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1990-08-06

THE EFFECTIVENESS OF THE
COMPUTER-ASSISTED CAREER GUIDANCE PROGRAM, CHOICES,
ON SELF-EFFICACY AND THE CAREER DECISION-MAKING PROCESS

by

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B.A., University of Victoria, 1987

A Thesis Submitted in Partial Fulfillment of the
Requirements for the Degree of

MASTER OF ARTS

in the Department
of
Psychological Foundations in Education

We accept this thesis as conforming
to the required standard



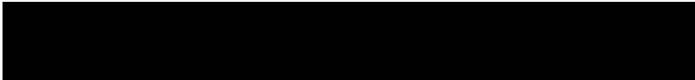
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ABSTRACT

The purpose of this study was to investigate the effect of one computer-assisted guidance program, the Computerized Heuristic Occupational Information Career Exploration System (CHOICES), upon self-efficacy and the decision-making process of system users. The effect of user/subject gender on self-efficacy and decision-making was also measured by comparing pre and post-test total-scores on the Career Decision Scale (CDS) and the Career Decision-Making Self-Efficacy Scale (CDMSES).


The subjects were 10 male and 22 female undergraduate university students who were enrolled in at least one 400-level academic course in the Faculty of Education, and whose majors included several disciplines (e.g., Psychology, Philosophy). Volunteer subjects were randomly assigned to either an experimental or a control group, and all subjects completed pre and post-tests of the CDS and CDMSES. An analysis of covariance was performed on the totals of all subjects' pre and post-test scores.

Results of the statistical analysis offered confirmation that in this population, CHOICES enhances decision-making abilities; $F(1,30)=8.9$; $p<.001$. No significant difference occurred in the level of self-efficacy between CHOICES users and control subjects. However, the analysis shows that female CHOICES users increased their mean level of self-efficacy from 290.5 to 322.7, as measured by the CDMSES; whereas, male CHOICES users showed a slight decrease in their total score mean.

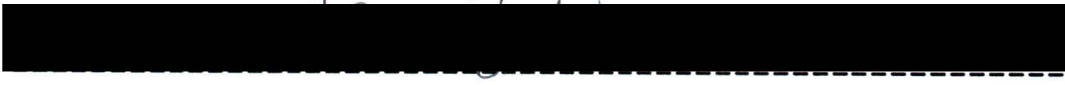
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ACKNOWLEDGEMENT

I am grateful to Dr. Honore France, my thesis supervisor, for sharing with me, his insight, knowledge, and valuable guidance which enabled me to progress so quickly. I thank, also, Dr. Geof Hett, and Dr. Bill Zuk, my thesis committee members, for their support and input whenever I needed them. I am fortunate to have worked with such understanding and helpful people.

I thank Drs. Rey Carr, Max Uhlemann, and Bram Goldwater for bearing with me during my exploration and fluctuation stage.

I especially wish to acknowledge my gratitude to Chris Rose, Leann DuHamel, Frank Madill, and George Olsen for their apt and timely suggestions and articles, motivation during low moments, accommodation, help in data collection, and real friendship.

A special acknowledgement is reserved for Malcolm and Karin Macaulay, Rob and Katie Gracie, and Lee Price, all of whom heard me cry and gave me their support during a very difficult period. Without your love and nurturing, the writing of these words may not have occurred.

It has been illuminating and enjoyable for me to have shared part of each of your lives. Thank you all.

DEDICATION

This thesis is dedicated to two women, Linda Vey and Karen Brix, who, each in her own unique and wonderful way, nurtured and guided me to this crossroad. I will be eternally grateful for their encouragement, support, and love.

CHAPTER ONE

Statement of the Problem

In order to provide the best possible service for clients, educational and vocational counsellors must keep abreast of the many changes occurring to people in this fast paced last decade of the twentieth century. Technology shrinks our world, but in so doing, it expands our horizons. For example, computers now perform in seconds, work that once took days to complete manually. Even though the use of computers provides a multitude of advantages to enhance productivity and leisure time, there exist questions regarding the effects such technological tools have upon their users. This research will focus upon the effects that the Computerized Heuristic Occupational Information and Career Exploration System (CHOICES) has upon the variables of decision-making and career self-efficacy of program users, and address the issue of whether user gender has an effect upon these two variables.

Decision-making and decision-making ability are used interchangeably in this study. Both expressions are defined as the act of distinguishing between one or more options, and then making a selection of one of those options. For example, when presented with the option of

working inside or outside, a person who does not like to work for many continuous hours in cold, wet weather will weigh his or her personal preferences against the occupational environment and requirements for fishing, and will likely select a vocation outside that field. Anyone who is consistently incapable of making such a decision would be assessed as being low in decision-making ability.

Self-efficacy is seen as the level of personal belief one has in one's ability to perform tasks which are relevant and important to effective career decision-making. For instance, people who see themselves as capable of carrying out a library search for information about a particular career would have a high level of self-efficacy with respect to this task. Having a belief in one's ability to perform many such tasks indicates an overall high level of self-efficacy.

Background

The range of educational and vocational opportunities for people in developmentally advanced countries today is greater than at any other time in history. Because of technology, that range continues to expand, and three factors emerge:

1. The amount of information on available vocations and instructional institutes for those vocations is

reaching a point where it may be overwhelming to access manually (Burke & Benedict, 1984);

2. The increased amounts of information to manually process make it more difficult for educational/vocational counsellors to provide valuable counselling time (Burke & Benedict, 1984; Sampson, 1983; Harris, 1974);

3. Many people, by default, enter into careers or academic programs which do not provide adequate outlets for their values, interests, abilities, or needs (Burke & Benedict, 1984; Pyle & Stripling, 1976).

