may in fact be very conservative.

As mentioned earlier in this dissertation, the undecided students have been reported to be attrition prone (Astin, 1975; Beal & Noel, 1980). Without help many of these students will simply drop out of school. In addition, Chase and Keene (1981) have found that undecided students tend to carry less credits and have difficulty achieving academically.

One must keep in mind that the undecided student is part of a group that may be characterized as diverse. Consequently, any counselling services offered to these individuals must be as comprehensive and as flexible as possible taking into account the uniqueness of each individual (Gordon, 1984).

Holland (1973) claims that many current vocational counselling practices are inefficient. He feels that at the root of the problem is the counsellor who clings to outdated practices.

The above-mentioned comments by Holland (1973) and Gordon (1984) together with empirical evidence presented thus far would lead one to question if a computer-assisted counselling system could help the undecided student.

As yet, no research project has specifically looked at CHOICES as it relates to the undecided CEGEP student. Gordon (1984) summarizes the research on computer-assisted counselling in the following manner:

«a) Computer systems provide personalized exploration of self.
b) Voluminous, up-to-date occupational information is offered in an easy-to understand format.
c) Computerized systems are excellent tools for helping integrate personal and occupational information.
d) Computer systems can teach students decision-making strategies.
e) Students are in control.
f) Computer systems help students plan for
It would therefore seem appropriate to include CHOICES in a study related to decidedness, for CHOICES shares the characteristics of other computer assisted counselling tools.

DECISION-MAKING STYLE

It is said (Janis & Mann, 1977) that people use different strategies to approach and resolve important decisions. As mentioned earlier, these strategies are often defined in terms of decision making style. A number of authors have studied and formulated various classifications of decisional styles (Dinklage, 1969; Jepsen, 1974; Arroba, 1977; Harren, 1979; Krumboltz, 1969). Harren's (1979) classification is certainly the most widely recognized (Phillips et al, 1984b) and was judged appropriate for use in this dissertation.

Krumboltz, Scherba, Hamel, Mitchell, Rude, and Kinnier (1979) states that it is important to realize that the interventions used by most people may not be the best for everyone. Consequently, one could conclude that computer-assisted counselling is not necessarily beneficial to all students (Dungy, 1984).

Rubinton (1980) states that there is evidence that individuals with different decision-making styles need different forms of intervention. Krumboltz et al (1979) found that subjects who were characterized as being rational decision-makers benefited the most from a rational type intervention. These authors found that intuitive decision-makers, who are believed to be in need of rational training, actually made worse decisions when exposed to such training.

Computer-assisted counselling can be characterized as being a form of intervention that is based on logic (Katz & Shatkin, 1980). It approaches vocational questions with objectivity and clarity. It encourages students to be involved in their own vocational decisions (Gordon, 1984).

The information presented to the student is perceived as being accurate and well-structured.

CHOICES enables the users to try out a variety of situations and then find out the consequences of the choice. In considering the
characteristics of the rational decision-maker and the design of CHOICES, one is lead to assume that the needs and attitudes of the rational decision-maker are in fact inherent in CHOICES.

In a thorough review of the literature, only one study was found which investigated the relationship between decision-making style and CHOICES (Cassie, 1979). The researchers found that students who were characterized as intuitive or dependent reported feeling frustrated by CHOICES. Whether or not these students benefited as a result of CHOICES in spite of their feelings of frustration was not indicated in the research report. It thus seems pertinent and logical to say that computer-assisted counseling will benefit different students in different ways and more specifically that rational decision makers will benefit more from their exposure to CHOICES (in terms of congruence, identity and decidedness) than intuitive and dependant decision makers.

Based on the above-mentioned rationale it seemed appropriate to propose the following hypotheses:

2.11 Major hypotheses

Hypothesis 1:
After exposure to CHOICES and when adjusted for pre-test differences, the mean post-test scores of the rational decision makers on a measure of person-environment congruence will be significantly higher than those of the intuitive and dependant decision makers.

Hypothesis 2:
After exposure to CHOICES and when adjusted for pre-test differences, the mean post-test scores of the rational decision makers on a measure of identity will be significantly higher than those of the intuitive and dependent decision makers.

Hypothesis 3:
After exposure to CHOICES and when adjusted for pre-test differences, the mean post-test scores of the rational decision makers on a measure of decidedness will be significantly higher than those of the intuitive and dependent decision makers.
2.12 Secondary hypotheses

Following a thorough investigation of possible moderator variables that could be considered for this dissertation, it was determined with the support of empirical research that the construct of anxiety could not be overlooked.

Head and Lindsey (1983) mention that the effects of anxiety on the college student's experiences should be considered one of the major concerns for all higher education.

As we have seen, Crites (1974) believes that anxiety may possibly be the primary negative effect charge present in students who continuously avoid making vocational decisions and Hawkins, Bradley and White (1977), among others, report that a number of investigators have clearly shown that anxiety is related directly or indirectly to the inability to make a decision concerning one's vocation.

Making a vocational choice is certainly a demanding task for a college student. Spielberger, Goodstein and Dahlstrom (1958) found that greater levels of anxiety relate to poor performance on complex tasks.

Students with high levels of anxiety have been found to choose low-risk courses of action which guarantee success or taking risks where success is almost impossible and therefore failure is excusable (Hawkins, Bradley & White, 1977).

Harren (1979), as we have also seen, suggests that both high and low anxiety levels are conducive to poor decision making.

«Moderate anxiety precipitates the decision making process and fosters progress through the stages whereas low anxiety results in continuance of ones present course of action without any perceived need to decide. High levels of anxiety result in various defensive avoidance behaviors...» (p. 127)

In relating decision making styles to anxiety, Berger-Gross, Kahn and Weare (1983) suggested that less anxious students were more apt to favor rational decision making styles whereas highly anxious students tended to favor the dependant and intuitive decision making styles. Again this statement emphasizes the role anxiety plays in decision making.
Based on the above mentioned literature, the following hypotheses were proposed;

Hypothesis 4:
After exposure to CHOICES, and when adjusted for pre-test differences, the mean post-test scores, on a measure of person-environment congruence, of the rational decision makers characterized as moderately anxious will be significantly higher than those of the rational decision makers characterized as having low or high levels of anxiety.

Hypothesis 5:
After exposure to CHOICES, and when adjusted for pre-test differences, the mean post-test scores, on a measure of identity, of the rational decision makers characterized as moderately anxious will be significantly higher than those of the rational decision makers characterized as having low or high levels of anxiety.

Hypothesis 6:
After exposure to CHOICES, and when adjusted for pre-test differences, the mean post-test scores, on a measure of decidedness, of the rational decision makers characterized as moderately anxious will be significantly higher than those of the rational decision makers characterized as having low or high levels of anxiety.
CHAPTER III

METHODOLOGY

The present chapter deals with the procedures utilized in the verification of the hypotheses. In specific terms, this chapter presents the operational definitions of the variables, the population studied, the testing instruments, the testing procedures, the experimental design, and the procedure used for the analysis of the data.

3.1 Operational definition of the variables

In this research project the specified variables had the definitions stated below:

3.1.1 Congruence

This variable was determined by comparing one's three-letter code on Holland's Vocational Preference Inventory with one's corresponding three letter code for the occupation which one aspires. This expressed aspiration was obtained from the subject's answers on a questionnaire. The response was then translated into a Holland letter code. The Dictionary of Holland Occupational Codes. (1982) was used in order to designate a three letter code for each occupation.

The calculation of congruence was done according to the revised Compatibility Index (Wiggins & Moody, 1981). «This scale is a 9 point scale (0-8) derived from the match between any two Holland codes using
a simple position weighter order scale.» (Wiggins, Lederer, Salkowe & Rys, 1983, p. 115) (see Table 2).

**TABLE 2**

8 = Letters and order of both codes match exactly (CRI-CRI).
7 = Primary letters match, with secondary and tertiary letters of one code reversed in the other code (CRI-CIR); or only primary and secondary letters of both codes match in order (CRI-CRE).
6 = All letters of both codes match but primary letters are not the same (RIC-CIR), (RIC-IRC), (RIC-ICR).
5 = Primary letters match, with secondary or tertiary letters of one code matching tertiary letter of the other code (RIC-REC), (RIC-REI); or primary and secondary letters of one code reversed in other code (RIC-ICE).
4 = Primary and secondary or tertiary letters of one code match any two letters of other code in any order (RIC-ERI, (RIC-EIR), (RIC-SRC), (RIC-ECR); or primary letter of one code matches primary letter of the other code (RIC-RES).
3 = Secondary and tertiary letters of one code found in the other code in any order (IEC-SCE), (IEC-SEC); or primary letter of one code matches secondary letter of the other code (IEC-AIS).
2 = Primary letter of one code matches tertiary letter of the other (SEC-AIS); or secondary letter of one code matches secondary or tertiary letter of other code (SEC-AEI), (SEC-AIE).
1 = Tertiary letters of both codes match (AIS-ECS).
0 = No letters match in either code (AIR-ECS).

3.1.2 **Identity**

Identity was determined by the score obtained on the Identity Scale of Holland, Daiger, and Power's questionnaire *My Vocational Situation*.

3.1.3 **Decidedness**

Decidedness was determined by the score obtained on the Career Decision Scale (Osipow, Carney, Winer, Yanico & Koschier, 1976b).
3.1.4 Decision Making Style

Decision making style was determined by the score on the Assessment of Career Decision Making by Harren (1979).

3.1.5 Anxiety

Anxiety was determined by the score obtained on the $Y_2$ scale of the State & Trait Anxiety Inventory by Spielberger, Gorsuch, Luschen, Vagg and Jacobs (1983).

3.2. The population studied

The research population was composed of first year pre-university students from St. Lawrence Campus of Champlain Regional College. These students were registered in one of the following programs: commerce, social sciences, languages and literature, pure and applied sciences and health sciences. During four semesters students must successfully complete 28 courses. Twelve of these courses are in the area of their concentration (e.g., social sciences). The remaining courses deal with subject matter related to English, Humanities and Physical Education. Included in the 28 courses are 4 complementary option courses.

On the day of registration (August 16, 1986), all students entering St. Lawrence Campus as first year students were tested ($n = 363$). These students come from all over Québec and Canada. In all cases these students have a good command of the English language. The tests administered at this time were the Vocational Preference Inventory (Holland, 1985b) and the Assessment of Career Decision Making (Harren, 1979). In addition the students were asked what program they had registered in and if they had ever worked on CHOICES.

This initial testing period was seen as a way to screen students and to categorize them in order to be in a better position to create sub-groups. Sub-groups were created because of the logistical problem involved in having 363 students work on CHOICES.

