UTILIZING COGNITIVE INFORMATION PROCESSING THEORY TO ASSESS THE EFFECTIVENESS OF DISCOVER ON COLLEGE STUDENTS' CAREER DEVELOPMENT

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This study explored outcomes of using the Internet version of the DISCOVER career guidance system by college students who are unsure of their career direction. Previous research indicated mixed results concerning DISCOVER's effectiveness. A review of these studies showed that measures of foundational components of career development (i.e., individuals' knowledge of their skills, interests, and values) consistently improved after DISCOVER use, while more advanced areas of career development (e.g., actual occupational choice) showed mixed results. This study proposed that the Cognitive Information Processing (CIP) theory of career development can be used to assess these different levels under a unifying model. Sixty-three undergraduate students participated in a pretest/posttest study where they were assessed on various measures, including need for cognition, vocational identity, and dysfunctional career thinking before and after using DISCOVER. Participants were found to have increased levels of vocational identity and lower levels of dysfunctional career thinking after DISCOVER use. Of particular note, individuals with higher levels of vocational identity prior to using DISCOVER showed greater decreases in dysfunctional career thinking after using DISCOVER than those with lower initial levels of vocational identity. These results offer support to the proposal that an understanding of one's interests, skills, and values must be achieved before an individual can make additional gains on more advanced levels of career decision making. Additionally, patterns

of DISCOVER use among college students in this study indicate that individuals did not plan a strategy prior to using the program, suggesting that college students could benefit from additional instruction prior to using DISCOVER. Also, participants did not express an interest in discussing their DISCOVER results with others while they were using the program, implying that college students believe using a computer-assisted career guidance system is a solitary endeavor. This study recommends that a "one size fits all" approach to using DISCOVER should not be taken by college career counselors; rather, counselors should make an initial assessment of a client's stage within the career development process and then offer suggestions to the individual regarding how best to use the program.

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1.0 INTRODUCTION

Choosing a major or a career direction is an important developmental task for college students. According to the Cooperative Institutional Research Program (CIRP) annual survey, 72% of college freshmen in 2005 report deciding to attend college in order to be able to get a better job (2006). This perception is borne out in the "real world" where having a bachelor's degree instead of a high school diploma results in enhanced occupational prestige and earnings over an individual's life span (Pascarella & Terenzini, 2005). Colleges and universities recognize the need to prepare their students for the practical aspects of life after college and have devoted resources to assist students with the career development process.

There is a rich theoretical base related to career counseling that has been applied to research and practice (Whiston, 2003). The first modern career theories date back to Frank Parsons, who articulated the foundation upon which many career theories are built today, a three-part model involving self-knowledge, knowledge about the work environment, and reasoning between the two to select an appropriate occupation (Parsons, 1909). Subsequent theories focused on the fit between an individual's personality and their work environment, such as John Holland's model of six types of vocational personalities and work environments: Realistic, Investigative, Artistic, Social, Enterprising, and Conventional (Holland, 1985; Holland, Whitney, Cole, & Richards, 1969). Others, such as Donald Super, advocated a developmental perspective in which career development occurs across the life span in stages and is influenced by the

demands placed upon individuals by the roles they have within society (Super, 1980; Super, Savickas, & Super, 1996). Emergent career development theories such as Social Cognitive Career Theory (SCCT) have attempted to unify previous theories as well as provide an added dimension related to the cognitive processes, such as self-efficacy (Bandura, 1986), that may be involved in career decision making (Lent, 2005; Lent, Brown, & Hackett, 1994).

As career theories have advanced, so has technology in society, specifically the pervasiveness of computers in the culture. Computer-based career development systems have been created to provide a means to assist clients with career-related problems. Such computerized systems have been available since the late 1960s and have been refined over time. Harris-Bowlsbey (1992) outlined two main classifications of systems: computer-based career information systems and computer-based career guidance systems. Computer-based career information systems simply provide information about occupations such as job responsibilities, educational requirements, and salary and employment projections. In contrast, computer-based career guidance systems – in more recent literature referred to as computer-assisted career guidance systems (or CACG systems) – can include the same job information, but they also teach career development concepts (Harris-Bowlsbey, 1992). The impact of CACG systems such as DISCOVER, the system used in this study, is that they are designed to assist individuals with the *process* of deciding on a career. CACG systems may be used in collaboration with individual or group career counseling or they may be used without counselor intervention.

Historically, career development theories and the research surrounding them tend to be reductionist in nature, isolating specific aspects of career development and not considering multiple factors involved in complex interactions and processes (Bloch, 2005; Swanson, 1995; Whiston, 1996). As this relates to DISCOVER, the research has focused on individual outcome

variables, such as those assessing an individual's commitment to a specific occupational choice or those measuring career decision-making self-efficacy, without examining the interrelatedness of multiple factors under a unifying theoretical framework. Furthermore, while the career theories of the 1960s and 1970s did guide the development of the major CACG systems that are still used today, emergent career development theories have not been related to these systems in an effort to inform current practice (Niles & Harris-Bowlsbey, 2002; Sampson & Bloom, 2001). Recent literature advocates a new paradigm for research surrounding career development that de-emphasizes the reductionist view focusing on career choices as an outcome, and instead emphasizes research associated with the career decision-making process itself (Bloch, 2005; Chen, 2003; Krieshok, 1998; Savickas, 2003).

One of the emergent career development theories, the Cognitive Information Processing (CIP) approach, which is the focus of this study, provides a theoretical model appropriate to examine how the decision-making process affects career decisions. CIP theory includes a component of information processing domains relating to knowledge about various occupations and an understanding of one's values, skills, and interests, combined with a recursive process of problem-solving and decision-making skills (Gary W. Peterson, Sampson, & Reardon, 1991; Reardon, Lenz, Sampson, & Peterson, 2000). CIP is especially suited for exploring issues related to the career decision-making process, because a specific assessment tool, the Career Thoughts Inventory (CTI), was created to examine individuals' negative thinking that interferes with the career development process (Sampson, Peterson, Lenz, Reardon, & Saunders, 1996).

1.1 Statement of the Problem

This study will apply the CIP approach to DISCOVER use by traditional aged college students. Two of the traits indicative of the Millennial Generation, those individuals born between 1982 and 2002, now forming the cohort of traditional aged college students, are that they face a great deal of pressure and that they have a high need for achievement (Howe & Strauss, 2000). As they look beyond college, they (and their parents) view their first job as representing "the initial payoff for all the planning, stress, and shared ambition" they have faced in their education (Howe & Strauss, 2003, p. 133). Given this pressure to achieve and the perceived importance of higher education in forming an individual's career direction, it is surprising to note that only 54 percent of college graduates report having developed a plan that led them to their current jobs while in college (Hoyt & Lester, 1995). College students do have resources available for them to assist with developing such a plan. Indeed, entire career services departments are designed around assisting students in clarifying their occupational goals and providing them with guidance to implement a plan to achieve their career aspirations.

Even though college career counselors facilitate the process of assisting students with finding the right occupation, all students do not avail themselves of the expertise offered from these professionals. In a 1999 survey by The Gallup Organization for the National Career Development Association, seven in ten adults report that they would try to get more information about the job and career options open to them if they had to start over (The Gallup Organization, 2000). As such, many college students appear to struggle with the career decision-making process on their own. At the same time, Millennials are assimilating computers into their lives more than any previous generation (Howe & Strauss, 2000; Tapscott, 1998), so there is the

potential that computer- and Internet-based means of career decision making will become more popular with college students.

The details surrounding how college students use computers, notably how they use the Internet, is unclear (Aiken, Vanjani, Ray, & Matin, 2003), so it is uncertain whether college students will, in fact, turn to online resources for assistance with career decision making. However, the likelihood of this occurring is high, given that college students are already heavy consumers of online resources related to health care, financial, and travel information (Jones, 2002).

Teenagers are already using online resources to obtain information about prospective colleges. According to the Pew Internet & American Life Project, 57% of teenage Internet users have gone online to get information about a college they were thinking about attending, compared to only 45% of adult Internet users using the Internet to gain information about colleges for themselves (Lenhart, Madden, & Hitlin, 2005). In the same survey, 44% of adult Internet users sought information about jobs online, but only 30% of teenage Internet users did so (Lenhart et al., 2005). Although this appears contradictory, it should be noted that the teenagers in the study ranged in age from 12 to 17, none of whom were in college. It is possible that teenagers view career-related issues as less important than adults, so teens are not as motivated to search for career-related information in any format. Millennials in college may exhibit different behaviors related to using the Internet to obtain information about jobs.

Given the integration of computers and the Internet in the lives of today's Millennial college students, computer-assisted career guidance systems may hold promise in helping college students gain career direction. The question to be addressed, then, is whether CACG systems are

being used in the best way possible to facilitate the career development of college students, especially if they are used without the support and guidance offered by a trained counselor.

1.2 Significance of the Study

As the cost of higher education increases, colleges and universities find themselves under added pressures to prepare all of their students for life after college, whether in the workforce or continued education in graduate or professional school. Colleges and universities may find themselves facing calls for accountability, not only from students and parents, but also from local, state, and national government. CACG systems offer higher education institutions the ability to address the career-related needs of college students in a cost-effective way that capitalizes on this population's ease with integrating technology into their lives. In order to learn how best to use CACG systems with college students, studies must be conducted that apply career development theory to those systems.

1.3 Definition of Key Terms

1.3.1 Career Development

Current thought surrounding career development regard it as a multi-faceted construct relating to the "lifelong psychological and behavioral processes as well as contextual influences shaping one's career over the life span" (Niles & Harris-Bowlsbey, 2005, p. 12). This definition

moves beyond the idea of making a career decision as the primary outcome of an intervention, and places emphasis on the decision-making process itself. Furthermore, it implies that making such a decision involves aspects both internal (e.g., interests, skills, values, and cognitions) and external (e.g., culture, socioeconomic issues, and the influence of others) to the individual.

1.3.2 Career Thoughts

Career thoughts are "outcomes of an individual's thinking about assumptions, attitudes, behaviors, beliefs, feelings, plans, and/or strategies related to career problem solving and decision making" (Sampson et al., 1996, p. 38). Dysfunctional career thoughts (also referred to as negative career thoughts) are believed to interfere with the career decision-making process. In this study, career thoughts will be measured by the Career Thoughts Inventory (CTI) (Sampson et al., 1996).

1.3.3 Cognitive Information Processing (CIP) Theory

Cognitive Information Processing (CIP) theory (Gary W. Peterson et al., 1991; Reardon et al., 2000) extends foundational career development theories to include a problem solving/information processing dimension. The CIP approach is examined in detail in the Review of the Literature section.

1.3.4 College Students

Participants in this study will be traditional aged college students, that is, individuals who enter higher education directly from high school. More specifically, the student participants in this study will be from the Millennial Generation, individuals born between 1982 and 2002 (Howe & Strauss, 2000).