For years, researchers have been developing vocational and educational guidance programs. As technological advances become more enmeshed in career and educational development, academic and non-academic institutions are increasingly employing computer-assisted guidance (CAG) programs to more efficiently utilize personnel in the provision of effective service (see Melhus, Hershenson, & Vermillion, 1973; Pyle, 1984; Sampson, Shahnasarian, & Reardon, 1987; Sampson & Stripling, 1979).

According to Jarvis (Dec. 2, 1988) in a paper presented to the Annual Conference of the Association of Computer-Based Systems for Career Information (ACSCI) "...6.1 million 'career seekers' gained access to 49 different computer-based career information delivery

systems at 13,742 sites..." (p.1) in 46 states during the previous year in the United States. This number of sites represented, at that time, 5.8 percent of the total kindergarten to grade 12 education market of 139,228 schools, and less than that percentage for all other agencies (Jarvis, 1988). There is still much opportunity for increasing the usage of computer-assisted guidance systems.

Use of CHOICES is increasing in most of the Canadian provinces. It is also being used in at least 20 of the United States of America, and is being considered for use in several other countries (Watts & Ballantine, 1983). There appears to be no doubt that CHOICES is growing in popularity, but does its use enhance decision-making and career self-efficacy, and does the gender of users have an effect upon this enhancement?

The purpose of this study is to provide a more informed response to this question, to report the results, to form conclusions, and to make recommendations for future research. In order to effectively address the issue, this study measured the decision-making abilities and self-efficacy of university undergraduate students who were enrolled in at least one 400-level course, and who performed an interaction with the CHOICES program (as compared to a control group of their peers having no

interaction with CHOICES). The effect of user gender on decision-making and self-efficacy was also explored.

CHAPTER TWO

Review of the Literature

This selected review of the literature provides an overview of the CHOICES program, and examines research which is specifically concerned with the effects of CHOICES on user self-efficacy and decision-making abilities. A portion of the review assesses research which deals with the influence of gender differences on self-efficacy and decision-making. Also presented are interpretations of, and excerpts from material of a general nature related to the development of computer-assisted information and guidance (CAG) systems.

The CHOICES Program

One of those computer-assisted guidance systems, CHOICES, was developed in Canada in the late 1970's by the Occupational and Career Analysis Development Branch of the Canada Employment and Immigration Commission (CEIC) with Phillip S. Jarvis as its author. Field testing of CHOICES was carried out in 1977 and 1978 (CSG Corporation, 1988; Wright, 1980; Feron, 1982). CHOICES is a three-step counselling and self/career exploration process.

Step one is the group session client preparation

stage which consists of the counsellor (a) introducing users to the system, (b) motivating clients to complete the Guide, (c) explaining the process of negotiating with the computer, and (d) having the user complete the Guide.

Step two, is the one-on-one pre-interaction counselling stage wherein (a) career goals are discussed, (b) the Profile is analyzed, (c) priorities are confirmed, (d) the bargaining table on the Profile is completed, (e) introduction to the computer takes place, (f) interaction with the CHOICES program occurs, and (g) the printout is analyzed.

Step three, the post-interaction (one-on-one or group) stage, involves (a) discussion of the printout, (b) reassessment of priorities, (c) referral to information resources, (d) commitment to a follow-up plan, and (e) periodic checking of the user's progress.

CHOICES, which is seen as very user-friendly, has the flexibility to be used in a variety of settings such as high schools, universities, employment offices, or anywhere career decisions are routinely being made. More than 1114 different occupations are progressively sorted by CHOICES while the user examines various personal and occupational factors. Unrealistic responses can be examined and altered if deemed too restricting. The number of possible occupations from which the user may

select is gradually reduced each time a choice is typed into the program. The user is eventually left with 25 or fewer occupations, and the possibility of obtaining a list of these occupations. A full print-out of any occupation is available upon typing the appropriate coding into the computer terminal. Upon termination of the CHOICES program, a summary of the user/computer interaction is printed.

After completion of a personal profile, and with the aid of a computer keyboard, users interact with the completely bilingual Choices program through one of four access routes, EXPLORE, RELATED, SPECIFIC, and COMPARE, as illustrated below.

EXPLORE enables the user to narrow the range of occupational possibilities, and develop career options based on personal criteria for the 15 factors listed in Table 1. Because the user is required to make decisions based on these factors, and answers can be changed at any time, this route is probably the most useful for assisting in formulating career goals. Occupations accessed through EXPLORE meet the widest possible range of user needs. When the list of available occupations has been narrowed to 30 or fewer, the user can obtain a printed list. If an occupation of interest to the user is not listed, the reason for its omission may be obtained from the program.

RELATED can be utilized to access and list occupations which are similar on nine of the factors in Table 1.

SPECIFIC permits a user to examine specific aspects of occupations that were chosen through the Explore process. A print-out of all the information in the program about a particular occupation can also be obtained through SPECIFIC.

COMPARE allows comparison in a side-by-side format, and prioritization of specific aspects of user-chosen occupations.

Table 1 is a Schemata of Occupational Sort which lists factors that are derived from ratings assigned to vocations by the Canadian Classification and Dictionary of Occupations (CCDO). CHOICES is designed so that every occupation used in its program corresponds to the 7-digit numbering system utilized in the CCDO. A detailed description of CHOICES can be found in CHOICES professional manual (Jarvis, 1988).

Table 1

Schemata of Occupational Sort

| | |
|-------------------------------|---------------------|
| Interest | Aptitudes |
| Temperaments | Educational Level |
| Physical Demands/Activities | Training Required |
| Environmental Conditions | Future Outlook |
| Earnings | Hours of Work |
| Hours of Travel | Occupational Fields |
| Outside/Inside Considerations | Summary of Work |
| Similar Occupations | |

Since the creation of CAG by John F. Cogswell in 1964 (Cogswell, 1983), this type of career guidance has been extensively researched and steadily developed. Much time, effort, thought, and money were needed to extend Cogswell's research into readily available tools acceptable by counsellors as adjuncts to their skills.