The first step undertaken in the formation of the final research groups was to eliminate all students who had used CHOICES in the past
(n = 43). In addition, all students registered in a professional program were also eliminated (N = 88). After eliminating these students the sample was made up of 232 students.

The results for this group on the Decision making styles scale of the ACDM were carefully studied in order to form the final research group. This final group was made up of students who had high scores on either the Rational, Intuitive or Dependent decision making styles. Based on the results of the test, all students who were at the 80th percentile or higher were considered to be part of the specified group. The extreme scores were chosen for reason of clarity and as a result 142 students were asked to participate in the complete testing procedure including spending time on CHOICES (see Table 3).

Table 3

<table>
<thead>
<tr>
<th>Original Sample in Terms of Sex, Program, and Decision Making Style</th>
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</thead>
<tbody>
<tr>
<td>(N=142)</td>
</tr>
<tr>
<td>Rational Decision Making</td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Social Science</td>
</tr>
<tr>
<td>Commerce</td>
</tr>
<tr>
<td>Science (pure and applied and health)</td>
</tr>
<tr>
<td>Languages &amp; Literature</td>
</tr>
</tbody>
</table>

3.3 The testing instruments

3.3.1 The Vocational Preference Inventory

(Holland, 1985b)

This test was originally developed to assess personality. However, it is being used more and more in assessing vocational interests. The
inventory is made up of 160 items, each representing a vocational title. Students completing the inventory must indicate whether they like or dislike the occupations presented. A total of eleven scales are found in the VPI: Realistic, Investigative, Artistic, Social, Enterprising, Conventional, Self-control, Masculinity-Femininity, Status, Infrequency, and Acquiescence.

The first six scales deal with the six personality types described earlier in this dissertation and are in fact the main dimensions found in most interest inventories (Holland, 1985).

The Self-Control scale measures what is usually referred to as self control and over control of impulses. High scores indicate over control whereas low scores indicate impulsiveness. An average score associated with other positive signs reflects a healthy spontaneity.

The Masculinity-Femininity scale «measures a masculinity-femininity cluster of variables including choice of occupational roles, identification with males and females, conflicts about these identifications, and some personal traits traditionally identified with masculinity and femininity» (Holland, 1985b, p. 8).

The Status scale measures the prestige ranking of specific vocational choices. In some ways this scale provides an estimate of self-esteem and self-confidence.

The Infrequency scale is a heterogeneous validity scale. High scores have been found to represent personal effectiveness.

The final scale is the Acquiescence scale which can be described as the tendency to like occupations. This scale is valuable, for it can detect extreme biases and dissimulation.

Although the VPI dates back to 1953 it has gone through eight revisions. The revisions have had little effect on the psychometric properties of the inventory (Holland 1985b).

Holland (1985b) reports internal consistency coefficients (KR20) for the VPI Scales dealing with personality types to range from .85 to .91. These high homogeneity coefficients point to the fact that the content of the personality type scales is relatively homogeneous.

Harvey (1971) reports test-retest reliability coefficients ranging from .61 to .92 for college students. Using another group of college
students, Holland (1968) found the test-retest reliabilities to be very similar for the interest scales (.54 to .80). The median for this particular group of junior college students was .71.

The standard errors of measurement of the scales Realistic through Status range for college females from .60 to .90 and from .80 to 1.16 for the college male population. (Holland, 1985b)

The construct validity of the VPI has been examined by a number of researchers. In his most recent book, Holland (1985a) presents the reader with over 400 studies that have looked at his six personality types. For the most part these studies have indicated that the constructs implied by the VPI are valid.

The VPI has been studied in terms of how it is related to the Kuder and Strong interest inventories. In both cases these tests have been demonstrated to measure similar dimensions of the VPI (Rezler, 1967; Campbell & Holland, 1972). In addition, the VPI has been intercorrelated with a number of personality tests. The results indicate that the VPI scales are related in the expected direction to scales in a number of such inventories.

Most studies dealing with the concurrent validity of the VPI scales have been positive. Among others Holland (1966) found that the VPI discriminates among college students with different occupational choices. Another study has shown that the VPI scales distinguish engineering students from other students (Scott & Sedlacek, 1968).

The predictive validity of the VPI is also worth noting. Wiggins and Weslander (1977) conducted a four year study using 200 males and 200 females. These researchers found that the VPI hit rate for occupations four years after the original testing was 64.5% for males and 56.5% for females.

The psychometric qualities of the VPI make it a very interesting inventory, and the theoretical background of the test is closely related to the rationale of this dissertation. In addition to this important factor the VPI was retained for this dissertation because of its informal nature, its non threatening presentation and its brief testing and scoring time.
3.3.2 The Vocational Identity Scale
(Holland, Daiger & Power, 1980)

The Identity Scale in My Vocational Situation measures on the one hand the clarity of one's vocational goals and on the other, one's clarity of self perception. It is believed that such characteristics direct one toward making decisions that are relatively untroubled.

The vocational identity scale is made up of 18 true or false items. It takes about six to seven minutes to complete. The total score is represented by the number of «False» answers.

The authors developed this test by referring back to literature dealing with indecision, older diagnostic schemes and studies looking at the effect of counselling programs on clients.

The reported KR20's for the Vocational Identity Scale are very good. The authors report .89 for male college students and workers and .88 for female of the same group (Holland, Daiger & Power, 1980). In addition Taylor (1980) examined the reliability of the identity scale using 214 male and female college students and obtained a KR20 of .87.

Research on the validity of the Vocational Identity Scale seems promising (Holland, Daiger & Power, 1980). The authors have tested a number of hypotheses concerning the relation of vocational identity to educational level, age, vocational aspirations, external ratings and other criteria. The results indicate that their scale does in fact have construct validity. The validity of the scale is also confirmed by studies showing its relationship to vocational indecision (Holland, Daiger & Power 1980), decision making skills (Holland, Gottfredson & Nafziger, 1975) and general personality characteristics (Henkels, Spokane & Hoffman 1981; Holland, Gottfredson & Power, 1980).

The Vocational Identity Scale of My Vocational Situation was chosen for this dissertation because it is a specific way of measuring what Holland (1985b) calls Identity. Its psychometric qualities make it a viable test. In addition this test is easily administered and can be hand corrected.
3.3.3 The Assessment of Career Decision Making
(Harren, 1979)

The development of the ACDM (Harren, 1984) began in 1964. The original test was called Vocational Decision Q Sort and it was also constructed by Harren. Today's version (ACDM) consists of four parts;

- a) Decision Making Style,
- b) Feeling About School,
- c) Occupational Plans and
- d) Academic Major.

This dissertation is specifically interested in the Decision Making Style section of the test.

In developing the Decision Making style scale Harren collapsed Dinklage's (1969) eight decision making styles into 3 styles: Rational, Intuitive and Dependant. The college normative sample was made up of 2495 students from a total of 6 separate studies spanning over seven years (Harren 1979; Buck 1981; Buck & Daniels, 1983; Daniels & Buck 1984; Philips et al, 1984b; and Stonewater & Daniels, 1983).

The internal consistency of the ACDM has been demonstrated throughout its development. In a recent research project Daniels and Buck (1984) studied a sample of 143 male and female college students and report alpha levels ranging from .71 to .84 for the Decision Making Style scales of the ACDM. Jepsen and Prediger (1981) report alpha levels ranging from .60 to .72 for a high school sample of 232. Three separate studies (Daniels & Buck, 1984; Harren & Kass, 1978; Warren, 1978) have examined the temporal stability of the ACDM. Harren and Kass (1978) tested 73 students enrolled in introductory psychology. They found test-retest Pearson product moment correlations (2 week interval) ranging from .76 to .85 for the ACDM section dealing with Decision Making Styles. Warren (1978) reports test-retest reliability scores ranging from .63 to .87 using 44 college students with test administrations one week apart. Using the present form of the ACDM with 90 college students, Daniels and Buck (1984) report, for the Decision Making Styles scale, Pearson product moment correlation
coefficients ranging from .76 to .81 with a 2 week interval between the administrations of the test.

The content validity of the ACDM has been considered throughout its development. As mentioned earlier the Decision Making Style scales were based on a taxonomy developed by Dinklage (1969). In addition to this theoretical foundation, Harren used empirical studies to make modifications which have evolved into the present ACDM.

A number of researchers (Warren, 1978, Sarnoff & Remer, 1982; Harren, 1979; Moreland, Harren, Krimsky-Montague & Tinsley, 1979) have conducted studies that clearly show that the ACDM has criterion related validity. Warren (1978) was able to substantiate the relationship between rational style and progress in areas such as adjustment to school and the selection of an occupation.

Sarnoff and Remer (1982) found a strong positive correlation between rational style scores and the number of career alternatives listed by students in an experimental career planning program. This phenomena was not found for the intuitive or dependant styles.

Harren (1979) found «that the Decision-Making Styles scales were descriptive of the types of student's choices of major and occupation» (Buck & Daniels, 1985, p. 54).

Moreland, Harren, Krimsky-Montague and Tinsley (1979) classified 578 undergraduate males and females as androgynous feminine, masculine or undifferentiated (sex role). Using an analysis of variance these authors evaluated the relationship between the college students' sex-role self concepts and their decision making styles. Significant differences were found for the male and female sex role groups on the Rational scale. However, the post hoc analysis did not reveal which groups differed within the male sample. The analysis for the female group demonstrated that the androgynous females scored higher than the undifferentiated females.

The construct validity of the ACDM has been examined by Harren (1979), Jepsen and Prediger (1981), Philips and Strohmer (1982) and Philips, Strohmer, Bertaume, and O'Leary. (1983). These authors investigated the relationship of the Decision Making Styles scale with other measures of career development. Their findings indicate that the Rational Decision Making Styles scores are positively correlated with a
As expected, the Intuitive Style and Dependant Style scores were (with few exceptions) negatively correlated with the same measures. A research project by Harren (1979) looked at the relationship between the Decision Making Style scales, the Paragraph Completion Method (Hunt 1971) and the Cognitive Differentiation Grid (Bodden, 1970). The results, based on a sample of 1115 college students, indicated that the Decision Making Styles scale did not correlate significantly with these two tests, although all three instruments were considered tools to measure cognitive style. Harren concluded that they were in fact measuring different constructs.
Jepsen and Prediger's (1981) study correlated the scores of the Decision Making Styles scale with five measures of career development: The Career Maturity Inventory (Crites, 1973), the Career Skills Assessment Program (College Entrance Examination Board, 1978), the Career Decision Scale (Osipow et al., 1976b), the Career Development Inventory (Super & Thompson, 1979), and the Assessment of Career Development (American College Testing Program, 1974). The results of this study reveal that the Rational Decision Making scale has low but positive correlations with the five above mentioned measures of career development. The Intuitive and Dependent scales were found (with one exception) to be negatively correlated with the five measures. The authors explain the low correlations between the Decision making styles scales and the five other measures by suggesting that these correlations indicate that the scales measure «a unique perspective on career decision making» (Jepsen & Prediger, 1981, p.363).