1.3.5 Computer-Assisted Career Guidance (CACG) Systems

A computer-assisted career guidance (CACG) system is a "group of activities, delivered by a computer, designed to help with one or more steps of the career planning process" (Niles & Harris-Bowlsbey, 2005, p. 203). The most advanced CACG systems provide access to extensive databases of occupational information, interactive activities for assessment of client characteristics (e.g., values, interests, and skills), and monitoring of the career planning process (Niles & Harris-Bowlsbey, 2005). DISCOVER, the CACG system used in this study, is discussed in detail in the Review of the Literature section.

1.3.6 Need for Cognition

Need for cognition is defined as "an individual's tendency to engage in and enjoy effortful cognitive endeavors" (Cacioppo, Petty, & Kao, 1984, p. 306). Individuals high in need for cognition are believed to be "intrinsically motivated to think and to enjoy complex cognitive tasks" (S. Coutinho, Wiemer-Hastings, Skowronski, & Britt, 2005, p. 323). In this study, need

for cognition will be measured by the short form of the Need for Cognition Scale (Cacioppo et al., 1984).

1.3.7 Vocational Identity

Vocational identity refers to a "clear and stable picture of one's goals, interests and talents. These characteristics lead to relatively untroubled decision making and confidence in one's ability to make good decisions in the face of some inevitable environmental ambiguities" (Holland, Daiger, & Power, 1980, p. 1). In this study, vocational identity will be measured by the 18-question Vocational Identity scale on the My Vocational Situation (J. L. Holland et al., 1980).

2.0 REVIEW OF THE LITERATURE

This review of literature focuses on two main areas. The first section provides an overview of various cognitive factors that have been used in the development and application of career development theories, as well as an in-depth examination of the Cognitive Information Processing (CIP) approach. This section will also include a discussion of how the various measurements used in this study may be applied to CIP. The second major section examines computer-assisted career guidance (CACG) systems, with particular attention given to the DISCOVER program and the research surrounding its use.

2.1 Cognitive Factors in Career Development

The role of client cognitive factors in the career development process is a relatively new conceptualization in the career development field and one requiring further research (Heppner & Heppner, 2003). Given the importance of cognitive factors in the larger field of psychology, it is surprising to note that the application of cognitive factors has not had the same significance in career theory development or research. The early vocational theories (e.g., Parsons) did focus on cognitive abilities insomuch as individuals' skills (verbal, mathematical, spatial, etc.) would be assessed and then matched to a job appropriate to those skill levels. The application of later career development theories, while still assessing cognitive skills, de-emphasized their scoring.

Gottfredson suggests that social movements such as the civil rights and women's movements influenced career counselors, making them "reluctant to tell counselees they could not become whatever they wished to be" (Gottfredson, 2003, p. 116). In effect, interests (what one likes) and skills (what one is good at doing) were conflated in order to de-emphasize the negative aspects associated with not being adept in certain domains of skills. Thus, if a career counseling client had a low skill level but a high interest level in an area, the counselor simply would encourage the client to focus on improving skills, regardless of whether the client had the capacity to truly do so.

Only recently have career counselors begun to seriously consider the role of complex cognitive factors in career decision making (Gottfredson, 2003; Heppner & Heppner, 2003). The most significant research into cognitive factors and career development has been related to career decision-making self-efficacy (CDMSE), which grew in large part from SCCT's emphasis on the interaction between cognitions and learning experiences in guiding career behavior. The impact of CACG systems on CDMSE has been part of this research (CDMSE studies related to DISCOVER will be discussed later in this section). Because of its added emphasis on the role of cognition, the CIP approach provides the opportunity to expand research into the relationship of cognitive factors and career decision making.

2.1.1 Cognitive Information Processing (CIP) Theory

The CIP approach is based on the premise "that career counseling should focus more on helping individuals develop the capability to make wise career decisions, rather than on the appropriateness of the decision itself" (Gary W. Peterson et al., 1991, p. 15). Peterson, Sampson, and Reardon based their ideas for the CIP approach on the cognitive science theories of Hunt

(1971), Lackman, Lackman, and Butterfield (1979), and Newell and Simon (1972). As such, the CIP approach focuses on how career decisions are made, rather than emphasizing the outcome of the decision.

Peterson et al. (1991) base the CIP approach on the following ten assumptions:

1. Career choice results from an interaction of cognitive and affective processes.
2. Making career choices is a problem-solving activity.
3. The capabilities of career problem solvers depend on the availability of cognitive operations as well as knowledge.
4. Career problem solving is a high-memory-load task.
5. Motivation.
6. Career development involves continual growth and change in knowledge and structures.
7. Career identity depends on self-knowledge.
8. Career maturity depends on one's ability to solve career problems.
9. The ultimate goal of career counseling is achieved by facilitating the growth of information processing skills.
10. The ultimate aim of career counseling is to enhance the client's capabilities as a career problem solver and a decision maker. (pp. 8-9)

These assumptions are incorporated into three components graphically represented by the pyramid of information-processing domains in career decision making (Figure 1). The foundation of the pyramid represents a knowledge domain consisting of self-knowledge (individuals' understanding of their skills, interests, and values) and occupational knowledge (information such as working conditions, training requirements, and salary information,

combined with an understanding of the similarities and differences between different occupations); the importance of this latter form of occupational knowledge is that with increased sophistication in this area, occupational alternatives are increased and individuals become better able to evaluate the options available to them (Gary W. Peterson et al., 1991).

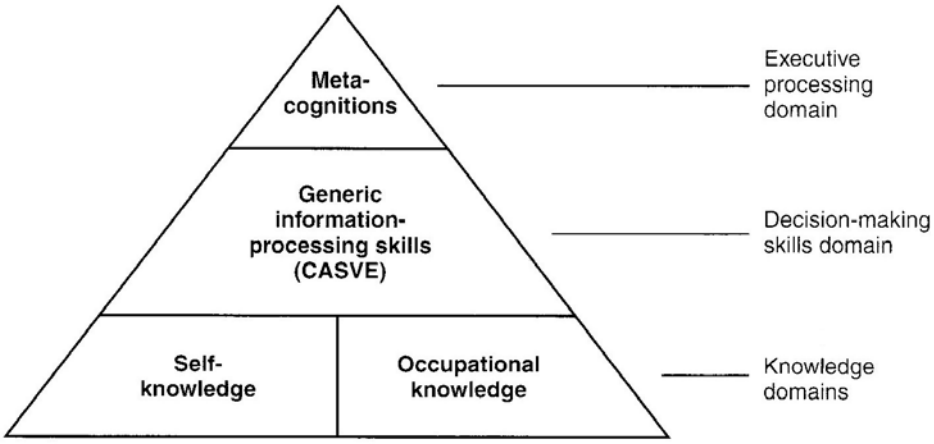


Figure 1. Pyramid of Information Processing Domains in Career Decision Making.

From *Career development and planning: A comprehensive approach* (2nd ed.), by R. C. Reardon, J. G. Lenz, J. P. Sampson, and G. W. Peterson, 2005. Reprinted with permission of Custom Publishing, a division of Thomson Learning: www.thomsonrights.com Fax 800-730-2215.

One of the key concepts in the CIP approach relates to the notion of a career-related *problem* and subsequent *problem solving*. CIP defines a career problem as a "gap between an existing and a desired state of affairs…the difference between where a person is and where he or she wants to be" (Sampson, Lenz, Reardon, & Peterson, 1999, p. 5). An example of a gap or problem could be a college student who knows that he or she needs to declare a major (the existing state) and having made the right choice of major (the ideal or desired state). This gap is closed through problem solving and decision making in the second domain of the pyramid of information-processing domains. This decision-making skills domain of the pyramid contains a

generic information processing model applied to career decision making called the CASVE cycle (Figure 2).

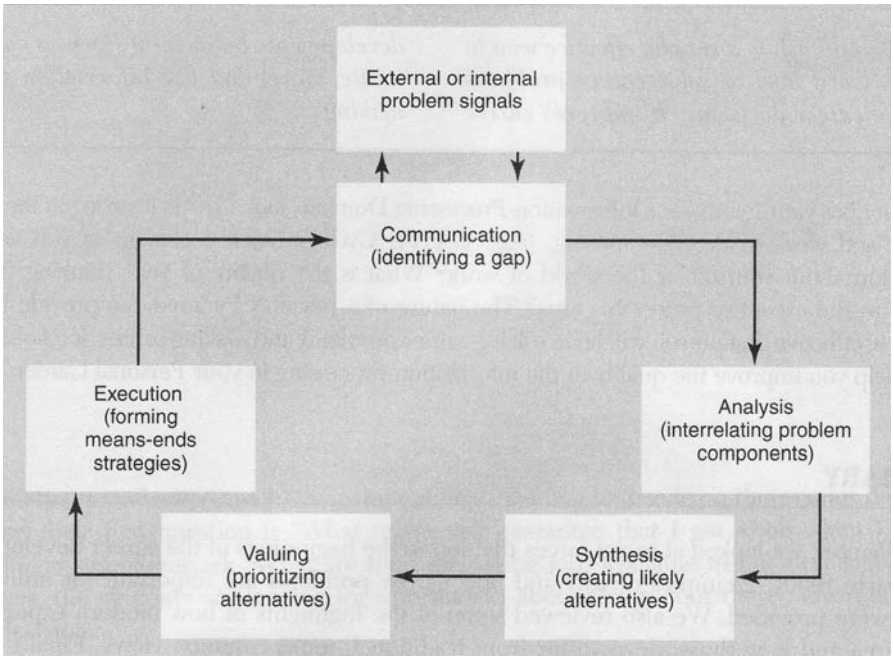


Figure 2. The Five Stages of the CASVE Cycle.

From *Career development and planning: A comprehensive approach* (2nd ed.), by R. C. Reardon, J. G. Lenz, J. P. Sampson, and G. W. Peterson, 2005. Reprinted with permission of Custom Publishing, a division of Thomson Learning: www.thomsonrights.com Fax 800-730-2215.

In the *communication* (C) phase, an individual identifies a gap through internal cues (the identification of emotional states such as depression, behaviors such as avoidance, or physiological states such as headaches) or external cues (events such as the need to declare a major or the influence of others such as friends, family, or educators). Once the gap is recognized, individuals must engage in an *analysis* (A) to determine what is required to resolve the problem. This may include enhancing one's self-knowledge or occupational knowledge or even learning new problem solving skills. *Synthesis* (S) involves both elaboration (identifying as many possible solutions to a career problem as possible) and crystallization (identifying those

options that are realistic alternatives for the individual). When *valuing* (V), individuals prioritize the alternatives available to them, often based on a cost/benefit analysis that may include the alternatives' impact on themselves and others. Through the valuing process, a tentative first choice is identified. The *execution* (E) phase involves forming a plan of action to implement the primary choice identified. Returning to the communication phase, individuals must then evaluate whether the initial gap has been closed (Gary W. Peterson et al., 1991; Sampson, Lenz et al., 1999).