Once the ramifications of the Cogswell and Estavan (1965) work, as cited in the Cogswell (1983) paper, were realized, creators of progressively advancing new systems came forward to meet the challenge: Harris-Bowlsbey with CVIS and DISCOVER; Katz with SIGI; Tiedeman with ISVD; Jarvis with CHOICES; and others with exciting additions to the pool of growing knowledge about CAG systems. Financial support was also made readily available.

Obtaining financial support was timely and welcome news for researchers in vocational/career development and guidance; many researchers had already developed, or been working on the development of, non-computerized career guidance programs. Using computers in education was gaining popularity as computer companies utilized technological innovations from the electronics field in order to create progressively more powerful computers and programs. The challenge now was for researchers to convert their guidance programs to computer usage, or develop new programs.

Many user-friendly programs which provided their own on-screen instructions for use had already been developed by computer programmers. Expanding this type of computer-assisted instruction into programs designed to help clients choose careers and/or academic direction was a logical step to take in this age of vocational choice expansion. By engaging in this endeavour, computer manufacturers and career guidance researchers alike, added to the storehouse of knowledge about computer-assisted guidance systems. The creation was good; but what about the effects those guidance systems were having on the users?

A perusal of the literature shows that numerous investigations and evaluations have been conducted on a variety of computer-assisted guidance systems. (e.g., the System of Interactive Guidance and Information (SIGI), the Student Guidance Information Service (SGIS), DISCOVER, and CHOICES.

CAG programs are designed so that the user is part of the instruction system, and is capable of utilizing latent knowledge of personal values, interests, and abilities (Katz & Chapman, 1978). Several studies show that guidance programs (computer-assisted or not) facilitate the career development of users by helping them develop greater awareness of values and the career decision-making

process, and increase their career maturity (see Glaize & Myrick, 1984; Sampson, 1983; Rayman, Bryson, & Bowsbey, 1978; Katz & Chapman, 1978; Pyle & Stripling, 1976).

To further help researchers effectively direct their studies on computer-assisted systems, Katz and Shatkin (1980), provided a comprehensive report of the characteristics of CAG in North America. Watts and Ballantine (1983) showed a similar picture for Britain.

Myers, Lindeman, Thompson, and Patrick (1975) studied the effects of the Educational and Career Exploration CAG system (ECES) on several dimensions of vocational maturity. Their pre and post-test differences in Career Development Inventory (CDI) scores for 792 students as compared to the scores for a control group of 1,453 tenth graders, indicated that, for the experimental group, there were significant gains in degree of ability to plan, as well as in the knowledge and uses for career exploration. However, acquisition of information about education, occupations, and career decision-making were not evident in this study.

Tiedeman (1983) suggests that decision-making is one of the fundamental building blocks of career development which should be embodied in a computer-assisted guidance system. According to Tiedeman (1983), the CAG system should be designed to teach a process of decision-making

which users can incorporate into their lives, to the extent that they not only know and understand their needs enough to make appropriate decisions, but they can also comprehend the process itself; the process becomes integrated and utilized in all future decisions made by the users, whether or not those decisions be career related or computer-assisted.

Taylor and Betz (1983), when developing the CDMSES, determined (1) "...that the concept of career-related self-efficacy expectations provides a useful framework for the understanding, assessment, and treatment of at least some of the antecedents to vocational indecision" (Abstract, p.63), (2) that subject gender and category of decision-making task did not effect levels of self-efficacy, and (3) that less confidence in ability to complete a task indicated greater undecidedness.

Fukuyama, Probert, Neimeyer, Nevill, and Metzler (1988) studied the effects of the CAG program DISCOVER on the self-efficacy and decision-making of undergraduates. Generalizability of the Fukuyama et al. (1988) study is limited because subjects were lower division undergraduate students who were enrolled in only an introductory psychology course, and gender differences were not examined; however, indications were that the DISCOVER CAG system had a positive effect on users' career self-

efficacy and career decision-making.

Cochran, Hoffman, Strand, and Warren (1977) studied the effects of SIGI usage on the career decision-making process of undergraduate college students, most of whom were freshmen and sophomores. Cochran et al. showed that using SIGI enabled the treatment group to increase their scores on the Vocational Decision-Making Checklist from a pre-test mean of 20.81 for major and 22.22 for occupation to a post-test mean of 23.33 for major and 23.36 for occupation (n=36 in both test times) with a significant Test x Treatment interaction ($F=6.16$; $p<.05$). The control group, on the other hand, remained virtually the same (pre $M=21.72$ & 22.22 , $n=18$; post $M=21.94$ & 22.94 , $n=18$). Cochran et al. (1977) concluded that, although limited range of the population sampled restricted generalizability of the results, "...the system assisted students in decision making and in learning skills related to choice of academic major" (p.312).

Neimeyer and Metzler (1987) conducted three studies on vocational identity development by examining the differentiation of vocational schemas ("...organized framework[s] of knowledge about a specific domain..." p.16), and the integration of those schemas into existing frameworks of knowledge. Their assumption was that structural features of vocational schemas are related to

established development sequences, career decidedness, and career decision-making self-efficacy. The results of these studies are "...qualified... by the inconsistent relationship between structural features of vocational schemas and less advanced stages of identity development and by the cross-sectional nature of the designs utilized" (p.31). There are, nevertheless, indications that career decision-making self-efficacy and career decidedness both increase as vocational schemas become more highly differentiated and integrated.

According to Burke and Benedict (1984), the efficiency of computer-based systems is superior to any current manual system in providing the three necessary factors for effective career decision-making; "[1] self-knowledge, [2] accurate knowledge of occupation and [3] an effective strategy for analyzing data" (p.31). These factors assure that users obtain a greater amount of information which is more highly differentiated and more easily integrated with respect to choice alternatives; thus, the likelihood of good decision-making increases (Gelatt, Clarke, & Levine, 1965).