Philips and Strohmer (1982) and Philips et al. (1984b) reported results that are similar to those of the above mentioned studies. In reviewing these studies Buck and Daniels (1985) report that «magnitude of the correlation was uniformly small indicating that decision making style represents a separate career development structure» (p.55).

The results of a study (Daniels & Buck, 1984) investigating the intercorrelation among the Decision Making Styles scales reveal that the three scales «measure relatively discrete decision making styles» (p.58).

The Decision Making Styles section of the ACDM was chosen for this study because it was so closely linked to Harren's theory of career development, which has served as a theoretical basis for this dissertation. Holland, Magoon and Spokane (1981) have noted that the ACDM was «the most comprehensive theoretically oriented scheme to appear in 1978-79» (p.286). In addition the ACDM was developed with college students in mind and consequently was well suited for the population of this particular study. Lastly, the psychometric properties of the ACDM are very good.
The State Trait Anxiety Inventory

This inventory (Spielberger, 1977) has had much use in research and clinical practice. It has separate self-report scales for estimating one's state and trait anxiety levels. The STAI form Y-1 (State Anxiety Scale) asks respondents to answer twenty questions relating to how they feel «right now». The STAI form Y-2 (Trait Anxiety) asks respondents to answer twenty questions that assess how they generally feel. College students generally complete both scales in 10 minutes.

There have been a phenomenal number of studies which have looked at the STAI. Spielberger (1983) lists over 2000 such studies and reviews.

The normative sample for college students consisted of 855 students taking introductory psychology courses at the University of South Florida. The mean scores for males and females on the S-anxiety were 36.47 and 38.76 respectively. The alpha coefficients were .91 for the males and .93 for the females. The mean scores for the same students on the T-anxiety were 38.30 for males and 40.40 for females. Their respective alpha's were .90 and .91. The above mentioned alpha coefficients indicate that the STAI enjoys a promising internal consistency level. Spielberger (1983) mentions that the alpha coefficient is a more meaningful index of reliability for S-anxiety when compared to test-retest correlations. Due to the transitory nature of state anxiety the test-retest measures have been low, ranging from .16 to .54. The test-retest correlations for T-anxiety in college students range from .76 to .86. In addition, item remainder correlations computed for the normative sample indicate internal consistency levels that are quite high.

The validity of the STAI was given careful attention when this inventory was developed. Before an individual item could be retained it had to meet validity criteria at each stage of the test development (Spielberger, 1983). Construct validity for the STAI is supported by a study looking at two contrasting groups (Spielberger, Garouch, Luschene, Vagg & Jacobs, 1983b). Specifically, neuropsychiatric patients were compared to normal subjects. The results indicate that the neuropsychiatric subjects (for whom anxiety was a major symptom) scored substantially higher on T-anxiety than the normal subjects.
This finding shows that the STAI can discriminate between contrasting groups. In addition, the T-anxiety scale was correlated with other measures of trait anxiety: The IPAT (Cattell & Scheier, 1963) and the TMAS (Taylor, 1953). The results of these studies show correlations ranging from .85 to .73 which indicates evidence of concurrent validity.

Spielberger et al. (1983) also presents correlations between the STAI scales and other personality tests. The results of these studies present evidence of convergent and divergent validity of the STAI.

The STAI has been used in studies dealing with the effects of anxiety on academic achievement (Heinrich, 1979), memory (Eysenck, 1975), computer assisted instruction (Rappaport, 1975; Sieber, O'Neil & Tobias, 1977), test anxiety (Culler & Holahan, 1980), depression (Mould, 1975) and neurosis (Von Richthofen & Mellor, 1980), to name a few. In the last decade over 300 studies have used the STAI to evaluate processes and outcomes of certain counselling treatments. It is therefore a tool that has often been used within the counselling profession.

The above mentioned studies demonstrate that the STAI has excellent psychometric properties for the assessment of anxiety of college students. It has had over fifteen years of usage and is considered one of the best tests for measuring anxiety. It is a test which is short and easily corrected and has been widely used with college students. Based on the philosophy that one's vocational choice is a developmental process, it was seen as essential to test one's trait anxiety level as opposed to state anxiety. Consequently, this research used the Y2 form of the STAI.

3.3.5 The Career Decision Scale

The Career Decision Scale or CDS (Osipow, Carney, Winer, Yanico & Koschier, 1976b) was devised as an instrument to identify factors which prevent individuals from making career decisions. The CDS reflects the notion that a restricted number of circumstances cause problems for individuals who are trying to make a vocational decision. The authors identify these circumstances or barriers with a list of 16 descriptions of antecedents for vocational indecision. Respondents are asked to «indicate which of the items in the list below describe you and
indicate the degree to which the description fits your circumstance». In addition to the 16 items the CDS has 2 items which indicate certainty of choice (with career and major) and one item that gives the respondents an opportunity to comment on the previous 18 items.

The administration of the test takes approximately 8 minutes. Students are asked to circle one of four choices for each item: 4 if exactly like me, 3 if very much like me, 2 if only slightly like me, 1 if not at all like me. The higher the score the less decided is the individual.

In a first study by Osipow, Carney and Barak (1976), it was reported that as a whole the CDS had a test-retest reliability of .902. In a second study these same authors (1976) reported a test-retest reliability coefficient of .819. In both studies the subjects were students from Ohio State University with a testing interval of two weeks. Most correlations fell between the .60 to .70 range. Slaney and Palko-Nonemaker (1981) reported a test-retest reliability of .70 on the CDS over a period of six weeks. The time interval of six weeks may explain why the test-retest correlations were lower that those reported by Osipow, Carney and Barak (1976a).

Taylor (1979) investigated the effect of a residential career exploration program on the level of undergraduate career decidedness. To do so, she compared 96 students who were part of a residential career group with a group of 42 randomly housed students. The results of this comparison indicate that on all items of the CDS the career group was more undecided than the non program group. It is interesting to note that all students in the residential career planning group had chosen these special housing arrangements in order to be helped with their career indecision. Therefore, the results of Taylor's study testifies to the construct validity of the items in the CDS. After 8 months the residential career planning group was once again compared to the non-program group. This time, however, no differences were found. There was also no significant difference by sex.

In a similar study, Sutera (1977) used the CDS in order to measure the impact of a residential career planning program at an Ohio State University co-educational residence hall. The career program lasted 16 weeks with weekly meetings lasting an hour-and-a-half.
These sessions dealt with topics such as: assessment of personal characteristics, career information, job search strategies and concepts of effective career decision making. Comparisons of the pre-test and post-test scores showed that the CDS total scores were significantly reduced, which indicates that these students were more decided about their career plans at the end of the program. The changes did not favor males or females, demonstrating that the CDS does not reflect gender.

Carney (1977) also studied a group of students from Ohio State University. This group had a program similar to Sutera's (1977) group. However, these students were not in a university residence setting and met two-and-half hours a week for 11 weeks. The comparisons between the pre-test and post-test scores yielded results showing that the total score on the CDS was significantly reduced.

Cellini (1978) predicted that there would be a correlation between vocational indecision as measured by the CDS and external locus of control. Using a group of undergraduate students Cellini found support for his hypothesis. In fact his results showed that the students who had high levels of indecision were also characterized as having an external locus of control.

In an attempt to study the predictive validity of the CDS, Halasz-Salster and Osipow (1978) used a sample of freshman students who were planning careers in teaching. These students were administered the CDS during an orientation week and a year later were asked if they were still planning a career in education. It was predicted that the higher one's indecision score (lower decidedness score), the greater the chances of a change of program. The results of this study did not support this hypothesis because very few of the committed students had high scores of indecision. Osipow (1980) suggests that there is a need to repeat such a study with a population in which there is clear variance in indecision.

Taylor (1979) reported findings which provide substantial validation of the CDS. She used a sample of 101 female and 98 male students from Ohio State who were registered in an introductory psychology course. Her aim was to study the relationship between vocational indecision and psychological constructs such as fear of
success and locus of control. The results of Taylor's research demonstrated that as career indecision increased, so did the level of fear of success and external locus of control. In addition Taylor found that students characterized as being less academically able displayed more vocational indecision.

Limburg (1980) studied a group of 102 male and 114 female undergraduate students at Tennessee State University. Her results clearly showed that the CDS differentiated decided and undecided students. In addition, she found that students seeking counselling scored higher on the CDS than non-seekers, indicating greater indecision in the former group.

Osipow and Schweikert (1979) predicted that there would be a relationship between the scores on Harren's scale (ACDM) and CDS scores. A sample of 43 males and 76 female freshman students living in a residence hall focusing on career exploration were used in their study. The results demonstrate an overall correlation between the scores on the CDS and ACDM (-.265). The direction of the correlations was also as predicted; for example, the CDS was negatively correlated with planfulness. The fact that both scales are measuring similar network of career events gives evidence of concurrent validity.

Hartman (1980) studied 99 Master's degree counselling students and 65 advanced counselling students. He found that the CDS relates to state-trait anxiety in that higher scorers on the CDS scored higher on state anxiety and were more undecided than low anxiety scorers. The same phenomena existed for the trait anxiety group: students higher on trait anxiety were more undecided than those characterized as having a low trait anxiety score. Students with an external locus of control were more undecided than those with an internal locus of control.

Rogers (1980) studied the career decision of 175 male college students. He reported that career indecision and mental abilities were not highly correlated. He also reported a significant positive correlation between the CDS and the Holland and Holland Vocational Indecision Scale (1977) which is an indication of convergent validity.

As the above mentioned studies indicate, the CDS possesses attributes of reliability and validity that are certainly interesting. It
was therefore believed that such a test was worth retaining for this dissertation. In addition to these considerations, college students are largely represented in the various groups studied with this instrument.

3.4 Testing procedures

All of the 142 students of the original sample were sent a letter asking them to participate in a research project dealing with CHOICES. The students were asked to meet the counsellor in order to indicate whether they would participate. It was made clear that the research would go on after school hours, and that the students would be asked to invest about five hours of their time. Of the 142 students originally asked to participate 129 did in fact respond positively to the request.