The final component of the pyramid is the executive processing domain. This domain consists of metacognitive skills that influence how one approaches the decision-making and knowledge domains. In CIP theory, the three important skills in this area are self-talk, self-awareness, and control and monitoring (Reardon et al., 2000). Self-talk can be positive ("I am confident that I will be able to make a good career decision"), leading to effective career problem solving, or it can be negative ("I'll never be able to make the right career choice"), leading to career indecision. Self-awareness is important because effective problem solvers have an understanding of how their values, beliefs, and biases influence their decisions. Finally, effective problem solvers are also able to monitor and control their progress through the decision-making process; they are able to effectively plan and implement a course of action (including knowing when they may need help) and they are able to manage their emotions to mitigate the impact any negative feelings may have on the process (Reardon et al., 2000; Sampson, Lenz et al., 1999). These metacognitions are believed to have a strong impact on career problem solving (Reardon et al., 2000). At the same time, they are very difficult to change because these cognitive processes are ingrained in an individual as a result of their learned experiences with problem solving (Sampson et al., 1996).

In this study, individuals' levels within each of the three domains of the information processing pyramid will be assessed through the following constructs: vocational identity will be used for the knowledge domains; dysfunctional career thoughts will be used for the decision-making skills domain; and need for cognition will be used for the executive processing domain. The remainder of this section will discuss each of these constructs and their relation to the CIP model.

2.1.2 Need for Cognition

Gottfredson (2003) believes that an understanding of a client's cognitive abilities is particularly important when examining the effectiveness of career theories that emphasize the career decision process, rather than outcome, and that broad, stable cognitive abilities will greatly impact an individual's career decision making. In this study need for cognition is believed to represent one such stable cognitive ability. While CIP theory divides the executive processing domain into three components (self-talk, self-awareness, and control and monitoring), the theory is, at its core, cognitively based. As such, a construct that provides a global measure of the degree to which an individual enjoys engaging in cognitive tasks (i.e., need for cognition) would appear to be an appropriate representation to unify all metacognitive tasks within the executive processing domain.

Need for cognition has been related to increased performance by college students on a number of cognitive tasks. College students with high need for cognition received higher grades than those with low need for cognition on material requiring a high level of cognitive effort (Leone & Dalton, 1988). High need for cognition college students generated more complex and elaborate explanations in their answers to questions (Sadowski & Gulgoz, 1996) and solved more

GRE analytical problems correctly (S. Coutinho et al., 2005) than those with low need for cognition. Additionally, high need for cognition in college students has been related to greater overall life satisfaction (S. A. Coutinho & Woolery, 2004).

Need for cognition has also been used to research Internet use. Individuals high in need for cognition were found to be more likely than those with low need for cognition to use the Internet to seek information (Das, Echambadi, McCardle, & Luckett, 2003; Tuten & Bosnjak, 2001). Additionally, Amichai-Hamburger, Kaynar, and Fine (2007) found that low need for cognition was associated with a preference for websites that provide a degree of interactivity, suggesting that that individuals low in need for cognition prefer to have information in websites easily accessible though links provided to them, rather than having to search for the information themselves.

2.1.3 Vocational Identity

The construct of vocational identity was chosen to assess the knowledge domains in the information processing pyramid because high vocational identity is defined as having a "clear and stable picture of one's goals, interests and talents" (J. L. Holland et al., 1980, p. 1). This definition is similar to that of the self-knowledge dimension of the knowledge domain of CIP theory. Furthermore, as the knowledge domain builds a solid foundation for subsequent career decision making within the CIP model, a high vocational identity is believed to "lead to relatively untroubled decision making and confidence in one's ability to make good decisions in the face of some inevitable environmental ambiguities" (J. L. Holland et al., 1980, p. 1).

The formation of vocational identity is believed to be a crucial component in the career development process (Savickas, 1985; Sharf, 2002). Studies have shown a relationship between

high levels of vocational identity and positive aspects of career development, such as a rational career decision-making style (Leong & Morris, 1989), vocational commitment (Grotevant & Thorbecke, 1982), and decreased levels of dysfunctional career thinking (Sampson et al., 1996). Other studies have indicated a positive correlation between vocational identity and career decidedness (Holland & Holland, 1977). In addition, Lucas, Gysbers, Buescher, and Heppner (1988) found that college students who had difficulty committing to a major had lower levels of vocational identity.

Regarding the effect of career interventions on vocational identity, completing a college career development education course was associated with an increase in vocational identity (Ware, 1985). Additionally, increases in vocational identity have been correlated with using a CACG system (specific studies related to the DISCOVER program in this regard are referenced later in the review of the literature).

2.1.4 Dysfunctional Career Thoughts

Dysfunctional (or negative or self-defeating) career thoughts as they apply to the decision-making skills domain will be measured by the total score on the Career Thoughts Inventory (CTI). The CTI is based on CIP theory and was designed by the creators of CIP. When the CTI was developed, items were selected that represented all three domains of the information processing pyramid because it is believed that dysfunctional career thoughts can occur at any point in the CIP process (Reardon et al., 2000; Sampson, Peterson, Lenz, Reardon, & Saunders, 1999). As such, scores on the CTI include the total score, a global indicator of dysfunctional career thinking, as well as three subscales that were identified through factor analysis: the

Decision Making Confusion (DMC) scale assesses a person's inability to initiate or sustain the decision process; the Commitment Anxiety (CA) scale measures the degree to which anxiety-producing thoughts may be contributing to indecision; and the External Conflict (EC) scale assesses the ability to balance self-perceptions with the input from significant others (Sampson et al., 1996; Sampson, Peterson et al., 1999).

It should be noted that there are some concerns about the CTI subscales. For example, Gilbert (1997) notes that the EC scale is based on only five out of the 48 items on the CTI. Additionally, the subscales may only represent components of the various CIP domains. The CA scale, for example, may only reflect the monitoring and controlling aspects of the executive processing domain. Similarly, the EC scale appears to focus on the communication component of the CASVE cycle. Because the CASVE cycle of the decision-making skills domain is influenced by the executive processing and knowledge domains, only the CTI total score, a composite of items representing all three domains, represents a pervasive level of dysfunctional/negative career thinking and will be used for hypothesis testing in this study.

In the literature related to this area, several studies have found a relationship between high levels of dysfunctional career thoughts and high levels of career indecision (Johnston, 2002; Kleiman et al., 2004; Debra Sue Osborn, 1998; Saunders, 1997). Other relationships have been found between high levels of dysfunctional career thoughts and high levels of family conflict (Dodge, 2001) and some forms of anger (Strausberger, 1998). In addition, individuals having a strong sense of coherence (i.e., viewing the world as easily understood and manageable) tend to have lower levels of dysfunctional career thoughts (Lustig & Strauser, 2002). Finally, there appears to be a relationship between high levels of dysfunctional career thoughts and the inability to choose a college major (Kilk, 1997).

Regarding the effect of career interventions on dysfunctional career thoughts, Kilk (1997) also found no differences in the overall level of dysfunctional career thoughts between students participating in a college career course and those who did not; however, the researcher did find a significant difference between the two groups in the DMC subscale of the CTI. In contrast, (Reed, Reardon, Lenz, & Leierer, 2001) found significant decreases in the CTI total score and all three subscales among students who completed a college career course.

The literature applying CIP theory specifically to CACG systems is sparse. Most is from the creators of CIP theory (Sampson, Peterson, & Reardon, 1989), offering guidance to counselors regarding the implementation of the CIP approach with a CACG system. One research study of note is a survey of client anticipations of CACG system use conducted by Osborn, Peterson, Sampson, and Reardon (2003), where the researchers classified participant responses according the CIP framework, and after analysis, offered brief recommendations for counselors. As previously noted, this study seeks to add to this area of the literature.

With the recent attention in the literature emphasizing the process of career development interventions over outcomes, many researchers suggest that effective career development interventions should focus on changing the dysfunctional career thoughts of clients (Kilk, 1997; D. S. Osborn et al., 2003; Reed et al., 2001; Saunders, 1997). The CIP approach offers a model to do so. Beyond the application of CIP to CACG systems noted above, intervention strategies employing the CIP approach with college students have been developed for a number of populations and areas including career services offices (Gary W. Peterson et al., 1991; Sampson & Peterson, 1992), academic advising (Mayhall & Burg, 2002), and student athletes (Wooten, 1994). This study seeks to add to the research base providing a rationale for the development of more interventions such as these.

2.2 Computer-Assisted Career Guidance Systems

As previously noted, computer-assisted career guidance systems (CACG systems) were first developed in the 1960s and 1970s. According to Katz (1993), CACG systems were developed because students believed they were not receiving needed career guidance in college and because evaluations of career guidance services showed a lack of quality and effectiveness. Seeing these deficits as harming recruitment and retention rates, colleges and universities turned to CACG systems as a means to provide cost-effective career services to students (Katz, 1993).

While some may view CACG systems as a panacea for solving career-related problems, others take a more measured approach. Gati (1994; 1996) suggests that there are a number of concerns with CACG systems from accuracy in the data base of occupations used in the system to the inability of the system to adapt to the ambiguities inherent in human decision making. Other issues noted with CACG systems include the inability of the system to assess client readiness to make a decision or to choose appropriate decision-making strategies (Brown, 2003), individual differences in learning style and personality type (Isaacson & Brown, 2000; Niles & Harris-Bowlsbey, 2005), individual cognitive differences (N. Peterson & Gonzalez, 2005), and the need for human support in addition to the services provided by the CACG system (Taber & Luzzo, 1999). Even with these cautions, the research on CACG system effectiveness has been generally positive (Barnes & Herr, 1998; Garis & Niles, 1990; G. W. Peterson, Ryan-Jones, Sampson, Reardon, & Shahnasarian, 1994; Pinder, 1984; Sampson & Norris, 1997).

Since their creation, CACG systems have been refined from use on large mainframe computer systems to stand-alone microcomputers. Most recently, CACG systems have integrated with the Internet to provide up-to-date access to career resources and information. This section will provide an overview of CACG systems, with emphasis on factors researchers believe make

for a quality systems, and will include a discussion of the research related to the DISCOVER program.

2.2.1 Components of CACG Systems

The early development of CACG systems relied on the career development theories of the time, notably, the Parsonian trait-factor model. CACG systems were well-suited for individuals to complete any number of assessments related to their values, skills, and interests, then match those individual traits to occupations which required similar factors in order to be successful in the job. As more CACG systems were developed, other theoretical models were incorporated into their design (e.g., DISCOVER, which will be discussed later in this section, relies on John Holland's model to organize how it presents occupational options to individuals).

CACG systems not only provide choices to individuals, the programs also offer individuals guidance on how to implement a plan to achieve their career goals. Katz (1993) describes the four major features of a CACG system as helping people:

1. know themselves in terms that are relevant for career decisions;
2. use these self-appraisals to narrow the staggering number and bewildering variety of occupations into a comprehensive but manageable list of options worthy of further consideration (I say "narrow" from the [CACG system] developer's point of view. For the user, the search does not merely eliminate occupations; it often suggests occupations not previously known or considered and may be seen as expanding options);
3. make distinctions between occupations on the list and so close on a choice that offers an optimal combination of desirability and probability of successful entry;

4. make plans and engage in actions designed to implement the choice. (p. 83)

Most modern CACG systems have a visually appealing graphical interface that may include sound clips, short videos, and with a connection to the Internet, access to a number of resources such as professional organizations affiliated with an occupation, up-to-date salary information and employment outlook projections, and other types of relational databases (e.g., the U. S. Department of Labor's Occupational Information Network, O*NET).