An examination of the procedure for completion of the CHOICES program indicates that ample opportunity is available for users to differentiate and integrate information within the process described by Neimeyer and

Metzler (1987). CHOICES is designed to utilize career counsellor assistance, as well as a user-prepared personal profile of values, interests, abilities, and educational level. Also, as they complete the program, clients are afforded the opportunity to make unlimited response changes while receiving immediate feedback from the computer.

The CHOICES completion procedure allows clients to (1) assess occupational and educational variables (differentiate), (2) engage in preliminary decisions, (3) further enhance preliminary decisions by considering the limitations and consequences of those decisions as indicated by computer feedback and their personal profiles (integration), and (4) modify their decisions. Empirical observation suggests that as more practice is obtained in making preliminary decisions to which additional, accurate information and/or positive results are immediately supplied, the more sophisticated and appropriate are the final decisions, and the more confidently those decisions are made.

Although completion of the CHOICES program has been shown to have an impact on clients in some areas such as the career maturity of high-academic female students (e.g. Williams, 1983), only a small number of studies actually assess the impact of this system on users' self-efficacy

and decision-making abilities.

One such study done with 136 undergraduate and graduate students at the University of Central Florida, Orlando, by Pinder & Fitzgerald (1984), demonstrated that "...a significant change was found in career decision making" (p.128) after using CHOICES. Higher post-test scores using the Occupational Decision Making Scale of the Assessment of Career Decision Making (ACDM-O, successor to the VDC) indicated that treatment subjects were more committed to their occupational choices when compared to control group subjects, and that lower scores on the CDS indicated that subjects were removing barriers to making those occupational choices. Pinder and Fitzgerald (1984) allow the results to stand alone, and beyond making the above statement, are not emphatic about the use of CHOICES increasing users' self-efficacy and decision-making ability.

Career decisiveness has been identified as the most important variable in career development (Tiedeman & Miller-Tiedeman, 1984; Tiedeman, 1983). Certainty in decision-making would also appear to rank high on the list of important career development variables.

The problem is that, even though there is a logical assumption and some research to suggest that using CHOICES will have a positive effect on self-efficacy and the

decision-making process of users, there does not yet appear to be conclusive evidence to substantiate this suggestion.

Having reviewed the literature and determined that most career guidance programs (CHOICES included) are designed to utilize the decision-making process, and thereby enhance self-efficacy, sufficient justification exists for performing further research to determine if CHOICES does indeed increase users' career decision-making ability and enhance their self-efficacy.

Hypotheses

On the basis of the literature review, the following hypotheses were made:

1. After receiving an overview of the program, and any assistance necessary from a qualified instructor during interaction, students who interact with the computer-assisted guidance system CHOICES will show significant increases in their decision-making abilities, and self-efficacy (the confidence with which they make their decisions) when compared to a control group of their peers.
2. Whether the user is male or female will have no significant difference in the effect that interacting with the computer-assisted guidance system CHOICES has on self-efficacy and the career decision-making process.

CHAPTER THREE

Method

Subjects

Male and female undergraduate students enrolled in at least one 400-level course at the University of Victoria, volunteered to serve as subjects and participate in a "career exploratory study". Subjects ranged in age from 20 to 43 years old, with a mean age of 25.2 years. There were 10 females and 5 males in the experimental group, and 12 females and 5 males in the control group.

Instrumentation

In order to measure the effects of CHOICES on self-efficacy and the decision-making abilities of undergraduates enrolled in a fourth year course, this study utilized the following scales:

The "Career Decision Scale" (CDS) was developed by Samuel H. Osipow, Clarke G. Carney, Jane Winer, Barbara Yanico, and Maryanne Koschier in 1976). This scale was designed to identify factors which contribute to educational-vocational indecision.

Each item of the 18-item Likert-type scale pertains to some aspect of vocational decision-making, and requires

a response which ranges from "exactly like me" (scored 4) to "not at all like me" (scored 1). Item 1 measures the degree of indecision with respect to a choice of career, and item 2 reflects a choice of university major; a composite of scores on these two items serves as an index of vocational undecidedness. The 16 remaining items provide measures which indicate degrees of indecision; a score of 16 demonstrates extremely decided, and 64 indicates completely undecided.

With respect to the reliability of the CDS, Osipow, Carney, and Barak (1976), using two samples of college students over a two-week period of test-retest, obtained coefficients of $r = .902$ ($n=56$), and $r = .819$ ($n=59$) for total overall scores on the CDS. Studies over 6 weeks by Slaney, Palko-Nonemaker, and Alexander (1981), and over 3 weeks by Phillips (1983) reported correlations of $r = .70$ ($n=115$) and $r = .79$ ($n=117$) respectively (see also Allis, 1984).

Hartman, Utz, and Farnum (1979), however, reported a 2-week test-retest correlation of only $r = .61$ ($n=164$) when they used an adapted version of the CDS with college 164 graduate students. Also, Slaney, Palko-Nonemaker, and Alexander (1981) suggest that the CDS seems promising as a means "...of more effectively measuring career indecision, selecting vocational treatments, and conducting research

on the effects of such treatments" (p.102). However, there appears to be some item overlap, and more research is necessary to clarify the factor structure of the scale. Reliability for the CDS could be considered moderate at present.

A number of studies have extensively examined the CDS with respect to its validity (for example, Taylor, 1979). Apart from the fact that the results of some studies are inconsistent with respect to several variables (i.e. sex, locus-of-control, ability), those studies clearly and reasonably illustrate that the CDS does actually measure the construct of career decidedness. Validity of the CDS is generally accepted, and the scale continues to be used for its intended purpose of measuring indecision.

A detailed review of the CDS is provided in the Manual for the Career Decision Scale (Osipow, 1980), which does not report internal consistency, but gives percentile norms for high-school and college students. These norms suggest that career indecision levels decrease with time, and effects due to gender differences are insignificant.