A random selection was made to form six groups of approximately 20 students. The reason for forming six groups was based on the available computer time. Only twenty students per week could use the computers. At the beginning of each week one of the six groups was invited to a testing session and an information session on CHOICES. The students were given the option to attend the 12 o'clock information session or the 1 o'clock information session on the respective Tuesday. Approximately 90% of the students at St. Lawrence have a spare period during the 12:00 to 2:00 o'clock time block.

Upon entering the session the students were asked to complete 3 tests: The Vocational Identity Scale, the Career Decision Scale and the State and Trait Anxiety Inventory Form Y2. In addition the students were asked to answer the question «What career are you aspiring to?» Once the tests were completed, the students were introduced to CHOICES with the use of a Video Tape produced by Canadian Systems Group, owners of CHOICES.

The information video tape lasted 22 minutes. This video gave the students the necessary information needed to work on CHOICES. Once the video tape was completed, the students were each given a CHOICES guidebook. The Guidebook's relative importance was described in the above mentioned video tape. The students were asked to sign up for their computer time (Friday, Saturday or Sunday) before leaving the information session. If students did not show up at the registered time
they were called by phone. Sunday night of each week was reserved for such students.

The students were instructed to spend 90 minutes on the computer. Most students respected this time frame. During the scheduled period the author of this dissertation was always present for the students and available to answer questions.

The 90 minute time frame was determined based on past experience with CHOICES users in 5 different Quebec CEGEPS. The counsellors of these CEGEPS indicated to the author that on the average, the students spend about 90 minutes on the computer.

The students left the computer room with their entire CHOICES conversation on hard copy. They were encouraged to read it over and study the information.

Six weeks after their work on CHOICES, the students were asked to complete the Vocational Identity Scale and the Career Decision Scale. In addition, they were asked once more to answer the question: «What occupation are you aspiring to?» Four of the students did not write the post tests. Two of these students had left the college and the two others indicated having schedule problems. In addition, four students who had agreed to participate finally could not find the time to go through the entire experiment. Consequently, the final group was made up of 121 subjects. (See Table 5) Students were then thanked for their participation.

| TABLE 5 |
| Final Sample in Terms of Sex, Program, and Decision Making Style |
| (N=121) |

<table>
<thead>
<tr>
<th></th>
<th>Rational Decision Making</th>
<th>Intuitive Decision Making</th>
<th>Dependant Decision Making</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>55</td>
<td>18</td>
<td>15</td>
</tr>
<tr>
<td>Female</td>
<td>66</td>
<td>23</td>
<td>16</td>
</tr>
<tr>
<td>Social Science</td>
<td>36</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>Commerce</td>
<td>23</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>Science (pure and applied and health)</td>
<td>42</td>
<td>16</td>
<td>6</td>
</tr>
<tr>
<td>Languages &amp; Literature</td>
<td>20</td>
<td>8</td>
<td>6</td>
</tr>
</tbody>
</table>
3.5 **Experimental Design**

The experimental design chosen for this dissertation was the classical «pretest-treatment-post-test» design. This design lent itself particularly well to the research objectives of this dissertation. The 8 students who did not complete all stages of the research (pretest, treatment, posttest) were not included in the final sample and consequently were not included in any of the analyses.

3.6 **Analysis of the Data**

All six hypotheses were tested using an analysis of covariance. The ANCOVA was selected because of its ability to help explain posttest differences while taking into account pre-existing differences:

«Analysis of covariance reduces the effects of initial group differences statistically by making compensating adjustments to the posttest means of the two groups.» (Borg & Gall, 1983 p. 683). The homogeneity of slopes was verified in order to see if the research groups could be characterized as having this factor, for if this condition is missing then one can not undertake an analysis of covariance.

Additional analyses (T tests) were performed in order to see if there were significant changes between the pretest and posttest scores for each variable.

The temporal deployment technique was also used in order to present a graphic view of the changes that occurred between the pretests and posttests for all variables in each of the three decision making style groups.
CHAPTER IV

PRESENTATION OF THE RESULTS

In order to be as clear and concise as possible the following chapter is divided into six sections. To begin with, descriptive results are presented for each variable studied then followed by the analyses related to the homogeneity of slopes. Thirdly and fourthly, the results of the analyses of covariance that were performed for each of the six hypotheses are presented. The results from supplementary analyses that were seen as helpful in the interpretation of the results are presented in the fifth section. All of the above were done in accordance to what was suggested in the previous chapter. Finally the temporal deployment technique as it refers to this specific thesis is introduced.

4.1 Descriptive results about the variables studied

There were 41 students identified as being part of the rational decision making style group (table 6). On the variable of identity (MVS) the scores on the pretest ranged from 1 to 18 with a mean score of 8.15 and a standard deviation of 4.42. On the posttest, the scores ranged from 2 to 18 with a mean score of 9.56 and a standard deviation of 3.10.

On the variable of decidedness (DEC) the scores ranged on the pretest from 18 to 47 with a mean score of 33.58 and a standard deviation of 7.66. The posttest scores ranged from 17 to 49 with a mean score of 32.07 and a standard deviation of 8.39.
The test results for the person-environment congruence variable ranged from 0 to 8 on both the pre and posttests. The mean score for the pretest was 4.34 and 4.20 for the posttest with standard deviations of 1.56 and 2.01 respectively. As indicated in the second chapter, this dissertation is also interested in the anxiety scores of students categorized as rational. The scores on the anxiety scale ranged from 26 to 57 with a mean score of 39.31 and a standard deviation of 7.95. Based on the results, 23 students were classified as being part of the high anxiety (79th percentile and higher) or low anxiety (29th percentile and lower) group and 18 were classified as moderately anxious (between the 79th percentile and 29th percentile based on the normative freshman college student sample, Spielberger et al 1983). Because of the small number of subjects included in the low anxiety (N=10) and high anxiety (N=13) groups it was deemed necessary for statistical reasons to combine them into one group of 23.

**TABLE 6**

Descriptive Results of the Pretests and Posttests for the Rational Decision Making Style Group on the Variables of Identity, Decidedness and Person-Environment Congruence, and Descriptive Results on the Variable of Anxiety (N=41).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Score Obtained</th>
<th>Possible Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MVS - Pretest</td>
<td>8.15</td>
<td>4.42</td>
<td>1</td>
<td>18</td>
</tr>
<tr>
<td>MVS - Posttest</td>
<td>9.56</td>
<td>3.10</td>
<td>2</td>
<td>18</td>
</tr>
<tr>
<td>Decidedness</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DEC - Pretest</td>
<td>33.58</td>
<td>7.66</td>
<td>18</td>
<td>47</td>
</tr>
<tr>
<td>DEC - Posttest</td>
<td>32.07</td>
<td>8.39</td>
<td>17</td>
<td>49</td>
</tr>
<tr>
<td>Person - Environment Congruence</td>
<td>4.34</td>
<td>1.56</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Cong. Pretest</td>
<td>4.20</td>
<td>2.01</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Anxiety</td>
<td>39.31</td>
<td>7.95</td>
<td>26</td>
<td>57</td>
</tr>
</tbody>
</table>
The second group was the intuitive decision making style group, composed of 31 students (Table 7). On the variable of identity (MVS), the scores on the pretest ranged from 3 to 16 with a mean score of 8.23 and a standard deviation of 3.22. For the posttest, the scores ranged from 1 to 17 with a mean of 9.94 and a standard deviation of 3.01.

On the variable of decidedness, the intuitive group had scores on the pretest ranging from 20 to 47 with a mean score of 34.77 and a standard deviation of 6.49. On the posttest, the scores ranged from 16 to 47 with a mean score of 31.94 and a standard deviation of 7.25.

The person-environment congruence variable had scores ranging from 0-8 on both the pretests and posttests. The mean score for the pretests was 4.06 with a standard deviation of 2.11. The posttest results indicate a mean score of 3.55 and a standard deviation of 2.00.

The scores on the anxiety scale ranged from 29 to 68 with a mean of 41.10 and a standard deviation of 11.04

TABLE 7

Descriptive Results of the Pretests and Posttests for the Intuitive Decision Making Style Group on the Variables of Identity, Decidedness, and Person-Environment Congruence, and Descriptive Results on the Variable of Anxiety (N=31).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Score Obtained</th>
<th>Possible Score Obtained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identity MVS - Pretest</td>
<td>8.23</td>
<td>3.22</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>Identity MVS - Posttest</td>
<td>9.94</td>
<td>3.01</td>
<td>1</td>
<td>17</td>
</tr>
<tr>
<td>Decidedness DEC - Pretest</td>
<td>34.77</td>
<td>6.49</td>
<td>20</td>
<td>47</td>
</tr>
<tr>
<td>Decidedness DEC - Posttest</td>
<td>31.94</td>
<td>7.25</td>
<td>16</td>
<td>47</td>
</tr>
<tr>
<td>Person-Environment Congruence Cong. Pretest</td>
<td>4.06</td>
<td>2.11</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Person-Environment Congruence Cong. Posttest</td>
<td>3.55</td>
<td>2.00</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Anxiety</td>
<td>41.10</td>
<td>11.04</td>
<td>29</td>
<td>68</td>
</tr>
</tbody>
</table>
The final group was made up of 49 students who were characterized as being part of the dependant decision making style group (Table 8). The scores on the identity scale (MVS) ranged on the pretest from 0 to 16 and from 0 to 17 on the posttest. The mean score for the pretest was 7.53 with a standard deviation of 4.01. For the posttest, the mean score was 9.71 with a standard deviation of 3.11. On the variable of decidedness (DEC), the scores on the pretest ranged from 16 to 44 with a mean score of 34.16 and a standard deviation of 6.31. The mean score on the posttest was 33.63 with a standard deviation of 6.29.

In studying the results for the person-environment congruence variable, it was found that scores ranged from 0-8 on both the pretest and posttest. The mean score for the pretest was 3.65 with a standard deviation of 2.43. The posttest results showed a mean score of 3.90 and 2.00 as the standard deviation.

The scores on the anxiety scale ranged from 20 to 61 with a mean score of 42.61 and a standard deviation of 8.42.

**TABLE 8**  
Descriptive Results of the Pretests and Posttests for the Dependant Decision Making Style Group on the Variables of Identity, Decidedness and Person-Environment Congruence, and Descriptive Results on the Variable of Anxiety (N=49).