The most recent literature pertaining to CACG systems stresses the need to integrate some degree of career counseling with a counselor/therapist in addition to using the CACG system (Harris-Bowlsbey & Sampson, 2001; Sampson & Bloom, 2001; Taber & Luzzo, 1999). Even though both career theorists and practitioners advocate CACG systems in collaboration with a counselor, higher education institutions often allow students to use the systems on a stand-alone basis without such collaboration. CACG systems, then, are readily accessible to students who may use them without guidance. The institution where this study occurs uses DISCOVER in this way, so the research design is such that participants do not work with a counselor as part of this study.

2.2.2 DISCOVER

DISCOVER (ACT Inc., 2005) grew out of the work of JoAnn Harris-Bowlsbey, who created the Computerized Vocational Information System (CVIS) in 1967, which was designed as a computerized career counseling program for high school students. In 1972, the first computer mainframe version of DISCOVER, based on Harris-Bowlsbey's work, was created. The first microcomputer version of DISCOVER was released in 1982; that same year, the DISCOVER Foundation merged with ACT, which currently manages the system. An MS-DOS

version of DISCOVER was released in 1987; the Macintosh version was released in 1995; and the Windows 95 version was released in 1997. ACT also offered different versions of DISCOVER aimed at specific populations: high school students, colleges and adults, middle schools, and the military. The most recent version of DISCOVER, the Internet version, was released in 2002, and is designed for use by high school and college students and adults in the workplace. The Internet version will be used in this study.

The Internet version of DISCOVER is divided into seven areas: Home, Inventories, Occupations, Majors, Schools, Job Search, and My Portfolio (a site map of the Internet version of DISCOVER is provided in Appendix A). The *Home* section is where individuals are taken when they first log onto the system. In this section, users are provided with the opportunity to plan how they wish to use the program (called an individual's "path"). They are also given information about the DISCOVER program and ACT, Inc., including frequently asked questions, research related to DISCOVER, an area to troubleshoot problems using the system, and access to information outside of DISCOVER (e.g., websites from careerbuilder.com and monster.com). The *Inventories* section allows users to take assessments to gauge their interests, abilities, and values. Individuals can use the *Occupations* section to search for information about occupations suggested to them by their assessment results, as well as find occupations sorted by different characteristics, keywords, or academic majors; individuals can also search for information about a specific job title. The *Majors* section provides more detailed searches of occupations related to specific academic majors. Individuals can learn about vocational schools, colleges, and universities in the *Schools* section, which also includes academic programs offered and financial aid information. The *Job Search* section offers practical information about areas such as resumes, cover letters, job search strategies, interviews, internships, and apprenticeships.

Because DISCOVER allows an individual to leave and return to the program at a later time, the *My Portfolio* section contains all the information the individual has saved from previous sessions.

In order to classify occupations and to show relatedness between areas, DISCOVER uses the World-of-Work Map (see Appendix B) which expands Holland's hexagonal model into a circle consisting of a refinement of the six groups in Holland's model into Technical, Science & Technology, Arts, Social Service, Administration & Sales, and Business Operations areas. It also includes the primary work tasks of occupations (working with people, data, things, or ideas). The circle is divided into 12 regions, and within the circle are 26 families of occupations called career areas that are based on similar work tasks.

The majority of career studies related to DISCOVER were from the 1970s & 1980s (Mau, 1999). Taber and Luzzo (1999) in their review of the literature surrounding outcomes of 26 studies measuring the effectiveness of DISCOVER from 1978-1998, "found that it increases users' vocational identity, level of career development, and career decision-making self-efficacy" (p. ii). However, their review found mixed results "regarding the effectiveness of DISCOVER as a tool for increasing career decidedness, occupational certainty, career maturity, and career exploration" (p. ii).

Two additional studies were found after Taber and Luzzo's review that may call into question one of their conclusions. Maples and Luzzo (2005) found that college students' career decision-making self-efficacy increased after using DISCOVER; however Brake (2001) found that the career decision-making self-efficacy of adolescents in foster care did not increase after using DISCOVER. It should be noted that Brake reported high levels of career decision-making

self-efficacy in the participants prior to using DISCOVER, which may account for the lack of an effect found.

It is interesting to note that the mixed results appear in those studies measuring final outcomes of the career decision-making process or those related to the decision-making process itself. These include outcome measures such as career decidedness, defined as "the degree to which an individual is decided on entering a particular career" (Taber & Luzzo, 1999, p. 7); occupational certainty, defined as "one's commitment to an occupational choice" (Taber & Luzzo, 1999, p. 7); career maturity, which relates to "task coping, or the implementation of behavior that leads to a satisfactory outcome of the developmental task" (Taber & Luzzo, 1999, p. 14); and career exploration, "career information-seeking behavior" (Taber & Luzzo, 1999, p. 25). These four constructs all appear to be related to the CASVE cycle within the decision-making skills domain of the pyramid of information processing of the CIP model.

In contrast, studies assessing the effect of DISCOVER on foundational aspects of the career decision-making process (i.e., the knowledge domain of the CIP model) tend to show increases after DISCOVER use. These constructs include level of career development, which is related to "clarification of values, understanding interests and competencies" (Taber & Luzzo, 1999, p. 21), and of particular importance to this study, vocational identity. The only study not congruent with these findings was a dissertation by Yonkovig (1987), in which no difference was found between the posttest vocational identity measures of college students using DISCOVER and those in the control group who did not use DISCOVER. The research design used, however, encouraged those in the control group "to begin to read career literature, think about potential careers, and talk with friends and relatives about career-related ideas" (Yonkovig, 1987, p. 21). By doing so, those in the control group were increasing their vocational identity, which may

account for the lack of differences in vocational identity between the control and experimental groups.

2.3 Summary of Literature

The research pertaining to DISCOVER indicates mixed effectiveness of the program in assisting individuals with career guidance. By considering how different outcome measures may relate to dimensions of the CIP career development theory, this study seeks to address the discrepancies in the previous research. In addition, most theoretical models for career development pre-date the creation of CACG systems; as such, career theories often have informed the development of CACG systems. This study will be unique in that it relates a career theory from the early 1990s with a CACG system created in the 1970s in an effort to determine whether an emergent career development model can be applied to a computer system that pre-dates the theory.

3.0 METHODS

This chapter outlines the general research questions for this study and the specific hypotheses related to the questions. It also describes the study's research design, the selection of participants and research procedures, and an overview of the measures used. The chapter concludes with a description of the data analysis, including the rationale for the statistics chosen.

3.1 Research Questions

There are three research questions examined in this study:

1. What is the relationship between need for cognition, vocational identity, dysfunctional career thoughts, and DISCOVER use?
2. How does vocational identity change after DISCOVER use?
3. How does dysfunctional career thinking change after DISCOVER use?

3.2 Hypotheses

Based on the research questions examined in this study, the following hypotheses are proposed:

Hypothesis 1: Individuals with higher levels of need for cognition will show greater increases in posttest measures of vocational identity and greater decreases in dysfunctional career thinking after using DISCOVER as compared to those with lower levels of need for cognition.

Hypothesis 2: Individuals with higher levels of need for cognition will be more engaged in the DISCOVER computer program, as evidenced by spending more time using the program and by planning a strategy to approach using the program before beginning it; these individuals will also be more likely to save their data and return to the program at a later time.

Hypothesis 3: Individuals with lower levels of vocational identity prior to using DISCOVER will show increased levels of vocational identity after using DISCOVER.

Hypothesis 4: Individuals with higher levels of vocational identity prior to using DISCOVER will show greater decreases in dysfunctional career thinking after using DISCOVER as compared to individuals with lower levels of vocational identity.

3.3 Research Design

A pretest-posttest design was used to assess the impact of the DISCOVER computer program on vocational identity, as measured by the Vocational Identity (VI) scale of the My Vocational Situation (MVS), and dysfunctional career thinking, as measured by the Total score of the Career Thoughts Inventory (CTI). Additionally, participants' need for cognition, as measured by the Need for Cognition Scale (NCS) prior to the DISCOVER intervention, were correlated with pretest and posttest measures of vocational identity and dysfunctional career thinking, as well as participants' responses on a posttest questionnaire regarding DISCOVER use (Appendix C). Participants were recruited and received the pretests in January and February

2007. After completing the pretests, participants then used DISCOVER on their own time for as long as they wished, and returned the posttest assessments to the researcher. Data were analyzed in March 2007, using SPSS 15.0 for Windows.

3.4 Participants

Undergraduate participants were recruited from the University of Pittsburgh, Pittsburgh Campus. Volunteers for this study met two criteria: they identified themselves as undecided or unsure of their career paths and they were between 18-24 years of age. The age criterion was established by the researcher in order for participants to be classified as part of the Millennial Generation (Howe & Strauss, 2000). Participants were recruited through flyers in the posted in public areas of the university (Appendix D) and through posting on the institution's Office of Clinical Research web-based "study finder" designed to help potential volunteers identify research studies that may be of interest to them. The Freshman Program Office in the School of Engineering and the Career Services Office also informed staff and students of this study and procedures to contact the researcher for those interested in participation.

Participants also were recruited at the group advising information sessions for undeclared students within the School of Arts and Sciences. The researcher was given time to present an overview of the study to groups of freshmen as part of the group program. After the group program was completed, individuals would schedule individual meeting times with their advisors. The researcher was available after students scheduled their advising appointments to meet with potential participants to answer questions and begin the research protocol. In addition, the researcher recruited participants by staffing a table in a residence hall complex lobby.

Potential participants would approach the researcher, who then would provide an overview of the study, answer any questions, and if the individual wished to participate, begin the research protocol. Students wishing to participate in this study not recruited through the School of Arts and Sciences group advising session or in a residence hall lobby contacted the researcher to make arrangements to attend either a group or individual meeting with the researcher where they received an overview of the study. Students recruited at the School of Arts and Sciences group sessions received the overview in the group setting. If a student approached the researcher while at a table in a residence hall lobby, the overview of the study was presented immediately upon the participant expressing an interest in the study.

3.5 Procedures

After hearing the overview of the research, if students wished to participate in the study, they completed the informed consent documents and the first series of assessments: the Need for Cognition Scale (NCS), the Vocational Identity (VI) scale of the My Vocational Situation (MVS), and the Career Thoughts Inventory (CTI). At that time they also completed a demographic information sheet recording their gender, age, ethnicity, and year in school. Once finished with the three assessments and demographic information sheet (Appendix E), participants were given an envelope containing written instructions on how to access the DISCOVER program (Appendix F), as well as the posttests (the VI scale of the MVS and the CTI), along with a sheet containing several questions regarding their use of DISCOVER. The envelope containing these items was addressed to the researcher, and participants were instructed to return the posttest documents to the researcher in the envelope through the university's

campus mail system. The NCS was not administered as a posttest because it is generally believed to be stable (Cacioppo & Petty, 1982; Cacioppo, Petty, Feinstein, & Jarvis, 1996).