The "Career Decision-Making Self-Efficacy Scale" (CDMSES) was based on Crites' (1973) model of the five Career Choice Competencies, and Bandura's (1977) theory of self-efficacy. The CDMSES was developed by Karen M. Taylor and Nancy E. Betz in 1983 to delineate specific

behaviours in the five domains of "...(1) accurate self-appraisal, (2) gathering occupational information, (3) goal selection, (4) making plans for the future, and (5) problem solving" (p.66). Each domain or subscale, utilizes 10 items to assess degree of confidence felt when engaging in the specific behaviour of that domain. As a whole, the CDMSES consists of 50 items, and according to Taylor and Betz (1983), it assesses self-efficacy expectations in career related decision-making tasks by requesting respondents to indicate the degree of confidence they feel in being able to complete those tasks. Responses range from "no confidence" (scored 0) to "complete confidence" (scored 9). Total scale score ranges from 0 to 450.

Robbins (1985), in his study of the validity estimates for the CDMSES, found that "...results of concurrent and discriminant validity studies only partially supported the construct validity of the CDMSES, and that use of individual subscales proved uncertain" (p.64). In the same study, Robbins also suggests that the CDMSES related only moderately to self-esteem (median $r = .53$), vocational identity (median $r = .36$ with 10 % variance explained), and career decidedness (median $r = .33$ with 9% variance explained). According to Robbins, the results of his study indicate that the CDMSES is not

an adequate assessment of self-efficacy expectations relating to specific career decision-making skills, but more "...a measure of generalized self-efficacy" (p.70), which it could be renamed to reflect.

However, other, more recent studies support the concurrent and predictive validity of CDMSES (Neimeyer & Metzler, 1987; Nevill, Neimeyer, Probert, & Fukuyama, 1986). Also, internal consistency and reliability of CDMSES are acceptable with coefficient of .97, and item-total score correlations ranging from .50 to .80 (Fukuyama et al., 1988).

The results of these studies suggest that both the CDS and CDMSES would be potentially valuable instruments for measuring the variables of decision-making and self-efficacy respectively in this study.

Materials

The CHOICES Guide (Canada Systems Group, 1988) is a document designed to prepare clients to use the CHOICES computer terminal by having clients complete an extensive profile of their occupational and educational needs, preferences, and abilities. In other words, the CHOICES Guide functions as a map of the topics and factors which are covered in the CHOICES computer program.

The CHOICES Handbook (Canada Systems Group, 1988) is designed to provide clients with an explanation of how the CHOICES program functions, as well as provide instructions and examples of how to complete the CHOICES Guide.

A Summary of the Study (see Appendix A) was read to several 400-level classes of undergraduate students in order to obtain volunteers for the study.

General Purpose Answer Sheet University of Victoria, Form B, response sheets (Op-scan sheets) that are readable by a computer optical scanner were used to record subject responses to both pre and post-tests of the CDS and the CDMSES.

Procedure

Permission to conduct the study was obtained from the University of Victoria Human Subjects Committee (Permit #64-89). A number of University of Victoria instructors of fourth year Education courses were approached by the researcher with a request to attend their classes in order to invite students to be volunteers in the study. When permission was obtained, the researcher attended the classes in question, and read to the students "The Summary of the Study" (Appendix A). Students were then invited to

participate in the study. Thirty-two males and females from those who wished to participate served as subjects.

Subjects were interviewed individually, and randomly assigned to either an experimental group (interaction with CHOICES), or a control group (no interaction with CHOICES). The interviewer, with a trained researcher present, conducted all the interviews in a private office. Each subject was asked to complete the CDMSES and the CDS as pre-test measures, and requested to sign a consent form (Appendix B) which advised them of their right to withdraw from the study. Also, before commencement of every step of the experimental procedure, subjects were reminded of their right to withdraw, and were asked if they wished to do so.

Data collecting conditions were as shown by Table 2.

Table 2

Data Collecting Conditions

| <u>Condition</u> | <u>Variable</u> | <u>N</u> | <u>Pre</u> | <u>CHOICES</u> | <u>Post</u> | <u>Sex</u> |
|------------------|-----------------|----------|------------|----------------|-------------|------------|
| Experimental | CDMSES, CDS | 15 | Yes | Yes | Yes | M/F |
| Control | CDMSES, CDS | 17 | Yes | No | Yes | M/F |

Subjects in the control group were asked to return two weeks after pre-testing to again complete the CDMSES and CDS as post-test measures. Control subjects were advised to not interact with the CHOICES computer program during this two week period because such an interaction would cause contamination in the control condition.

Experimental group subjects were assigned specific times during which they engaged in a one-on-one variation of Steps 1 and 2 of the CHOICES counselling and self/career exploration process. During this session, each subject individually discussed his or her career directions. As part of this session, subjects received a one hour overview of the CHOICES program, received the CHOICES Handbook and CHOICES Guide, and completed personal profiles. Subjects were also familiarized with the computer hardware and the CHOICES software. Each subject then engaged in an approximately 45 minute interaction with CHOICES, during which the researcher or an assistant was available to answer questions, or assist in the subject/computer interaction.

After the interaction was completed, the researcher or the assistant debriefed each subject, and helped each one process the experience of the interaction with the CHOICES program. In order to provide post-test measures, all experimental group subjects were asked to again

complete both the CDMSES and the CDS (the control group subjects provided post-test measures two weeks after pre-test, as stated previously).

At the conclusion of data collections, analyses was performed on the data. Subjects who wished it were notified of the results, and again asked if they wished to withdraw from the study. All subjects were advised that the researcher or assistant would provide opportunities for participant/computer interactions at mutually arranged times for any subject so desiring, thereby enabling subjects in the control group to avail themselves of the resources provided by the CHOICES program and the researcher.