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>Score Obtained</th>
<th>Possible Score Obtained</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identity MVS - Pretest</td>
<td>7.53</td>
<td>4.01</td>
<td>0</td>
<td>16</td>
</tr>
<tr>
<td>Identity MVS - Posttest</td>
<td>9.71</td>
<td>3.11</td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>Decidedness DEC - Pretest</td>
<td>34.16</td>
<td>6.31</td>
<td>16</td>
<td>44</td>
</tr>
<tr>
<td>Decidedness DEC - Posttest</td>
<td>33.63</td>
<td>6.29</td>
<td>18</td>
<td>44</td>
</tr>
<tr>
<td>Person - Environment Congruence Cong. Pretest</td>
<td>3.65</td>
<td>2.43</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Person - Environment Congruence Cong. Posttest</td>
<td>3.90</td>
<td>2.00</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Anxiety</td>
<td>42.61</td>
<td>8.42</td>
<td>20</td>
<td>61</td>
</tr>
</tbody>
</table>
4.2 Homogeneity of slopes

As discussed in the previous chapter, one must test for homogeneity of slopes before conducting an analysis of covariance. With this in mind, a number of analyses were made. For each dependant variable, the analyses indicated non-significant differences, which consequently leads one to conclude that the groups can be characterized as having homogeneous slopes.

On the variable of identity, the posttest adjusted means were 10.01 for the dependant decision making style, 9.69 for the intuitive group and 9.38 for the rational decision making style group (Table 9). For the variable of decidedness, the adjusted posttest means were 33.55 for the dependant decision making style group, 31.58 for the intuitive decision making style group and 32.43 for the rational decision making style group (Table 9).

The congruence variable had adjusted posttest means of 4.04, 3.50, and 4.01 for dependant, intuitive and rational decision making styles respectively (Table 9).

TABLE 9

<table>
<thead>
<tr>
<th>Dependant Variables</th>
<th>Adjusted Posttest Means of the Dependant Variables (N=121)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Identity:</strong></td>
<td></td>
</tr>
<tr>
<td>Dependant decision making style</td>
<td>10.01</td>
</tr>
<tr>
<td>Intuitive decision making style</td>
<td>9.69</td>
</tr>
<tr>
<td>Rational decision making style</td>
<td>9.38</td>
</tr>
<tr>
<td><strong>Decidedness:</strong></td>
<td></td>
</tr>
<tr>
<td>Dependant decision making style</td>
<td>33.55</td>
</tr>
<tr>
<td>Intuitive decision making style</td>
<td>31.58</td>
</tr>
<tr>
<td>Rational decision making style</td>
<td>32.43</td>
</tr>
<tr>
<td><strong>Person-Environment Congruence:</strong></td>
<td></td>
</tr>
<tr>
<td>Dependant decision making style</td>
<td>4.04</td>
</tr>
<tr>
<td>Intuitive decision making style</td>
<td>3.50</td>
</tr>
<tr>
<td>Rational decision making style</td>
<td>4.01</td>
</tr>
</tbody>
</table>
4.3 Analyses of the data: Major hypotheses

The following section will look at the specific analysis that was done on each of the hypotheses. The hypotheses will be treated in the order they were presented earlier in the thesis.

Hypothesis 1: After exposure to CHOICES and when adjusted for pretest differences, the mean posttest scores of the rational decision makers on a measure of person-environment congruence will be significantly higher than those of the intuitive and dependant decision makers.

The results of the ANCOVA (Table 10) present us with a F value of 1.14 which is non-significant of the .05 level. One must therefore reject the above mentioned hypothesis and conclude that after exposure to CHOICES the rational decision making style group was not significantly different from the intuitive decision making style group and the dependant making style group on the variable of person-environment congruence.

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>PR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>6.8551</td>
<td>2</td>
<td>3.427</td>
<td>1.14</td>
<td>0.32</td>
</tr>
<tr>
<td>Error</td>
<td>351.1443</td>
<td>117</td>
<td>3.001</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 2: After exposure to CHOICES and when adjusted for pretest differences, the mean posttest scores of the rational decision maker on a measure of identity will be significantly higher than those of the intuitive and dependant decision makers.

The results of the ANCOVA (Table 11) show an F value of .46 which is non-significant at the .05 level.
One must therefore reject the above-mentioned hypothesis, for no significant differences were found in this specific research between the rational, dependant and intuitive styles on the variable of identity when using the pretest score as the covariate.

### TABLE 11

Results of the Analysis of Covariance for the Variable of Identity (N=121)

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>PR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>9.1033</td>
<td>2</td>
<td>4.5516</td>
<td>.46</td>
<td>0.63</td>
</tr>
<tr>
<td>Error</td>
<td>1131.7368</td>
<td>117</td>
<td>9.6730</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 3: After exposure to CHOICES and when adjusted for pretest differences, the mean posttest scores of the rational decision makers on a measure of decidedness will be significantly higher than those of the intuitive and dependant decision makers.

The results of the ANCOVA (Table 12) present us with an F value of 1.02, which is non-significant at a .05 level. Consequently, the above-mentioned hypothesis is rejected. Therefore, the rational decision making style group did not prove to be significantly different from the two other groups with respect to the variable of decidedness.

### TABLE 12

Results of the Analysis of Covariance for the Variable of Decidedness. (N=121)

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>PR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>76.7977</td>
<td>2</td>
<td>38.398</td>
<td>1.02</td>
<td>0.36</td>
</tr>
<tr>
<td>Error</td>
<td>4388.1032</td>
<td>117</td>
<td>37.504</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
4.4 Analyses of the data: Secondary hypotheses

Hypothesis 4: After exposure to CHOICES, and when adjusted for pretest differences, the mean posttest scores, on a measure of person-environment congruence, of the rational decision makers characterized as moderately anxious will be significantly higher than those of the rational decision makers characterized as having low or high levels of anxiety.

The results of the analysis of covariance present us with adjusted posttest means for the person-environment congruence variable of 4.19 for the low and high anxiety groups and of 4.26 for the moderately anxious group. In this specific analysis of covariance, the pretest congruence score was the covariate. An F value of .02 was found which is non-significant at the .05 level. (Table 13) These findings indicate that the above hypothesis must be rejected.

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>PR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>.05807</td>
<td>1</td>
<td>0.5807</td>
<td>.02</td>
<td>0.90</td>
</tr>
<tr>
<td>Error</td>
<td>127.9694</td>
<td>38</td>
<td>3.3676</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 5: After exposure to CHOICES, and when adjusted for pretest differences, the mean posttest scores, on a measure of identity, of the rational decision makers characterized as moderately anxious will be significantly higher than those of the rational decision makers characterized as having low or high levels of anxiety.

The results of this analysis of covariance show adjusted posttest mean scores of 8.82 for the high and low anxiety group and of 7.88 (Table 14) for the moderate anxiety group on the identity variable. In addition, the F value is 1.33 which is non-significant at .05 level of significance. Consequently, according to these results, the above-mentioned hypothesis must be rejected.
Results of the Analysis of Covariance for the High/Low Anxiety Group Versus the Moderately Anxious Group on the Variable of Identity for the Rational Decision Makers. (N=41)

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>PR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>8.831</td>
<td>1</td>
<td>8.831</td>
<td>1.33</td>
<td>.26</td>
</tr>
<tr>
<td>Error</td>
<td>252.126</td>
<td>38</td>
<td>6.63</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hypothesis 6: After exposure to CHOICES, and when adjusted for pretest differences, the mean posttest scores, on a measure of decidedness, of the rational decision makers characterized as moderately anxious will be significantly higher than those of the rational decision makers characterized as having low or high levels of anxiety.

The adjusted posttest means on the variable of decidedness for the students characterized as having high or low levels of anxiety was 32.48 and 31.54 for students characterized as being moderately anxious. The analysis of covariance (Table 15) using pretest scores of decidedness as a covariate resulted in an F value of .27, which is non-significant at the .05 level. Therefore, hypothesis 6 must be rejected.

Results of the Analysis of Covariance for the High/Low Anxiety Group Versus the Moderately Anxious Group on the Variable of Decidedness for the Rational Decision Makers. (N=41)

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>DF</th>
<th>MS</th>
<th>F</th>
<th>PR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>8.784</td>
<td>1</td>
<td>8.784</td>
<td>0.27</td>
<td>.60</td>
</tr>
<tr>
<td>Error</td>
<td>1217.806</td>
<td>38</td>
<td>32.0475</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Therefore, to summarize, all six hypotheses could not be retained because of the non-significant results on the analyses of covariance. It will be the function of the following chapter to attempt to explain these findings.
4.5 Supplementary analyses: Paired T test

Based on the literature presented earlier, it was concluded, although this was not a part of the rationale of this study, that the students exposed to «CHOICES» would benefit from it on measures of identity, decidedness, and person-environment congruence. In other words, there would be a significant gain when comparing the pretest to the posttest scores on the three above-mentioned variables.

The statistical procedure utilized to measure the difference between the pretest and the posttest was a paired T test.

A paired T test comparing the pretest scores and posttest scores for the total group of 121 on each of the three variables (Identity, Decidedness and Person-Environment Congruence) was performed. The results (shown in Table 16) demonstrate that there were statistically significant changes with respect to the variables of decidedness and identity.

TABLE 16

Effect of CHOICES on Decidedness, Identity and Person-Environment Congruence in the Total Experimental Group. (N=121)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (Pretest)</th>
<th>Mean (Posttest)</th>
<th>Mean (of the paired difference)</th>
<th>STD error (of the paired difference)</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decidedness</td>
<td>34.22</td>
<td>32.38</td>
<td>-1.84</td>
<td>.61</td>
<td>-2.50</td>
<td>.0137*</td>
</tr>
<tr>
<td>Identity</td>
<td>7.97</td>
<td>9.73</td>
<td>1.77</td>
<td>.29</td>
<td>6.21</td>
<td>.0001***</td>
</tr>
<tr>
<td>Person-Environment</td>
<td>4.02</td>
<td>3.88</td>
<td>-0.13</td>
<td>.18</td>
<td>.40</td>
<td>.68</td>
</tr>
<tr>
<td>Congruence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*: P < .05  ****: p = .0001
The rational decision making group demonstrated significant gains between the pretest and the posttest on the variable of identity, as shown in Table 17. As can also be seen in Table 17, there were no significant differences between the pretest scores and the posttest scores on the measures of person-environment congruence and decidedness.