All assessments, the demographic information, and the questionnaire regarding DISCOVER use were linked by a numerical code written by the researcher on the materials. This code, however, was not matched to an individual's name to ensure that any information provided by a participant cannot be linked to a specific individual. Because participants used DISCOVER and completed the posttest materials on their own time, two email reminders were sent to all participants at approximately one-week intervals in an effort to reduce attrition. Participants were given the option of providing an email address to the researcher to facilitate this process (Appendix G). The email addresses were not linked to any of the assessments, the demographic information, or the questionnaire regarding DISCOVER use, so the researcher did not know the names of individuals who had returned the second set of assessments. As such, all participants received both email reminders, even if they had returned the posttest assessments to the researcher.

3.6 Measures

3.6.1 Career Thoughts Inventory (CTI)

According to CIP theory, career decision making occurs in the information processing domain. Problems associated with the decision-making process are believed to arise from an individual's dysfunctional career thinking (also called negative career thoughts). The Career Thoughts Inventory (CTI) was designed by the creators of CIP theory to measure dysfunctional

career thinking that interferes with the career development process. The CTI consists of three scales derived from responses to 48 items: the Decision Making Confusion (DMC) scale assesses a person's inability to initiate or sustain the decision process; the Commitment Anxiety (CA) scale measures the degree to which anxiety-producing thoughts may be contributing to indecision; and the External Conflict (EC) scale assesses ability to balance self-perceptions with the input from significant others. The CTI also provides a Total score, a global indicator of negative/dysfunctional career thinking (Sampson et al., 1996; Sampson, Peterson et al., 1999).

With regard to reliability, the CTI Total score is reported to have an internal consistency ranging from .93 to .97; internal consistency for the three construct scales range from .74 to .94 (.90 to .94 for the DMC scale, .79 to .91 for the CA scale, and .74 to .81 for the EC scale) (Sampson et al., 1996). A recent study by Strauser, Lustig, and Uruk (2006) found similar internal consistency results: .97 for the CTI Total, .96 for the DMC scale, .89 for the CA scale, and .83 for the EC scale. Four-week test-retest reliability was found to be .77 for the DMC scale, .75 for the CA scale, and .63 for the EC scale (Sampson et al., 1996).

Because researchers used CIP theory to guide the construction of the CTI, evidence of content validity was achieved through congruence between dimensions of CIP theory and the construction of the CTI items and scales. Evidence of construct validity was determined by high correlations between the CTI Total score and scores on the three subscales. Finally, convergent validity was established through relating the CTI to the My Vocational Situation, the Career Decision Scale, and the Career Decision Profile; the CTI was consistently inversely correlated with positive constructs of career development (Sampson et al., 1996; Sampson, Peterson et al., 1999).

3.6.2 My Vocational Situation (MVS)

The My Vocational Situation (MVS) consists of three scales derived from 26 items: the Occupational Information (OI) scale measures the need for vocational information; the Barriers (B) score is an indication of perceived external obstacles to achieving a career goal; and the Vocational Identity (VI) scale measures the possession of a clear and stable picture of one's goals, interests, personality, and talents. (J. L. Holland et al., 1980). According to CIP theory, the development of self-knowledge and occupational knowledge is the first learning process that must occur; subsequent decision-making processes build upon this foundation. A high level of vocational identity, in turn, should lead to relatively untroubled decision making and confidence in one's ability to make good decisions (J. L. Holland et al., 1980).

Lunneborg (1985) reports internal consistency estimates for the VI scale ranging from .86 to .89. Test reviewers concluded that while the VI scale has adequate reliability, there are low reliability levels on the OI scale (KR 20s range from .39 to .79) and on the B scale (KR 20s range from .23 to .65) (Lunneborg, 1985; Westbrook, 1985). Such low reliability, due in part to only a few questions on the MVS that are used to assess OI and B (only four questions are used for each construct), led J. L. Holland et al. (1980) to conclude that the OI and B scales should be used only as checklists. Finally, Holland, Johnston, and Asama (1993) report test-retest reliability for the entire MVS of approximately .75 at intervals of one to three months.

Regarding validity, Holland, Gottfredson, and Power (1980) and Lucas, Gysbers, Buescher, and Heppner (1988) found high internal consistency on the VI scale. Additionally, construct validity was established by J. L. Holland et al. (1980) during the initial development of the MVS when the researchers found correlations in the expected direction across age, number of occupations the person was considering, and number of different types of occupations named.

Test evaluators caution, however, that these correlations, while in the expected direction, are relatively weak (Lunneborg, 1985; Westbrook, 1985). Most relevant to this study, the VI scale is negatively correlated with measures on the CTI (Dodge, 2001; Johnston, 2002; Strausberger, 1998; Strauser et al., 2006; Yanchak, Lease, & Strauser, 2005). Thus, low levels of vocational identity are associated with high levels of dysfunctional career thoughts. Because of this study hypothesizes that high levels of vocational identity must be achieved before an individual can address more complex areas of problem solving effectively, and because of suspect reliability and validity of the other two MVS scales, only the VI scale was used in this study.

3.6.3 Need for Cognition Scale (NCS)

This study used the 18-item short form of the NCS which is designed to assess "an individual's tendency to engage in and enjoy effortful cognitive endeavors" (Cacioppo et al., 1984, p. 306). This construct was selected to represent the executive processing (metacognitions) dimension of CIP theory. Because making a career decision is a task that involves cognitive effort, is hypothesized that the need for cognition forms a foundation for various outcomes associated with DISCOVER use. Individuals with a high need for cognition will enjoy the decision-making process and should show greater gains on various outcome measures, specifically vocational identity and dysfunctional career thinking, as well as should spend more time using the DISCOVER program, than those with a low need for cognition.

Cacioppo et al. (1984) found a significant correlation ($r = 0.95$, $p < .001$) between the items on the short form and those on the longer 34-item NCS, as well as high internal consistency on the NCS short form (Cronbach's alpha of .90). Similarly, high reliability estimates for the NCS short form (Cronbach's alpha of .84) have been reported by Waters and

Zakrajsek (as cited in Forsterlee & Ho, 1999). Sadowski (1993) found the NCS short form to be free of gender bias when used with a homogeneous population. Finally, multiple researchers have concluded that there is one dominant factor (construct) reflected in the NCS items (Cacioppo et al., 1984; Forsterlee & Ho, 1999; Sadowski, 1993).

3.6.4 Questionnaire Regarding DISCOVER Use

The questionnaire regarding DISCOVER use consists of seven questions designed by the researcher to obtain participants' self-reports concerning aspects related to how they used the program. Participants were asked the total amount of time spent using DISCOVER as well as whether they used DISCOVER in one session or saved their work to return to it later. A Likert scale was used to assess the following from participants: ease of DISCOVER use; if they developed a strategy to approach DISCOVER before using the program; whether they would have liked the opportunity to consult with a career counselor while using the program; if they would have liked to use DISCOVER in a group setting with other students; and whether they planned to continue to use DISCOVER after they had completed the study.

4.0 RESULTS

This chapter presents the results of the statistical analyses conducted to address the research hypotheses. It begins with a discussion of the assignment of participants to groups based on pre-DISCOVER measure of vocational identity. This chapter also includes descriptive statistics for the sample on the formal assessments administered and DISCOVER use patterns and attitudes from the questionnaire.

4.1 Participant Group Assignment

Prior to using DISCOVER, it was anticipated that individuals should fall into one of two categories: they should have low levels of vocational identity (as measured by the VI scale on the MVS) combined with high levels of dysfunctional career thinking (as measured by the total score on the CTI) or they should have high levels of vocational identity combined with high levels of dysfunctional career thinking. It was hypothesized that individuals must establish a high level of vocational identity before the level of dysfunctional career thinking can be significantly lowered. Therefore, after using DISCOVER, it was hypothesized that scores on the measures will change as follows:

Group 1: Initial low VI scale scores on the MVS and high CTI total scores should have significant change (an increase) in VI scale scores with no significant change on

the CTI total scores (i.e., individuals should gain a better understanding of their goals, interests, personality, and talents, but not necessarily improve in their overall level of negative career thoughts; in other words, they have addressed the knowledge domains of CIP theory and are ready to begin working in the decision-making skills domain).

Group 2: Initial high VI scale scores on the MVS and high CTI total scores should show no change on the VI scale scores but show a significant change (a decrease) in CTI total scores (i.e., the knowledge domains are already at the highest level, so there should be no change, while there should be a decrease in dysfunctional career thoughts because the individual has begun to address issues in the decision-making skills domain).

It was anticipated that an initial combination of high VI scale scores and low CTI total scores would have few, if any, individuals in the third possible combination (Group 3), as individuals with this pattern of scores should have formed, or at least be close to forming, a career direction. Since these individuals were already at the highest levels of the career development process or are working within the decision-making skills domain, they would be less likely to be interested in using a computer program designed to help them identify a career direction and might not choose to participate in this study. If there were individuals in this group in the study, they should show little changes in VI scale scores and CTI total scores between pretest and posttest.

There should be no participants in the fourth (Group 4) possible combination of initial scores (initial low VI scale scores and low CTI total scores) because such a pattern of scores (indicating that individuals have a low level of negative/dysfunctional career thoughts, but not a

clear understanding of their interests, skills, and values) is not possible according to career development theory. According to most theories of career development, the foundational step in the process is an individual's self understanding, and an individual cannot resolve the career development process (as related to CIP theory, achieve low levels of negative/dysfunctional career thoughts) without first achieving self-understanding (Niles & Harris-Bowlsbey, 2005). This fourth group should not be confused with those individuals who may choose a career direction and/or major without first gaining an understanding of how their values, skills, and interests may impact this choice. Even though they may have committed to a course of action in their career/major, external factors, such as their parents' wishes, will have influenced these individuals and they will be in a state of foreclosure in terms of their career identity (Marcia, 1966). These individuals would have low levels of vocational identity and high CTI total scores (i.e., they would be in Group 1 noted above) because they have not engaged in the career decision-making process.

Because both the MVS and the CTI have established norms for college students, participants were assigned to groups based on their pre-DISCOVER scores on these two assessments. If an individual scored at or above the reported mean for the norm group for an assessment, the individual would be considered high on that assessment's measure. Specifically, the reported mean for college students on the VI scale of the MVS is 11 (J. L. Holland et al., 1980), so individuals in this study with scores of 11 or greater would be classified as having high vocational identity, and scores of 10 or lower would be classified as having low vocational identity. The reported mean for college students on the CTI total score (a *T* score of 50) is a range between 46-48 (Sampson et al., 1996), so individuals in this study with scores of 46 or greater would be classified as having high levels of dysfunctional career thinking.