CHAPTER FOUR

Results

Two scales were used to collect data:

- a) The Career Decision Scale (CDS) assessed subjects' decision-making ability level. Responses to the 18 statements are scored on a Likert-type scale ranging from 4="exactly like me" to 1="not at all like me". Lower scores indicate less indecision/more decisiveness.
- b) The Career Decision-Making Self-Efficacy Scale (CDMSES) measured subjects' self-efficacy -- their level of certainty about decisions they make. CDMSES scoring ranged from 0="no confidence" to 9="complete confidence". Higher scores signify greater self-efficacy.

Data was collected in the form of subject responses to the statements on the CDS and CDMSES. These responses were made on special sheets (Op-Scan sheets) which are computer readable by an optical scanner. Each sheet was coded for group (Experimental or Control), test (pre or post), and sex. Separate sheets were used for pre and post-tests, but responses for both scales (CDS and CDMSES) were entered on each sheet.

In order to determine the differences between the Control and the Experimental groups, and between the

sexes, an analysis of covariance was performed on the data obtained from the CDS and the CDMSES.

Effects on Decision-Making Ability

From Table 3 for the CDS, results of the 2x2 analysis of covariance show a significant difference between the means scores of the Experimental and Control groups; $F(1,30)=8.9$; $p<.001$. Table 4 and Figure 1 show that the pre-test means were relatively close, but post-test means of Experimental subjects (female=34.4; male=32.75) were much lower (improved) than the post-test means of Control subjects (female=41.8; male=53.6). The ANCOVA results showed no significant difference between males and females for decision-making abilities on the CDS.

Effects on Self-Efficacy

Employment of the CDMSES to measure of self-efficacy produced some rather complex results. Referring to Table 3, there are no statistically significant differences between Experimental group scores and Control group scores on the CDMSES. Also, there are no significant differences between the scores of male and female subjects.

However, there is a major difference shown between the CDMSES pre and post-test scores in Table 3. Visual inspection of Figure 2 and Table 5 shows that the self-

efficacy level of experimental group males has decreased from $M=361.3$ to $M=336.5$; whereas, the female self-efficacy mean level increases from 290.5 to 322.7. The difference between the experimental group male and female pre-test scores is a 70.8 point spread, but the post-test scores are much closer together with only 13.8 points separating them.

Table 3

ANCOVA for Total Scores (Group by Sex)

| Source | df | F ratio | Significance of F |
|--------------------------------------|----|---------|----------------------|
| Post-test of CDS by group and sex | | | |
| Covariates | | | |
| Pre-test of CDS | 1 | 1.488 | .234 |
| Pre-test of CDMSES | 1 | 4.050 | .055 |
| Main Effects | | | |
| Group | 1 | 8.917 | .001 * |
| Sex | 1 | 2.624 | .118 |
| Two-way Interactions | | | |
| Group/Sex | 1 | 1.729 | .200 |
| Post-test of CDMSES by group and sex | | | |
| Covariates | | | |
| Pre-test of CDS | 1 | .093 | .762 |
| Pre-test of CDMSES | 1 | 18.966 | .000 * |
| Main effects | | | |
| Group | 1 | 1.298 | .265 |
| Sex | 1 | .567 | .458 |
| Two-way Interactions | | | |
| Group/Sex | 1 | .079 | .781 |

*= $p < .001$

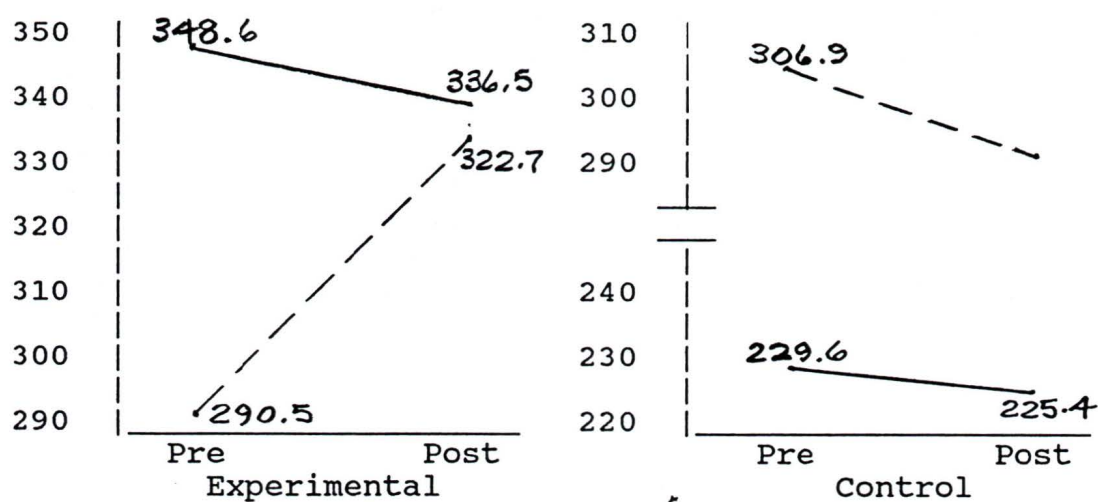
Table 5

Means and Standard Deviations for CDMSES

| Factor | Code | Mean | Std. Dev. | N |
|--------|--------------|--------|-----------|----|
| Group | Experimental | | | |
| Sex | Female | | | |
| Test | Pre | 290.50 | 82.600 | 10 |
| Test | Post | 322.70 | 72.564 | 10 |
| Sex | Male | | | |
| Test | Pre | 348.60 | 29.720 | 5 |
| Test | Post | 336.50 | 31.029 | 5 |
| Group | Control | | | |
| Sex | Female | | | |
| Test | Pre | 306.92 | 94.710 | 12 |
| Test | Post | 293.58 | 121.644 | 12 |
| Sex | Male | | | |
| Test | Pre | 229.60 | 105.218 | 5 |
| Test | Post | 225.40 | 112.338 | 5 |

Figure 2 is a graphic representation of Table 5.