**TABLE 17**

Effects of CHOICES on Decidedness, Identity and Congruence in the Rational Decision Making Style Group. (N=41)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (Pretest)</th>
<th>Mean (Posttest)</th>
<th>Mean (of the paired difference)</th>
<th>STD error (of the paired difference)</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decidedness</td>
<td>33.58</td>
<td>32.07</td>
<td>-1.5121</td>
<td>.8890</td>
<td>-1.70</td>
<td>.0967</td>
</tr>
<tr>
<td>Identity</td>
<td>8.15</td>
<td>9.56</td>
<td>1.4146</td>
<td>.5636</td>
<td>3.67</td>
<td>.0007***</td>
</tr>
<tr>
<td>Person-Environment</td>
<td>4.34</td>
<td>4.22</td>
<td>-0.1219</td>
<td>0.2967</td>
<td>-0.41</td>
<td>.6833</td>
</tr>
<tr>
<td>Congruence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

***: p < .001

The next group that was included in the T test analysis was the one characterized as being an intuitive decision making style group. For this group, both the decidedness variable and identity variable did show significant differences when comparing the pretest scores with the posttest scores on each of these variables (Table 18). The changes occurred in the expected direction: the differences between the means for the decidedness variable was a negative change, whereas the difference noted for the identity variable was in the positive direction. The differences between the pre and posttests on the measure of person-environment congruence was found to be non significant.
### TABLE 18

Effect of CHOICES on Decidedness, Identity and Congruence in the Intuitive Decision Making Style Group.  
(N=31)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (Pretest)</th>
<th>Mean (Posttest)</th>
<th>Mean (of the paired difference)</th>
<th>STD error (of the paired difference)</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decidedness</td>
<td>34.77</td>
<td>31.94</td>
<td>-2.83</td>
<td>1.3780</td>
<td>-2.06</td>
<td>.0482*</td>
</tr>
<tr>
<td>Identity</td>
<td>8.23</td>
<td>9.94</td>
<td>1.709</td>
<td>0.6032</td>
<td>2.83</td>
<td>.0081**</td>
</tr>
<tr>
<td>Person-Environment</td>
<td>4.06</td>
<td>3.55</td>
<td>-0.516</td>
<td>0.3466</td>
<td>-1.49</td>
<td>.1462</td>
</tr>
<tr>
<td>Congruence</td>
<td>9.94</td>
<td>9.94</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>1.00</td>
</tr>
</tbody>
</table>

*: p < .05  **: p < .01

The results of the paired T test (Table 19) for the dependant decision making style group indicated a significant difference with respect to the decidedness and identity variables. These differences were a gain in the expected direction.

### TABLE 19

Effect of CHOICES on Decidedness, Identity and Congruence in the Dependant Decision Making Style Group.  
(N=49)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean (Pretest)</th>
<th>Mean (Posttest)</th>
<th>Mean (of the paired difference)</th>
<th>STD error (of the paired difference)</th>
<th>T</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decidedness</td>
<td>34.32</td>
<td>33.16</td>
<td>-1.163</td>
<td>.9707</td>
<td>-0.71</td>
<td>.04782*</td>
</tr>
<tr>
<td>Identity</td>
<td>7.53</td>
<td>9.71</td>
<td>2.1836</td>
<td>.3528</td>
<td>4.23</td>
<td>.0001****</td>
</tr>
<tr>
<td>Person-Environment</td>
<td>3.65</td>
<td>3.90</td>
<td>0.244</td>
<td>.3107</td>
<td>0.79</td>
<td>.4345</td>
</tr>
<tr>
<td>Congruence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*: p < .05  ****: p = .0001
4.6 Temporal deployment technique

The temporal deployment technique was used in order to give a graphic view of the differences between the pretest and posttest for each of the three variables for each respective group. According to Bernier, Morissette and Valiquette (1983), this technique is superior to many other graphic techniques for it clearly shows the relationship existing between the pretest scores and the posttest scores. The diagrams are made up of two parallel axes. The left axis represents the pretest scores and the right axis represents the posttest scores. A line drawn from the left to the right axes shows the direction of the change between the pretest and the posttest for each individual. Thicker lines indicate that more than one person had the same score. In figures 2 through 10, the number of subject per thick line will be represented by an asterix. When no asterix appears one is to conclude that only one subject had the specified score. Each asterix represents the number of subjects (beyond one) that had the specified score. Consequently one asterix would indicate that 2 subjects had the same score, 2 asterixs would indicate that three subjects had the same score. As will be seen in the following chapter, the temporal deployment technique also helps in presenting a detailed explanation of the results.
In viewing Figure 2 one can immediately see that the rational decision making style group shows gains between the pretest and the posttest on the measure of identity for most of the subjects.

**FIGURE 2**

Rational Decision-Making Style Group
Identity Scores (Pretest - Posttest)
(N=41)
Figure 3 shows that most of the subjects (rational decision makers) saw their scores decrease between the administration of the pretest and posttest on the variable of decidedness. This change is in the desired direction, for the higher the score the more undecided is the individual.

FIGURE 3
Rational Decision-Making Style Group
Decidedness Scores (Pretest - Posttest)
(N=41)
Figure 4, dealing with the person-environment congruence variable, is difficult to interpret. However, one can conclude that many subjects in the rational decision making style group had scores that did not change between the time they took the pretest and they took their posttest.

FIGURE 4
Rational Decision-Making Style Group
Person-Environment Congruence Scores (Pretest - Posttest) (N=41)
In reviewing Figure 5, which deals with the identity variable for the intuitive decision making style group, one can see a clear upward swing between the pretest scores and the posttest scores. This evaluation would suggest that many subjects in this group knew themselves better after they used CHOICES.

FIGURE 5
Intuitive Decision-Making Style Group
Identity Scores (Pretest - Posttest)
(N=31)
Figure 6 shows that there is a downward change between the pretest and the posttest. This would indicate that the majority of subjects in the intuitive decision making group were more decided with reference to their occupational choice after they used CHOICES.

FIGURE 6
Intuitive Decision-Making Style Group
Decidedness Scores (Pretest - Posttest)
(N=31)
On the variable of person-environment congruence, Figure 7 demonstrates that when there was a change between the pretest and the posttest, a majority of subjects tended to see their scores go down.

**FIGURE 7**

Intuitive Decision-Making Style Group
Person-Environment Congruence Scores (Pretest - Posttest)
(N-31)
The graph (Figure 8) depicting the identity scores for the dependant decision making style group clearly shows that most individuals improved their scores between the time they took the pretest and the time they took the posttest.

FIGURE 8
Dependant Decision-Making Style Group
Identity Scores (Pretest - Posttest)
(N=49)
Figure 9 shows that most of the scores on the decidedness variable changed in a direction indicating that students were more decided after they used CHOICES than before.

FIGURE 9
Dependent Decision-Making Style Group
Decidedness Scores (Pretest-Posttest)
(N=49)
Finally, graphing the person-environment congruence variable (Figure 10) shows that most scores stayed the same or improved. Again, this is an encouraging result vis à vis the effects of CHOICES on its users.

FIGURE 10
Dependent Decision-Making Style Group
Person-Environment Congruence Scores (Pretest - Posttest)  
(N=49)

The following chapter will present an interpretation of the results of the statistical analyses presented above.
CHAPTER V

DISCUSSION OF THE RESULTS

This chapter will present a discussion that is based on the results given in the preceding chapter. This will be done by constantly referring back to the objectives of this study and its theoretical base as presented in the first and second chapters.

5.1 Discussion of the results: Hypotheses 1, 2, 3

To summarize the first three hypotheses presented earlier, it was proposed that, after exposure to CHOICES, the rational decision makers would do better than their intuitive and dependant decision making counterparts with respect to person-environment congruence (Hypothesis 1), identity (Hypothesis 2) and decidedness (Hypothesis 3). In short, the formulation of these hypotheses was based on research which showed that the rational decision makers do best in counselling interventions that are based on logic and precise information (Krumboltz et al, 1979; Rubinton, 1980). Leong, Leong and Hoffman (1987) suggested that computer assisted counselling would be particularly well suited for rational decision makers.

Based on the findings of this particular dissertation, it is very clear that the rational decision makers did not differ from the intuitive and dependant decision makers with respect to changes on the variables of person-environment congruence, identity and decidedness after being
exposed to CHOICES. Such findings contrary to the research findings of what the literature review in CHAPTER II could lead to expect.

In trying to explain why this happened, one is under the obligation to review the test chosen which differentiated the rational decision makers from the intuitive and dependant decision makers. An additional review of the Assessment of Career Decision Making was undertaken. Upon examination, it seemed clear that the discrepancy between what was hypothesized and what the results showed did not lie in this particular test, for most of the research dealing with this test has been exceptionally supportive of it (Holland, Magoon & Spokane, 1981).

In searching for other explanations one is presented with the variable of counselling expectations: Did the subjects feel CHOICES had helped them as they expected, or did they feel that it was a useless tool? Research has shown that when client's expectations are not met they tend to give up on the counselling process prematurely (Goin, Yamamoto & Silverman, 1965; Heilbrun, 1970; Heine & Trosman, 1960; Overall & Aronson, 1963). Is it possible that CHOICES did not meet the subject's expectations?

A second concern that comes to mind is whether or not the students chosen for the research felt they needed help with their career planning. There is certainly truth in the statement that to change you must want to change. Theoretically these students were given the option to participate or not in this research project. However, one must not forget that these students were only beginning CEGEP, and that they could feel that to take part in a research project could be viewed by the CEGEP personnel as an indication that they were being cooperative. Experience shows that most students at this point in their CEGEP life are very cooperative.

Another factor that may shed additional light on the results relates to a recent finding by Blustien (1987) who states that students who are in a university oriented program may not need a rational systematic intervention in attempting to resolve questions of a vocational nature. It is believed that the educational and social background of these students has provided them with opportunities that diminish the need to approach major decisions in a systematic way. These students often
have access to extra-curricular activities, part-time jobs, exposure to a variety of careers and a number of social supports, all of which being conducive to vocational maturity. In relationship to this thesis, one could possibly suggest that the rational decision makers in this research were not necessarily seeking what CHOICES was offering, which is a systematic approach to counselling, and that this is possibly why they didn't do significantly better than the intuitive and dependant decision makers. All students who participated in this particular research project were university bound.

Fretz (1981) has stressed the importance of attending to the characteristics and attributes of a given population when studying the effectiveness of certain counselling interventions. Decision making style can certainly be categorized as a relevant characteristic. However, there are a number of other attributes such as aptitudes, learning styles, locus of control and cognitive complexity that, although potentially important, were not taken into consideration in this thesis. This was due to the practical, economic and time restraints of a doctoral thesis.

Melhus, Hershenson and Vermillion (1973) add another explanation when they state that students with lower abilities (aptitudes) tend to make greater gains in knowledge about their occupational choices when they work with a counsellor as compared to working with a computer system. Knowing the intellectual aptitudes of the students involved in this research may have added an important dimension to the study.