As expected, when the pretest data were examined, few participants were found in Group 3 (6 participants) or Group 4 (0 participants). However, few participants also were found in Group 2 (6 participants); the remaining 88 participants were in Group 1. This may be accounted for by the fact that the norm group for college students consisted of individuals at both low and high levels of vocational identity, while this study targeted individuals with low levels of vocational identity by recruiting individuals who were "uncertain" of their career plans or academic major (see sample recruitment flyer in Appendix D). Additionally, the literature regarding the norm mean for vocational identity listed several concerns. Norms were established by the creators of the MVS and were reported in the test manual, but they caution that the norms should be considered "rough definitions" due to the "haphazard sampling" used in their establishment and they recommend the "development of local norms." (J. L. Holland et al., 1980, p. 6).

With this in mind, the decision was made to use a sample mean based on those individuals completing the posttest measures (M = 4.86, SD = 2.16) as the new cutoff point to distinguish between low and high levels of vocational identity. (For reference, the mean of the 94 individuals completing the pretests, which excludes the six individuals in Group 3, was 5.32, SD = 3.01.) As such, individuals with scores of 5 or greater would be classified as having high vocational identity, and scores of 4 or lower would be classified as having low vocational identity. This new grouping resulted in 31 individuals in Group 1 and 63 individuals in Group 2. Table 1 outlines the distribution of participants into groups using the norm mean for vocational identity and the sample mean for vocational identity.

Table 1.

Pre-DISCOVER Groupings Based on Vocational Identity Pretest Scores Using Reported Norm Mean and Sample Mean

Pretest Grouping	Number ($N = 100$)	Percentage
Using Norm Mean		
Group 1	88	88
Group 2	6	6
Group 3	6	6
Group 4	0	0
Using Sample Mean		
Group 1	31	31
Group 2	63	63
Group 3	6	6
Group 4	0	0

Because this study used a pretest/posttest design, attrition was expected. As previously noted, the sample mean for vocational identity was based on the vocational identity scores of those participants who completed the second set of assessments. Out of the 100 initial participants, 65 returned the second set of assessments. The specific pretest groupings for the 65 participants, including both grouping by the norm vocational identity mean and by the sample mean, is shown in Table 2. Two of the 65 participants returning posttests were in Group 3, so

data from these two individuals were excluded from analysis. As such, this study has a sample size of 63; all further description and analysis of participants in this study will refer to those 63 participants. Demographic data for this study's participants appears in Table 3.

Table 2.

Post-DISCOVER Groupings Based on Vocational Identity Pretest Scores Using Reported Norm Mean and Sample Mean

Prestest Grouping	Number (N = 65)	Percentage
Using Norm Mean		
Group 1	63	97
Group 2	0	0
Group 3	2	3
Group 4	0	0
Using Sample Mean		
Group 1	18	28
Group 2	45	71
Group 3	2	3
Group 4	0	0

Table 3.

Demographic Information for Participants

Demographic	Number ($N = 63$)	Percent
Gender		
Male	19	30
Female	44	70
Age		
18	45	71
19	18	29
Year in School		
Freshman	63	100
Ethnicity		
Black or African American	4	6
White	58	92
Other Ethnicity	1	2

4.2 Descriptive Statistics

Means and standard deviations on the NCS, pre- and post-VI scale, and pre- and post-CTI are provided for males, females, and combined in Table 4. As previously noted, the means for all

components of this sample (including post-measures) is below the reported mean of 11 for the norm group, indicating that this sample has maintained low levels of vocational identity throughout this study. In addition, the means for all components of this sample (including post-measures) is above the reported mean range of 46-48 for the norm group (Sampson et al., 1996), indicating that this sample has maintained high levels of dysfunctional career thoughts. Other descriptive statistics pertain to the questionnaire regarding DISCOVER use participants completed as a posttest to assess DISCOVER use patterns and attitudes about the program.

Table 4.

Descriptive Statistics for Pretest and Posttest Measures

	Males ($N = 19$)		Females ($N = 44$)		Combined ($N = 63$)	
Assessment	Mean	SD	Mean	SD	Mean	SD
NCS	68.42	10.09	66.73	9.20	67.24	9.43
pre-VI	5.16	2.12	4.73	2.19	4.86	2.16
post-VI	6.74	2.94	7.11	3.38	7.00	3.23
pre-CTI	69.21	12.12	74.57	12.93	72.95	12.84
post-CTI	61.74	13.78	64.36	17.91	63.57	16.71

Note: NCS = Need for Cognition Scale; VI = Vocational Identity Scale of the My Vocational Situation; CTI = Career Thoughts Inventory

4.2.1 DISCOVER Use Patterns and Attitudes

Patterns and attitudes of participants concerning their use of DISCOVER were assessed by a questionnaire designed by the researcher. It consisted of seven questions, five of which were designed on a Likert-type scale; one question asked participants if they used the program only once or saved their session data and returned to the program later ("Did you save your work and go back to it later, or did you do everything all at one time?"); and the final question asked participants to estimate the amount of time spent using DISCOVER ("How much time did you spend using DISCOVER?").

Participants (N = 63) report spending an average of 67.62 minutes (SD = 42.70) using DISCOVER. The time ranged from a minimum of 20 minutes to a maximum of 180 minutes. Because this measure relied on a self-report and participants were not instructed to monitor the amount of time spent using DISCOVER before beginning the program, these time estimates must be considered a limitation.

Because DISCOVER users can save their data and return to it later, participants were asked whether they used the program in one session or whether they saved data and returned to the program later. 36 participants (57%) report using the program in one session; 27 participants (43%) report saving data and returning to it later.

The remaining five questions on the post-DISCOVER questionnaire were designed around a Likert-type scale with 1 indicating strong disagreement with the statement and 6 indicating strong agreement. Means and standard deviations are reported for each of five items using the Likert-type scale in Table 5. The highest mean reported on any of the survey questions (M = 5.14, SD = 1.00) was associated with Question 4 ("When I first began using DISCOVER, I jumped right in and started without planning much of a strategy for how I would use it."),

indicating that participants strongly agreed with this statement; in other words, it appears that most participants in this study started using DISCOVER without planning a "path" on the DISCOVER home page.

Table 5.

Descriptive Statistics for Responses to Likert-Type Items on the Questionnaire Regarding DISCOVER Use

Survey Question	Mean	SD
Q3	4.76	.76
Q4	5.14	1.00
Q5	3.67	1.05
Q6	2.57	1.23
Q7	4.10	1.64

Note: Q3 = DISCOVER was easy to use; Q4 = Did not plan a strategy before using DISCOVER; Q5 = Wanted to talk to a career advisor; Q6 = Would use DISCOVER in a group setting; Q7 = Would use DISCOVER again (Q3-Q7 are items from the questionnaire regarding DISCOVER use, available in Appendix C)

Higher scores (M = 4.76, SD = .76) were found on Question 3 ("I found the DISCOVER program easy to use.") as well as on Question 7 ("I will use the DISCOVER program in the future."), which had a mean of 4.10 and a standard deviation of 1.65, indicating that study participants tended to find DISCOVER easy to use and appeared willing to use it again in the future. Mid-range scores (M = 3.67, SD = 1.05) were found on Question 5 ("I would have liked

to have had the opportunity to talk to a person such as a career advisor or counselor as I was using DISCOVER."), indicating slight agreement with the statement. The lowest scores (M = 2.57, SD = 1.23) were found on Question 6 ("I would like to be able to use a computer program for career decision making together with other students at the same time in a group setting."), indicating that participants may view career decision making using a CACG system as a solitary endeavor.

All questions using the Likert-type scale for responses had a range of at least four out of the six choices selected, so the Pearson correlation was appropriate for use in the analysis of these questions to compare them to other variables with continuous measures in this study. Table 6 reports the correlations between items on the questionnaire regarding DISCOVER use and other appropriate measures in this study, as well as correlations between items on the survey itself. Significant correlations will be addressed in subsequent sections.

4.3 Statistical Analyses

This remainder of this chapter focuses on the statistical analyses conducted to test the hypotheses presented in this study. Each hypothesis is addressed in a separate section. The chapter concludes with an overview of statistical analyses, notably significant correlations found, which are not specifically related to the study's hypotheses.

4.3.1 Hypothesis 1

Hypothesis 1: Individuals with higher levels of need for cognition will show greater increases in posttest measures of vocational identity and greater decreases in dysfunctional career thinking after using DISCOVER as compared to those with lower levels of need for cognition.

This hypothesis suggests that there will be a positive correlation between high levels of need for cognition and greater gain scores in vocational identity and dysfunctional career thoughts. The Pearson correlation was selected to test this hypothesis.

The Pearson correlation did not reveal a significant relationship between level of need for cognition (M = 67.24, SD = 9.43) and change in vocational identity (M = 2.14, SD = 2.47), $r(61)$ = -.018, p = .888, r^2 = .000. Furthermore, a significant relationship was not found between level of need for cognition and change in level of dysfunctional career thoughts (M = 9.38, SD = 10.62), $r(61)$ = .081, p = .527, r^2 = .007. Both of these non-significant relationships also had small effect sizes. Additionally, no statistical relationships were found between cognition and pretest or posttest scores on the VI scale of the MVS or on the CTI (see Table 6 for specific correlation data found). The lack of relationship between need for cognition and change scores on either assessment implies that need for cognition does not have an effect on changes in vocational identity or dysfunctional career thoughts after using DISCOVER.

4.3.2 Hypothesis 2

Hypothesis 2: Individuals with higher levels of need for cognition will be more engaged in the DISCOVER computer program, as evidenced by spending more time using the program

Table 6.

Correlations among Variables

	NFC	preVI	postVI	VIchg	preCTI	postCTI	CTIchg	Q2	Q3	Q4	Q5	Q6	Q7
NFC	__	.187	.111	-.018	-.219	-.220	.081	.041	.368**	-.312*	-.060	.042	-.458**
preVI		__	.644**	-.032	-.720**	-.720**	-.262*	.004	.305*	-.125	-.577**	-.133	-.187
postVI			__	.744**	-.412**	-.648**	-.521**	.133	.376**	-.330**	-.414**	-.207	.155
VIchg				__	.092	-.217	-.452**	.170	.225	-.322*	-.037	-.155	.365**
preCTI					__	.772**	.006	-.094	-.625*	.318*	.564**	.140	.372**
postCTI						__	.640**	.122	-.591**	.399**	.531**	.092	.134
CTIchg							__	.305*	-.174	.243	.154	-.024	-.239
Q2								__	.087	-.287*	-.261*	.008	.162
Q3									__	-.403**	-.469**	-.060	-.137
Q4										__	.370**	-.344**	-.008
Q5											__	.263*	.159
Q6												__	.164
Q7													__

Note: NFC = Need for Cognition; preVI = pre Vocational Identity; postVI = post Vocational Identity; VIchg = Vocational Identity change score; preCTI = pre Career Thoughts Inventory; postCTI = post Career Thoughts Inventory; CTIchg = Career Thoughts Inventory change score; Q2 = Time spent using DISCOVER; Q3 = DISCOVER was easy to use; Q4 = Did not plan a strategy before using DISCOVER; Q5 = Wanted to talk to a career advisor; Q6 = Would use DISCOVER in a group setting; Q7 = Would use DISCOVER again (Q2-Q7 are items from the questionnaire regarding DISCOVER use, available in Appendix C)

* $p < .05$

** $p < .01$

and by planning a strategy to approach using the program before beginning it; these individuals will also be more likely to save their data and return to the program at a later time.