Figure 2. Comparison of experiment and control group total score means for males and females on pre and post-tests using CDMSES.



Career Decision-Making Self-Efficacy Scale

CHAPTER FIVE

Discussions and Conclusions

Summary

This study contains a review of the literature pertaining to the effects of computer-assisted guidance (CAG) systems and user gender on the variables of self-efficacy as measured by the Career Decision-Making Self-Efficacy Scale (CDMSES), and decision-making abilities as measured by the Career Decision Scale (CDS). Pre and post-test scores on both the CDMSES and the CDS were provided by 32 undergraduate students enrolled in a 400-level course. Fifteen students interacted with the CHOICES program, and 17 peers performed no interaction. Analyses of covariance, with pre-test on CDS and CDMSES as covariates, were performed on scores for (a) post-test on CDS by group (experimental or control) and sex, and (b) post-test on CDMSES by group and sex.

The results indicate that, as was hypothesized, interaction with CHOICES significantly enhanced the decision-making abilities (measured by the CDS) of experimental subjects, as compared to control subjects (see Table 3). Also, as was hypothesized, there was no gender effect on the decision-making abilities of subjects who interacted with CHOICES.

The hypothesis that interaction with CHOICES enhances the self-efficacy of users was not substantiated by this research. However, there was confirmation of the null hypothesis that there is no significant enhancement of self-efficacy related to gender differences.

Although the ANCOVA (Table 3) did not find any statistical significance that gender had an effect on decision-making or self-efficacy, male and female scores in the Experimental condition appear to be approaching an interaction (see Figure 2). Male and female pre-test means are far apart (female $M=290.5$; male $M=348.6$), but on the post-test, male scores have decreased and female have scores increased. In other words, both genders' scores are approaching a similar level of self-efficacy on the post-tests. (Because sample size is small and variance is large, caution should be exercised with respect to interpretation of Figure 2 and Table 5.)

The fact that self-efficacy appears to have increased only for the experimental group females is somewhat confusing and difficult to interpret. It is difficult to rationalize that the use of CHOICES should produce a negative effect on self-efficacy in males while simultaneously producing a positive effect in females. The divergent results, or trend, as shown in Figure 2 and Table 5, may be due to the large range in variance and

small sample size, or to the influences from one or more confounding variables.

With respect to confounding variables, Lent and Hackett (1987) cite a study by Layton (1984) which found that for women, self-efficacy was significantly higher when associated with traditionally female occupations than when associated with nontraditional fields. Also, those differences were moderately correlated with the range of careers considered in either of the two categories.

In the present study, because most of the females in the experimental group were from the Education Department (teacher or counsellor training majors -- both viewed as helper occupations which are traditionally female dominated), it seems likely that the values and career desires of these women would be oriented toward helper type occupations. CHOICES provides a range of occupation options which are fitted to user characteristics and needs; therefore, it is logical to assume that a range of similar helper careers was presented to these women.

According to Layton's 1984 study then, if women in the experimental group in the present study viewed the career options presented to them by the CHOICES program as being traditionally female occupations, self-efficacy associated with the occupations would have increased. This perception would account for the substantial

difference in the female total score means between the pre and post-tests on the CDMSES.

However, according to Harvey, Barnes, Sperry, and Harris (1974), people who have internal locus of control "...will perceive greater choice when options are similar in attractiveness than when they are either dissimilar or virtually identical..." (p.450). This statement may be interpreted to mean that people in the present study who see themselves as achieving on the basis of their own efforts, will also see themselves as having a greater choice when they are presented, by the CHOICES program, with a variety of similar career options which satisfy their personal values and desires. This greater choice could then lead to a sense of greater certainty associated with that choice.

Because personal efforts are sine qua non to achievement at the level of academic study of this population, it could be that many of the experimental group women were internally oriented (perceived themselves as being self-achievers), and were only confused about their career directions when they completed the CDMSES pre-test. Therefore, if career options of similar attractiveness were presented to those women, greater self-efficacy would result, thereby, providing the unexpected large increase between the pre and post-test

mean total scores on the CDMSES for experimental group females. This increase then, rather than reflecting only a shift to greater certainty for these women, may also reflect the lack of a definite career choice, and/or the lack of knowing that a range of similar options existed.

The situation is different with the experimental males. Because there were only five males in the group, data obtained may have been insufficient to provide an accurate assessment of the effects of CHOICES usage on those men. For those males, total scores means on the CDMSES showed a slight decrease, and scores on the CDS showed only a slight increase. This fact could indicate that the lack of significant change between pre and post-testing might be attributed to the small sample size. Again, as with experimental females, further studies which control for confounding variables, and which use larger sample sizes, should serve to clarify the issue of whether the results shown reflect only small sample size, or whether they are influenced by one or more confounding variables.

Regardless of these issues, the results of most of the studies reviewed (some used both the CDS and CDMSES; some used other scales) strongly indicate that use of CAG systems did increase self-efficacy and decision-making abilities as a result of obtaining additional and more

precise information. Also, some researchers view CAG usage as enabling users to differentiate information at a higher level, organize that information more efficiently, and to integrate that information into established frameworks of knowledge. This view suggests that CAG usage increases a user's problem-solving abilities, which in turn, enhances decision-making abilities and self-efficacy.

Limitations

The results of the present study indicate that a significant positive relationship exists between the use of CHOICES and enhancement of decision-making abilities for both females and males, and suggest increased self-efficacy for females. Although the sample size was initially 50 (25 experimental and 25 control), loss of subjects diminishes the certainty regarding the significance of the relationship. Further studies using a greater number of subjects could confirm the effects on decision-making, and clarify the results obtained for self-efficacy.