The age of electronic computers was accompanied by a theory of information processing (Tyler, 1978). The cognitive developmental theorist adapted this theory so as it could be used in the study of psychology. It would seem important to investigate this theory in order to understand why the changes recorded in the students who used CHOICES did not occur in the way which was predicted. Why is it that the rational decision makers did not do better than the dependent and intuitive decision makers? An information processing view of the individual may be necessary in understanding the outcomes. Bieri (1971) suggests «that man learns relatively fixed patterns for experiencing his world-patterns which one may refer to as cognitive structures» (p. 178). In other words, individuals possess filters which
determine how one translates and interacts with the outside world. Such filters organize the information about the environment. Based on this theory it would seem unreasonable to assume that giving students information about careers is sufficient in helping them with career choice (Peavey, 1984).

Words such as scheme, conceptual system, and personal construct all describe the internal organizing structure found in each individual. It would be impossible to deal with all of the cognitive style constructs. However, a few will be presented which seem particularly related to the context of this study.

The study of information processing has been partly responsible for the visualizer-verbalizer concept (Tyler, 1978). In general terms, this concept relates to the idea that individuals encode information visually or verbally. Relating this concept to the present dissertation leads one to question whether CHOICES is adapted to serving the needs of both visualizers and verbalizers. It seems possible that a visualizer would gain more from CHOICES due to the fact that all information is presented on a computer screen.

Bodden (1970) mentions that the higher the individual's level of cognitive complexity, the better prepared he or she is to differentiate between occupations. Consequently he or she will have a tendency to make more adequate career choices. Relating this concept to this dissertation leads one to question the effect cognitive complexity would have on the rational, intuitive and dependent decision makers who are working on CHOICES.

Another construct which may be related to the outcome of this research is the «locus of control» construct (Rotter, 1966). This concept deals with an individual's perception as to the control he or she has over what happens in his or her life. Individuals who have an external locus of control feel they have very little power over what happens to them. The individual with an internal locus of control feels he or she can determine outcomes. There is some empirical evidence which suggests that individuals with an internal locus of control tend to have a higher level of career maturity (Lokan, Boss & Patsula, 1982). In relating this finding to the present dissertation, it is quite possible that students characterized as having an internal locus of control would
be more willing to get involved with CHOICES. The students characterized as having an external locus of control on the other hand would see very little usefulness in planning a career path for they have little to do with what will eventually happen in the future. It is therefore possible that this group would not participate actively in the CHOICES program.

It seems evident from the discussion of the above-mentioned constructs that one theory cannot answer all questions related to the complex world of vocational choice (Bujold, 1987). To include all of the cognitive constructs in one research would be impossible, yet this does not diminish their importance nor does it lessen their specific contribution. In this dissertation, one is faced with the reality that decision making styles do not function alone but rather work together with other cognitive constructs.

Before moving on to the next section of this chapter, there is one last avenue which may be worth investigating. Earlier in this dissertation, it was shown that CHOICES is a system which is based on logic. In order to derive the most from the system, one must work within the computer's logic. The author of this dissertation sees a distinct possibility that CHOICES indirectly teaches its users to use a rational approach to career decision making. While students are working on CHOICES, they are possibly being trained to be rational decision makers. In a recent research project, Krumboltz, Kinnier, Rude, Scherba and Hamel (1986) demonstrated that rational subjects benefited the least from rational training intervention program. With this in mind, it may be possible that both the intuitive decision makers and dependant decision makers benefited from CHOICES. The latter may have offered these «individuals an escape from inordinate dependency or submission to fate or impulse by providing them with a hitherto unknown decision making strategy.» (Krumboltz et al, 1986, p. 5) It could be hypothesized that rational decision makers showed improvements as far as their career development is concerned, but did so because of reasons not related to CHOICES. Subsequently, all these suggestions may explain why there was no significant difference between the decision making styles on the specific variables studied in this dissertation.
5.2 Supplementary analyses: Hypotheses 1, 2, 3

It is clear that the author of this dissertation wanted to see if CHOICES would help its users in their career search. By comparing the pre-test scores with the post-test scores on each of the variables it was hoped that one would find gain scores.

The first variable studied in the supplementary analyses was the person-environment congruence variable. The results of the T test for all decision making groups clearly shows that there was no significant difference between the pre-test and post-test on the measure of person-environment congruence.

On the other hand, it was found that the majority of the students who participated in the experimentation improved their scores on the variable of identity. This was true for all of the three decision making groups. A T score for the global group (N=121) of 6.21 was found to be significant at the .0001 level. This finding is in agreement with other research in the area of computer-assisted counselling (Katz & Shatkin 1980; Cairo 1983; Harris, 1974; Maze & Cummings 1982; and Mallory, Drake & Holder, 1979).

When looking at the 121 students tested it was also found that there was a statistically significant difference on the variable of decidedness (T = -2.50, significant at the .05 level) between the pretest and the posttest. In dividing the global group of 121 students into the three decision making style groups, it was found that both the intuitive and dependent groups showed significant differences on the variable of decidedness between their respective pretests and posttests. This was not found for the rational decision group; however, the difference between the pretest and posttest did approach significance (P=.097) and was in the expected direction. Consequently, one can conclude that as a whole, the students tested were found to be more decided about their career plans after they used CHOICES. This finding goes in the same direction of those presented by a number of researchers (Impelletteri, 1968; Harris, 1974; Chapman, Norris, Katz and Pears, 1977; and Myers, Lindeman, Forrest and Super, 1971.)

The findings dealing specifically with person-environment congruence go contrary to what Holland and Gottfredson (1976) and
Cairo (1979) reported. In trying to understand this discrepancy there are a number of explanations that seem worth investigating. First of all, a substantial number of subjects did not change career choices between the time they were administered the pre-test and the time they were administered the posttest, as it is revealed in the temporal deployment technique. It is possible that the period of six weeks between the administrations of the tests did not give the students sufficient time to act upon computer generated suggestions. Some students may not have been ready to make changes. It is important to stress that these students were in their first weeks of CEGEP life. They had not yet been confronted with information such as grades that would have possibly helped motivate a change. In addition, there was no sense of urgency to make a career change for they still had two years of CEGEP. King's (1978) emphasis on the importance of disequilibrium or dissonance in making people alter their cognitive structure to admit more complexity seems relevant when one considers the students who participated in this research. It is possible to hypothesize that at this point in the year, the environmental stimuli were not threatening. Consequently, although knowledge dimension were altered very little decision making took place.

Furthermore for many students in this particular research, the choice of occupations was limited to very prestigious types of occupations. Students tend to value these socially accepted occupations and tend not to want to give them up very easily.

It would seem fair to conclude that to make a person move towards a more congruent career choice may be very difficult even with the help of a computer-assisted type of intervention. The need for support and encouragement by a counsellor, a parent, or teachers is certainly a factor that cannot be neglected in a student's decision making process. However, the design of this research did not include the study of the effects of the above-mentioned factors. The time limits imposed upon the research is certainly a factor that effects its outcomes.
5.3 Discussion of the results of the secondary hypotheses

The formulation of the three secondary hypotheses presented in this dissertation was based on clear empirical evidence demonstrating that anxiety plays an important role in the career decision making process (Berger-Gross, Kahn & Weare, 1983; Fuqua & Hartman, 1983; Fuqua, Seaworth & Newman, 1987; Hawkins, Bradley & White, 1977; Janis & Mann, 1977; Harren, 1979). The superiority of the rational decision making style in terms of career decision making has been documented in a number of research projects (Harren, 1979). However, it was felt that even this specific decision making style group would be affected directly or indirectly by the variable of anxiety. More specifically, the low or high anxiety prone subjects would not do as well as the moderately anxious group with respect to the measures of person-environment congruence, identity and decidedness after having used CHOICES.

In spite of the supportive research presented in Chapter II, the secondary hypotheses were not supported. In other words, after exposure to CHOICES, there was no significant difference between the low/high anxiety group and the moderately anxious group when comparing pre-test scores with post-test scores on the measures of person-environment congruence (Hypothesis 4), identity (Hypothesis 5) and decidedness (Hypothesis 6).

In reviewing the instrument used to measure anxiety, the STAI, one must realize that it suffers some of the same weaknesses that many self-report tests demonstrate (Spielberger, 1983). Over half of the items in the STAI represent negative characteristics. Many people feel reluctant to admit things such as, "I feel like a failure," "I feel inadequate," "I wish I could be as happy as others seem to be." These are examples of the items presented in the STAI, Y2 form. Moreover, Fuqua, Seaworth and Newman (1987) suggest that "operationalizing anxiety in terms of one or even two instruments may not allow for a sufficiently broad definition of the construct" (p. 176). The latter statement would suggest that this specific research project
may have a methodological weakness for it only used one instrument to measure anxiety.

The students used in this research possibly had strong reasons for being less than truthful in their responses. One must not lose track of the fact that all these were first year students who had never been exposed to CEGEP. These students for the most part had never been part of a research project and may not have even clearly realized why people do research. Although the students were told about the confidentiality of the results, could they really trust the researcher? It is very hard to measure the student's level of trust, yet it is this trust that is necessary if the results are to be seen as meaningful (Spielberger, 1983).

The next factor that must be taken into consideration when interpreting the results is the fact that the group representing the low/high anxiety level was made up of 23 subjects and the moderately anxious group was made up of 18 subjects. These relatively small groups add to the difficulty of using statistical analyses.

The specific type of anxiety which was measured in this research is another factor which may explain the findings. Spielberger (1983) mentions two types of anxiety: trait anxiety, which is described as a relatively stable individual characteristic related to anxiety proneness, whereas state anxiety refers to a transitory emotional experience which increases in response to different kinds of stress. In this research the students were tested only on trait anxiety, for it was believed important to view vocational choice as a developmental process spanning over one's lifetime (Super, 1953; Crites, 1969). Other authors have suggested, however, that there is such a thing as vocational anxiety which is characterized as a form of state anxiety present when one is attempting to make a vocational choice (Pushkoff, 1978). It may therefore be more appropriate to see anxiety as a situationally specific state as compared to a general personality characteristic.

It is possible that CHOICES caused students' reactions that increased their level of state anxiety. Consequently, this could possibly explain why there was little change when comparing pretest results to posttest results on the variables of person-environment congruence, identity, and decidedness. Measuring state anxiety would
possibly have given an additional clue as to how anxiety is related to vocational decision making.