This hypothesis suggests that there will be a positive correlation between high levels of need for cognition and greater time spent using DISCOVER, as well as a positive correlation between high levels of need for cognition and those individuals stating that they planned a strategy to approach using DISCOVER before beginning the program. The Pearson correlation was selected to test these components of the hypothesis.

Because only two groups were used to assess whether participants used DISCOVER once or whether they saved data and returned to it at a later time (i.e., the variables are not continuous), a t-test was selected to determine if there were significant differences in levels of need for cognition between the two groups.

The Pearson correlation did reveal a significant negative relationship with a medium to large effect size between need for cognition and participants' reports of not planning a strategy before using DISCOVER, $r(61) = -.312$, $p = .013$, $r^2 = .097$, implying that those with higher levels of need for cognition were more likely to plan a strategy to approach the DISCOVER program before beginning to use it. However, no significant statistical relationship was found between need for cognition and amount of time spent using DISCOVER, $r(61) = .041$, $p = .749$, $r^2 = .002$, indicating that need for cognition is not a factor in the amount of time an individual spends using DISCOVER.

A related measure associated with this hypothesis is whether participants used DISCOVER in one session or saved data and returned to the program at least once. This was assessed by the first item on the questionnaire regarding DISCOVER use. The two options posed in the format of this question necessitated statistical analysis by independent samples t-test. This

analysis failed to reveal a statistically reliable difference between level of need for cognition of individuals using DISCOVER in one session (M = 66.58, SD = 10.04) and those saving data at least one time and returning to use DISCOVER (M = 68.11, SD = 8.65), $t(61) = .634$, $p = .529$, $d = .164$, $\alpha = .95$. This implies that level of need for cognition is not related to whether an individual will use DISCOVER in one session or more than once. These mixed results appear to indicate that need for cognition may not play a role in how individuals use DISCOVER, but may influence how individuals begin to approach using the program.

4.3.3 Hypothesis 3

Hypothesis 3: Individuals with lower levels of vocational identity prior to using DISCOVER will show increased levels of vocational identity after using DISCOVER.

Because significant pre-DISCOVER/post-DISCOVER changes were only expected to occur in Group 1 (individuals in Group 2 were already at high levels of vocational identity, so there was expected to be relatively little change in vocational identity in Group 2 after using DISCOVER), a paired samples t-test was chosen to test this hypothesis. This statistic was selected because the hypothesis focuses on pretest/posttest measures within the same group of individuals.

The paired samples t-test revealed a statistical difference between vocational identity scores of those in Group 1 prior to DISCOVER use (M = 2.00, SD = 1.19) and vocational identity scores after DISCOVER use (M = 3.17, SD = 1.82), $t(17) = 2.122$, $p = .049$, $d = .777$, $\alpha = .95$. A paired samples t-test was also conducted with Group 2 and a statistical difference also was found between vocational identity scores of those in Group 2 prior to DISCOVER use (M = 6.00, SD = 1.17) and vocational identity scores after DISCOVER use (M = 8.53, SD = 2.24),

$t(44) = 6.948$, $p < .000$, $d = 1.484$, $\alpha = .95$. Both of these significant statistical differences also had large effect sizes. Consistent with previous research pertaining to vocational identity and DISCOVER use, these results indicate that DISCOVER use may increase levels of vocational identity. A comparison of the means and standard deviations of pre-DISCOVER and post-DISCOVER vocational identity scores for the two groups are found in Table 7.

Table 7.

Means and Standard Deviations of Pre- and Post-DISCOVER VI Scores

VI Score	Mean	SD
Pre-DISCOVER		
Group 1	2.00	1.19
Group 2	6.00	1.17
Post-DISCOVER		
Group 1	3.17	1.82
Group 2	8.53	2.24

4.3.4 Hypothesis 4

Hypothesis 4: Individuals with higher levels of vocational identity prior to using DISCOVER will show greater decreases in dysfunctional career thinking after using DISCOVER as compared to individuals with lower levels of vocational identity.

A two-way (group x time) analysis of variance was selected to test differences between Group 1 and Group 2 (a categorical independent variable) with a quantitative dependent variable (level of dysfunctional career thinking) measured at two points in time. This analysis seeks to determine whether the pre-DISCOVER/post-DISCOVER change in dysfunctional career thinking is greater for one group than the other; if this is the case, the ANOVA will indicate an interaction between the two groups. According to this hypothesis, there should be a greater change in dysfunctional career thinking in Group 2 than in Group 1, so an interaction is expected.

The two-way analysis of variance indicated a significant interaction between change in CTI score after using DISCOVER and grouping based on vocational identity, $F(1, 61) = 9.852$, $p = .003$, $\eta_p^2 = .139$. The significant interaction with a large effect size found between Group 1 and Group 2 indicates that the change in dysfunctional career thinking is greater for Group 2 (those with higher levels of vocational identity initially) than for Group 1 (those with lower levels of vocational identity initially). A comparison of the means and standard deviations of pre-DISCOVER and post-DISCOVER CTI scores for the two groups are found in Table 8.

The results of this analysis indicate that there is a statistical difference in the change in level of dysfunctional career thinking after using DISCOVER when individuals are assigned to groups based on level of vocational identity prior to using DISCOVER. Specifically, individuals with higher levels of vocational identity prior to using DISCOVER show greater decreases in levels of dysfunctional career thinking after using DISCOVER than individuals with lower levels of pre-DISCOVER vocational identity.

Table 8.

Means and Standard Deviations of Pre- and Post-DISCOVER CTI Scores

CTI Score	Mean	SD
Pre-DISCOVER		
Group 1	88.17	5.68
Group 2	66.87	9.33
Post-DISCOVER		
Group 1	85.00	9.26
Group 2	55.00	9.86

While not related specifically to this hypothesis, additional data analyses, consisting of paired samples t-tests such as were used to test Hypothesis 3, were conducted to determine whether participants in both Group 1 and Group 2 showed significant changes in level of dysfunctional career thinking after using DISCOVER. The paired samples t-test revealed a statistical difference between level of dysfunctional thinking of those in Group 1 prior to DISCOVER use and level of dysfunctional thinking after DISCOVER use, $t(17) = 2.818$, $p = .012$, $d = .424$, $\alpha = .95$. Not surprisingly, the paired samples t-test conducted with Group 2 also showed a statistical difference between level of dysfunctional thinking of those in Group 2 prior to DISCOVER use and level of dysfunctional thinking after DISCOVER use, $t(44) = 7.032$, $p < .000$, $d = 1.237$, $\alpha = .95$. These significant results indicate that DISCOVER use also may lower the level of dysfunctional thinking. Of particular note, there was a medium effect size related to

change in dysfunctional career thinking for Group1 and a large effect size related to the change in dysfunctional career thinking for Group 2, adding additional support for the assertion that individuals with higher levels of vocational identity prior to using DISCOVER (Group 2) will show greater decreases in dysfunctional career thinking as compared to those with lower levels of vocational identity prior to DISCOVER use (Group 1).

4.3.5 Additional Data Analyses

These final analyses may not pertain directly to the hypotheses of this study, however they do provide additional insight. This section is divided into major areas or themes identified by the researcher during data analysis and primarily represent statistically significant results found during data analysis.

4.3.5.1 Repeated or Single Use of DISCOVER

The first item on the questionnaire regarding DISCOVER use asked participants if they used the program in one session or whether they saved data and returned to DISCOVER at least one time. The two options necessitated statistical analysis by independent samples t-test. When various t-tests were conducted, there was a statistically reliable difference between those wishing to speak with a career advisor who used DISCOVER in one session (M = 3.42, SD = .98) and those wishing to speak with a career advisor who DISCOVER in multiple sessions (M = 4.00, SD = 1.07), $t(61) = 2.259$, $p = .027$, $d = .566$, $\alpha = .95$. These results indicate that individuals who used DISCOVER more than once are more likely to also want to discuss their results with a career advisor. Question 7 also revealed a statistically reliable difference between those

expressing an interest to use the program in the future who used DISCOVER in one session (M = 3.58, SD = 1.73) compared to those who used DISCOVER in multiple sessions (M = 4.78, SD = 1.25), $t(61) = 3.180$, $p = .002$, $d = .805$, $\alpha = .95$. This indicates that individuals who used DISCOVER more than once are more willing to return to use DISCOVER in the future.

4.3.5.2 Ease of DISCOVER Use

Reported ease of using DISCOVER by participants was positively correlated with need for cognition, $r(61) = .368$, $p = .003$, $r^2 = .135$, indicating that individuals with higher levels of need for cognition found DISCOVER easier to use than those with lower levels of need for cognition. Ease of DISCOVER use was negatively correlated with individuals' reports of not planning a strategy for approaching DISCOVER prior to use, $r(61) = -.403$, $p = .001$, $r^2 = .162$, implying that individuals who do not plan a strategy before beginning DISCOVER find the program more difficult to use than those who spend some time thinking about how to use the program before they start. Additionally, individuals' reports of not planning a strategy for approaching DISCOVER prior to use was negatively correlated with the amount of time spent using DISCOVER, $r(61) = -.287$, $p = .022$, $r^2 = .082$, implying that individuals who do not plan a strategy before beginning DISCOVER do not spend as much time using the program.

Ease of using DISCOVER was positively correlated with vocational identity scores both before using DISCOVER, $r(61) = .305$, $p = .015$, $r^2 = .093$, and after using DISCOVER, $r(61) = .376$, $p = .002$, $r^2 = .141$. These results indicate that higher levels of vocational identity are associated with individuals finding the program easier to use. Regarding dysfunctional career thinking, ease of using DISCOVER was negatively correlated with level of dysfunctional career thinking both before using DISCOVER, $r(61) = -.625$, $p < .000$, $r^2 = .391$, and after using DISCOVER, $r(61) = -.591$, $p < .000$, $r^2 = .349$, indicating that individuals with lower levels of

dysfunctional career thinking find DISCOVER easier to use. Taken together, the results for the vocational identity and dysfunctional career thinking scores appear to indicate that individuals further along in the career development process find DISCOVER easier to use.