Difficulty also lies with generalizing the results of the present study to other populations. This study found effects similar to those indicated by other studies which examined decision-making and self-efficacy of other

populations; however, most of those studies did not utilize the CHOICES program as the CAG system against which these variables were measured. In fact, there appear to be very few studies which directly address the issue of how CHOICES effects users' decision-making and self-efficacy; this fact seems sufficient justification for further studies in this area.

Also, the present study did not conduct research into the effects of time on the durability of the enhancement of decision-making abilities and self-efficacy as a result of the interaction with CHOICES. Future studies could assess and retest the experimental subjects to determine whether or not the enhancement is sustained, improved, or diminished over time. For instance, further post-testing could be performed at three months, and again at six months after the post-testing which was administered immediately upon completion of the CHOICES interaction.

It is difficult to say whether commitment to a choice reflects greater certainty about that choice (self-efficacy), or whether that commitment simply reflects a sense of wanting to hold fast to a choice which is attractive. It could also be questioned whether removing barriers to making occupational choices is increasing career decision-making ability, or whether it is merely discarding careers which do not neatly fit the chooser's

perception of an ideal career. In any case, if a choice is based on personal values, interests, abilities, occupational characteristics, and educational level while the process of problem-solving/decision-making is at least minimally engaged in, the decision cannot help but be as effective and viewed with certainty as one which is based on intuition alone.

Recommendations for Future Research

Most interactions with CAG systems include some pre- and post-interaction counselling with users. Research could be directed toward examining the strategies in which counsellors engage during the performance of their research. Studies in this area would help determine just what influence counsellor strategies have upon CAG users, how to moderate any counsellor influence for the best interests of users, and how to most effectively utilize counsellor time spent with users.

Also, several confounding variables may be factors in research on the effects of CAG usage. Future research could focus on any one or several of these variables and the effect which each or all of them have on the CHOICES program user. For example, because the present and other studies suggest that CAG usage enhances decision-making, future research into the effects of CHOICES could focus on

self-efficacy alone.

Another consideration for future research is that, although there was no definite substantiating evidence, the use of two scales having responses recorded in opposing directions (CDS descending; CDMSES ascending) may have acted as a confounding variable. Subsequent studies could employ two or more scales having responses which are recorded in the same direction (e.g., 1-9; 1-4; etc.). As well, longitudinal studies of the effects of CHOICES on users would be beneficial, not only to professionals in the area of career development, but also to developers of more advance versions of CHOICES and other CAG programs.

Implications for Counsellors

This research and the literature reviewed for this study suggest that CAG systems are useful counselling tools to help post-secondary students meet their career development needs. For example, when a qualified instructor provides a concise, informative explanation of how to interact with the CAG system CHOICES, and then provides adequate assistance during the interaction, a significant percentage of users increase their decision-making abilities. Also, because CHOICES is easily updated with new information pertaining to existing

occupations, and with information about newly created occupations, users are kept abreast of current occupational and academic needs. As well, the short CHOICES interaction completion time allows for almost immediate feedback of additional and pertinent career option information which enables the program to be used as a relatively fast treatment for career indecision. In total, CHOICES could be employed as an effective tool in the enhancement of student career development.

However, because this study suggests that CHOICES has limited beneficial effects on some aspects of system users, some caution should be exercised by counsellors. For example, some users may have very specific career goals, and would probably benefit more from the program interaction if they were encouraged to access the system through the RELATED route, rather than focus on the EXPLORE option. If, say, a user has very definite plans about a career in the legal profession, the counsellor could encourage the user to begin the CHOICES interaction by examining those careers which are related to that profession (e.g., real-estate law, or criminal law).

Also, some users enter very precise information into the EXPLORE route. For instance, if a user makes responses which indicate a preference for working with numbers and objects, but also makes responses which

indicate a preference for working with people, a conflict arises which severely limits the range of possible careers available to such a user. With this type of user, counsellors would need to place strong emphasis on the fact that the more specific the information which is entered, the more likely is the possibility that conflicts may arise between different items of information, and thus, the more specific and restricted will be the career options presented to the user.

The results of this study suggest that university educated women who are exploring career or academic options appear to increase their self-efficacy when they use CHOICES. Career counsellors might especially benefit from this finding when working with women who are experiencing uncertainty about choosing to embark on careers which are specifically viewed (either by society, or by the female client only) as traditionally male-oriented, and likely, still male-dominated careers.

At present, the results of this study suggest that CHOICES enhances decision-making abilities of university student users in general, and the self-efficacy of female university students in particular. It does, however, seem evident that there is a need for extensive and continued study into the effects of the CAG program CHOICES and several other variables upon users of the system.

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APPENDIX A

Summary of the Study

The project will test the effectiveness of the Computer-Assisted Career Counselling (CAG) program, CHOICES, on the career decision-making process. CAG strategies are gaining in popularity, yet little is known of the career self-efficacy and decision-making of users. Bandura (1982) developed the notion of self-efficacy which is the behavioral and psychological change mediated by cognitive processes. Self-efficacy theory related to career decision-making refers to the expected ability of clients to perform tasks that are important to effective career decision-making (e.g., library searches, values-hierarchies). This research will focus on whether CHOICES enhances the decisiveness of clients in regard to the certainty of career decisions.

APPENDIX B

Consent Form

I, _____, voluntarily agree to participate in the Research Project, "Effectiveness of CHOICES on the Career Decision-Making Process." I have read and understand what the project is about. I understand that I have the right to withdraw at any time during the study. I further understand that there is no personal hazard involved in this study; therefore, I absolve the University of Victoria of any liability that may incur as a result of my participation in this study.

Signature of Participant

Witness

Date

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Title of Thesis: The Effectiveness of the Computer-Assisted Career Guidance Program, Choices, on Self-Efficacy and the Career Decision-Making Process

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July 20, 1990
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