There is an additional construct of anxiety which may help explain the results found in this research. It is believed that the growth of computers has led to concerns about one's emotional reaction to them. The concept of computer anxiety is an attempt to put a label on this phenomenon (Cambre & Cook, 1985). Raub (1981) defines computer anxiety as «the complex emotional reactions that are evoked in individuals who interpret computers as personally threatening (p. 19).» Maurer (1983) defines computer anxiety as «the fear and apprehension felt by an individual when considering the implications of utilizing computer technology ((p. 17).» Computer anxiety, like vocational anxiety, has been described as a form of state anxiety as opposed to trait anxiety (Cambre & Cook, 1985).

Based on these findings, it is certainly possible that although a person may be characterized as moderately anxious (trait) his or her score on a measure of computer anxiety may have been high and consequently resulting in very little movement. One's level of computer anxiety may take precedence over one's trait or general anxiety. It may be very difficult to have high technology without high anxiety. It may be necessary to identify, measure, remediate or prevent computer anxiety before a student works on CHOICES.

O'Hare and Tamburri (1986) suggest that coping skills act as moderator between anxiety and career decision making. Coping skills were not addressed in this dissertation. However, understanding this variable may help explain our findings. Goldfried and Trier (1974) found anxiety to be a result of an ineffective coping repertoire. Individuals with effective coping skills do not experience the debilitating effects of anxiety. These individuals are capable of maintaining state anxiety at a moderate level (Janis & Mann, 1977).

In trying to relate coping skills to the present research, one is presented with the possibility that although the individuals in the rational decision making style group were identified prior to using CHOICES as to their level of trait anxiety, they may have had coping skills which helped eliminate the negative effect of anxiety. In the same realm of thought, it is possible that the students identified as
moderately anxious who had not developed coping skills have experienced the debilitating effects of anxiety on career decision making. The next logical step would be to say that without the knowledge of a subject's coping skills it is very difficult to predict how low/high trait anxious students will do compared to the moderately anxious student with respect to person-environment congruence, identity and decidedness after exposure to a computer-assisted counselling system.

The results presented earlier with respect to Hypothesis 1 show that there was very little movement between the time of the pre-test and that of the post-test on the variable of congruence. The fact that there was very little movement to begin with makes it even more difficult to differentiate low/high students from moderately anxious students.

In interpreting the results related to Hypothesis 2 it was mentioned that the students as a whole showed a significant tendency to know themselves better after using CHOICES. In relating the latter hypothesis to Hypothesis 5 (also dealing with identity), one realizes that although the rational students knew themselves better after using CHOICES, there is no significant difference between the low/high anxious students and the moderately anxious on the variable of identity. It is therefore possible that one or more of the previous explanations may account for the fact that both groups moved in basically in a similar fashion.

Jones and Chenery (1980) present us with the results of a research project that may be very much related to Hypothesis 6. These authors believe that within the undecided group, there are a number of sub-groups. The concept of sub-groups grew from a response to the reality that people are undecided for different reasons. There is a need to divide vocational decision into sub-categories if one hopes to «clarify the confusing picture regarding anxiety and vocational indecision» (Jones & Chenery, 1980, p. 475). These authors found certain sub-groups to have a greater tendency to be anxious. An extension of this dissertation could be the inclusion of a number of sub-groups in evaluating how differently these groups react to CHOICES.
To conclude this section, it would seem vital to stress that based on the results of the analyses of the data, trait anxiety is not a construct which can differentiate between those who benefit from CHOICES and those who do not. In other words, a rational decision making student who is characterized as moderately anxious will not necessarily do better than the student characterized as being part of the low/high anxiety group. This would indicate that one's level of trait anxiety does not determine the outcome of a computer-assisted counselling intervention. As presented earlier, constructs such as state anxiety, computer anxiety, and coping behaviour may in fact be better predictors of what outcomes can be expected when a student uses CHOICES.

The final chapter will present a resumé of the research and of its conclusions. It will also underline its limitations, and will identify future research needs which seem important in light of this dissertation.
CHAPTER VI

RESUME, CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

6.1 Resumé and conclusions

The present research had as its general objective the study of computer-assisted counselling, namely CHOICES. More specifically, however, the author wanted to investigate the general hypothesis that certain types of people tend to benefit more from computer-assisted counselling than others. Originally, this hypothesis was based mainly on a perception the author had from working with hundreds of college students who approached career decision making in a systematic way and who were moderately anxious. It was postulated that these students gained more from CHOICES than other types of students. Harren's theory (1979) on decision making styles introduced the author with theoretical and empirical support to the notion that people approach decision making in different ways. Harren identified three types of decision makers: rational, intuitive and dependant. The rational decision making style is said to be used by individuals who make decisions after carefully analyzing all the options. These individuals, in fact, get actively involved in their decision making. The intuitive decision maker, on the other hand, tends to make decisions that are based on what feels good or bad. Simply said, these individuals usually use intuition rather than logic in making decisions. The last style is referred to as the dependant decision making style. This style is made up of individuals who let others make their decisions
for them. Individuals in this group take a passive role with respect to decision making. These three different decision making styles were seen to be very similar to what the author of this research had considered as different decision making types. In addition, Harren (1979) stated that people with low or high anxiety levels had a very difficult time with career decisions. He also states that a moderate level of anxiety was conducive to making good career decisions. Again this researcher tended to support what the author of this research had observed. In addition, there were specific instruments which had been developed that measure decision making styles (ACDM) and anxiety (STAI). This made it possible to operationally define these variables with the support of these high quality instruments.

The next step for the author was to find a way to measure or define what was meant by «profit more from» in terms of vocational theory. What variables would be chosen to assist in deciding whether CHOICES had helped or not?

The works of Holland (1985a) presented strong empirical evidence to suggest that person-environment congruence and identity were variables that were important when measuring gains in vocational choice and so did the works of Osipow and others with respect to decidedness. Generally, it was concluded that if students came away from CHOICES with a better understanding of themselves, being more decided about a career choice and having made a choice of career which was congruent with their personality, then one could be satisfied with the system.

With the above information in mind, this dissertation began by introducing the statement of the problem, followed by a review of the pertinent literature, and the rationale for the research. The hypotheses were then formulated, keeping in mind the objectives which were stated above.

Subsequently, an analyses of the data was done for each hypothesis. In addition, supplementary analyses were conducted in order to better understand and interpret the effects of CHOICES on its users.

Based on the results of the analyses of the data, none of the six hypotheses was supported. On the basis of the results of this research, relation between one's decision making style the outcome of
work done on CHOICES is not supported. There is not one decision making style group that is significantly better suited to work on CHOICES.

In addition, the results of this dissertation also demonstrate that the level of trait anxiety in the rational decision maker does not affect how well he or she will respond to CHOICES.

The supplementary analyses produced results which indicated that most subjects in this research benefited from CHOICES in terms of identity and decidedness. These results were also supported by the graphs presented in chapter IV.

In very practical terms, this research has shown that CHOICES is a very useful counselling tool. It can assist individuals with the complex task of getting to know oneself better and it can help individuals become more decided about their career choice.

The fifth chapter of this dissertation demonstrated that in addition to the above mentioned conclusions, there are a number of possible explanations as to why the six hypotheses were not retained. The limitations inherent in any dissertation made it impossible to measure all the variables mentioned in Chapter V.

6.2 Limitations

With respect to the limitations of this study it is important, besides what has been said, to stress that CHOICES on its own cannot be expected to answer all career related questions. The virtues and advantages of CHOICES were clearly presented in this research. With the support of a number of other studies, it would seem fair to conclude that computer-assisted counselling has become a necessary and welcome addition to any counselling centre. One must keep in mind, however, that this research used first year students in an anglophone college which is situated in a predominantly francophone community. One must question whether this specific group is a true representation of most students registered in the Quebec CEGEP system. By its very nature, the group of students used for this research may be very different from the rest of the the CEGEP population. In addition, all students involved in this research worked on CHOICES for one hour.
and a half, no more, no less. Understanding the concept of individual difference may lead one to question whether some students would have needed more or less time in order to profit from CHOICES.

It is also important to be cautious with respect to how our profession embraces computer-assisted counselling. To expect CHOICES to take care of all vocational problems would be short-sighted. Indeed, CHOICES can help students. However, the role of the counsellor in this process cannot be omitted. The counsellor must support and guide students during their sessions with CHOICES.

6.3 Recommendations

Although the results were not those expected, this dissertation suggests questions which will be the seed for future research. For example, it is hoped that future investigations will examine the relationship between cognitive psychology and computer-assisted counselling. There is a need to investigate and understand how CHOICE's information is processed by its users.

In fact, it would be important to take into account the level of cognitive complexity used to deal with new sets of information, along with the perceptions, symbolic representations and mental operations used to process the computer information. It would also seem appropriate to evaluate the user's readiness to modify the scheme of reference from which first decisions were based.

In addition, future research dealing with the constructs of state anxiety and computer anxiety in terms of how they relate to the results one gets from working with CHOICES is also needed. As delicate and difficult as this task may be, there is a need to compare one-on-one counselling with computer-assisted counselling with respect to the concept of security versus disturbance of presenting new information that the user is not prepared to receive.

There is also a need to study the effect of CHOICES over time. Such a longitudinal study could look at how computer-assisted counselling predicts what a person will choose as a career two or three years after working on the system. A study of the university choice
made by the subjects of this research would enable one to see if the students who worked on CHOICES actually made a congruent choice.

In spite of the difficulties inherent in longitudinal studies, it could be interesting to verify whether students with high congruence tend to have less program changes and career changes than those students who had low scores of congruence.

Considering the number of personality variables that may have had an effect on the results of this present research and considering the multitude of ways people process information, the results of this study would seem to possibly suggest that there is a need to investigate alternative ways of studying the field of computer-assisted counselling. Moving away from a received view of research toward a more qualitative view could better help understand the whole groups going on during the computer-assisted counselling. This type of observational research could help us in finding out exactly what happens when a student sits down to interact with a computer. Do students use different strategies when working with the computer? Are students making full use of their time on the computer or are they daydreaming? Are they trying to minimize the impact of the new information in order to nurture their fantasies? How does a student go about answering the student guidebook? Because the qualitative researcher does not start with specific hypotheses, he or she is less likely to overlook situations which do not fit expectations. Consequently, qualitative research dealing with computer-assisted counselling could produce new insights that could be used by counsellors.

The interest in computer-assisted counselling is continuing to grow and consequently the research in this area should also grow. Each research project will have certain limitations. However, this should not discourage individuals in their search for answers to their questions. Counsellors should be encouraged to test computer-assisted counselling systems in their own settings no matter how modest these research projects seem to be.
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