4.3.5.3 Working with Others in the Career Development Process

Interest in speaking with a career advisor while using DISCOVER was negatively correlated with vocational identity scores both before using DISCOVER, $r(61) = -.577$, $p = .749$, $r^2 = .333$, and after using DISCOVER, $r(61) = -.414$, $p = .001$, $r^2 = .171$. These results indicate that individuals with lower levels of vocational identity are more likely to want to speak with a career advisor while using DISCOVER as compared to those with higher levels of vocational identity. Regarding dysfunctional career thinking, interest in speaking with a career advisor while using DISCOVER was positively correlated with level of dysfunctional career thinking both before using DISCOVER, $r(61) = .564$, $p < .000$, $r^2 = .318$, and after using DISCOVER, $r(61) = .531$, $p < .000$, $r^2 = .282$, indicating that individuals with higher levels of dysfunctional career thinking are more likely to want to talk with a career advisor while using DISCOVER than those with lower levels of dysfunctional career thinking. Taken together, the results for the vocational identity and dysfunctional career thinking scores appear to indicate that individuals at lower overall levels within the career development process are more likely to want to talk with a career advisor while using DISCOVER.

Interest in speaking with a career advisor while using DISCOVER was negatively correlated both with time spent using DISCOVER, $r(61) = -.261$, $p = .038$, $r^2 = .068$, and with reported ease of using DISCOVER, $r(61) = -.469$, $p < .000$, $r^2 = .220$, indicating that individuals spending less time using DISCOVER and who are having difficulty using the program are more likely to want assistance from another person during this process. Additionally, there was a

significant positive correlation between wanting to speak with a career advisor and not planning a strategy to approach using DISCOVER before using it, $r(61) = .370$, $p = .003$, $r^2 = .137$. This indicates that individuals who did not plan a strategy for using DISCOVER may realize that they need assistance because they are not using the program effectively. It should be noted that young people in general do not list talking to a guidance counselor as being an important influence in their career decision making (Mortimer, Zimmer-Gembeck, & Holmes, 2002). This outlook may affect college students' overall view of career counselors, and not necessarily be limited to the role of a career counselor assisting them within the framework of using a CACG system.

There also was a significant positive correlation between individuals wanting to use DISCOVER in a group setting with other students and those wanting to talk with a career advisor while using DISCOVER, $r(61) = .263$, $p = .037$ $r^2 = .069$. Although having only a medium effect size, this may indicate that there is a group within this sample who are interested in solving career problems in a social setting.

5.0 DISCUSSION

This study explored outcomes of using the DISCOVER computer program by college students who were unsure of their career direction. Of particular interest was whether college students at different levels within the Cognitive Information Processing (CIP) model of career development had different outcomes from using DISCOVER. The results of this study offer support to the idea that an understanding of one's interests, skills, and values must be achieved before an individual can make additional gains on more advanced aspects of career decision making. Additionally, patterns of DISCOVER use among college students in this study indicate that individuals did not plan a strategy prior to using the program. The results of this study suggests that a "one size fits all" approach to using DISCOVER should not be taken by college career counselors and career development programs in higher education. Rather, colleges and universities should make an initial assessment of a client's stage within the career development process and then offer suggestions regarding how best to use the program.

This chapter will discuss the findings of this study. It begins by addressing issues surrounding the retention of participants in this study. It continues with a discussion of the results related to each of the hypotheses and additional findings from the research not directly related to the specific hypotheses. Implications of the results are discussed, as well as potential areas for further research and limitations of the study. Finally, this chapter offers some conclusions regarding how this study relates to theory and career counseling practice.

5.1 Participant Retention

Because this study used a pretest-posttest design, the loss of participants was expected; however, participant demographics and measures on the pretest assessments should be explored to determine if any factors are associated with retention in this study. This section of the Discussion explores those factors.

Two factors were not associated with retention in this study: gender and level of need for cognition. The gender of those completing the initial set of assessments did not predict retention in this study, $\chi^2(1, N = 100) = .272$, $p = .602$, $w = .052$. Additionally, the level of need for cognition of those completing the study ($M = 67.51$, $SD = 9.40$) was not significantly different from the level of need for cognition of those not retained ($M = 63.89$, $SD = 11.05$), $t(98) = 1.727$, $p = .087$, $d = .354$, $\alpha = .95$.

Factors that were associated with retention were pre-DISCOVER levels of vocational identity, pre-DISCOVER levels of dysfunctional career thinking, and participant age. A significant statistical difference with a medium effect size was found between the level of vocational identity prior to using DISCOVER of those completing the study ($M = 5.09$, $SD = 2.51$) and those not completing the study ($M = 7.09$, $SD = 4.53$), $t(45) = -2.410$, $p = .020$, $d = .568$, $\alpha = .95$ (*note*: equal variances were not assumed in the analysis). It appears that those with higher levels of vocational identity were less likely to follow through with this study. Additionally, A significant statistical difference with a medium effect size also was found between the level of dysfunctional career thinking prior to using DISCOVER of those completing the study ($M = 71.74$, $SD = 14.38$) and those not completing the study ($M = 64.60$, $SD = 14.46$), $t(98) = 2.363$, $p = .020$, $d = .495$, $\alpha = .95$. It appears that those with lower levels of dysfunctional career thoughts were less likely to follow through with the study. Taken together,

these findings indicate that individuals further along in the career development process were less likely to remain in this study. Such attrition may have the effect of strengthening the interaction finding in this study because it implies that individuals further along in their career development (i.e., those individuals not retained in this study) would show less change on the measures assessed.

Regarding age of participants, a significant statistical difference with a large effect size was found between the age of those completing the study (M = 18.28, SD = .45) and those not completing the study (M = 18.86, SD = 1.11), $t(40) = -2.951$, $p = .005$, $d = .744$, $\alpha = .95$ (*note*: equal variances were not assumed in the analysis). As such, it appears that older individuals were less likely to follow through with completing the study. In fact, all individuals retained in this study were freshmen who were 18 or 19 years-old, while those not retained including individuals in all four undergraduate levels and ranged in age from 18 to 22 years old. Because older college students are more likely to be further along in their career development (i.e., they may have higher levels of vocational identity and lower levels of dysfunctional career thinking), age may be a correlated factor with other variables of career development and not a causal factor to explain retention by itself.

5.2 Need for Cognition and DISCOVER

The Pearson correlations indicated no significant differences in the relationship between need for cognition and outcome measures of vocational identity and dysfunctional career thinking after using DISCOVER (Table 6). Additional analyses examining the relationship

between pre- and post-measures on these scales and need for cognition (Table 6) yielded similar non-significant results.

While need for cognition has been shown to be correlated with greater success at solving academic tasks (S. Coutinho et al., 2005; Leone & Dalton, 1988), the career decision-making process may have added complexities or dimensions that require an individual to move beyond simply thinking through a problem. For example, additional experiential steps, such as gaining practical experience within a field though internships, may also be required to better facilitate the career decision-making process. Thus, adding a practical, concrete component to the career decision-making process, such as "reality-based career exploration" (Gottfredson, 2003), may serve to add another dimension to the process, facilitating positive outcomes for individuals having difficulty with the cognitive aspects of career decision making. Further research should be conducted to examine outcomes of individuals using a CACG system such as DISCOVER in tandem with an experiential component outside of the computer sessions.

Level of need for cognition had a significant positive correlation with reported ease of using DISCOVER (those who enjoy engaging in effortful cognitive activities tended to find DISCOVER easier to use). Additionally, level of need for cognition had a significant negative correlation with reported likelihood of using DISCOVER again (those who enjoy engaging in effortful cognitive activities tended not to want to use DISCOVER again). Taken together, these findings indicate that individuals higher in need for cognition may believe that they have received the maximum benefit from DISCOVER.

These findings may illustrate a difference between *perception* and actual *outcomes* regarding DISCOVER use based on an individual's level of need for cognition. Those with higher levels of need for cognition may have greater satisfaction with engaging in a task

requiring thought (i.e., the career decision-making process), but they may underestimate the actual benefit received. This assertion is supported by a review of literature surrounding need for cognition by Cacioppo et al. (1996), which indicates that need for cognition is distinct from cognitive ability. Thus, individuals with higher levels of need for cognition simply may enjoy the thinking processes involved in using DISCOVER, facilitating general positive feelings about using DISCOVER, even though they may not necessarily be making progress in the domain of career development.

This presents a practical problem for career counselors and the career development process. When examining the means and standard deviations associated with vocational identity and dysfunctional career thinking for the participants in this study, one SD of increase in vocational identity for this study's participants is at the mean of the norm group for college students on vocational identity, and one SD of decrease in dysfunctional career thinking for this study's participants is at the mean of the norm group for college students' dysfunctional career thinking. Thus, even though increases in vocational identity and decreases in dysfunctional career thinking were found in the participants in this study, these students did not display levels above norm means on either of these measures. Participants in this study still had much progress to make on both of these measures, yet they report that they were not likely to use DISCOVER in the future, even though the program may still have potential to increase their career development on these two measures. The relationship of perceptions, such as individuals' level of satisfaction, to outcomes when using DISCOVER is an area for future research.

Some aspects of the research support the hypothesis that individuals with higher levels of need for cognition will be more engaged in the DISCOVER; specifically, individuals with higher levels of need for cognition were more likely to plan how they are going to approach using

DISCOVER. In terms of using such a strategy as related to the decision-making domain of CIP (as measured by dysfunctional career thinking), those with higher levels of dysfunctional career thinking were significantly more likely not to plan a strategy (both on pre- and post-DISCOVER measures of dysfunctional career thinking), but those showing the greatest change scores after using DISCOVER were more likely *to* plan a strategy (the correlation, while not significant, does have a medium effect size). It appears that planning a strategy before using DISCOVER may promote greater gains in the decision-making domain of CIP.

Other aspects of this study do not offer support to the hypothesis that individuals with higher levels of need for cognition will be more engaged in the DISCOVER. No significant relationship was found between level of need for cognition and time spent using DISCOVER. Additionally, there were no differences found between level of need for cognition and whether an individual used DISCOVER in one session or more than one session.

Because career decision making is an effortful cognitive task, the opportunity to engage in such a task, as may be found when using a CACG system such as DISCOVER, would appear to be an activity those with high levels of need for cognition would find rewarding. This study, however, calls into question the assumption that using DISCOVER is inherently cognitively demanding. Of note, there was a significant correlation between higher levels of need for cognition and reported ease of using DISCOVER. In other words, it appears that those with high levels of need for cognition may not have found enough cognitive stimulation from DISCOVER. Relating the challenge associated with using a CACG system to measures of career development outcomes may be a fruitful area of future research.

5.3 Need for Cognition and Executive Processing Domain

The construct of need for cognition was chosen to represent the executive processing domain of CIP because career decision making involves cognitive effort and because the executive processing domain is believed to be stable in the CIP model. Need for cognition, in turn, provides a global measure of the degree to which an individual enjoys engaging in cognitive tasks and is considered to be a relatively stable trait within an individual (Cacioppo & Petty, 1982). The results of this study, however, indicated no correlations between need for cognition and other aspects of the CIP model, notably measures of vocational identity and dysfunctional career thoughts. The results generally were mixed in terms of individuals' reports of their experiences using DISCOVER on the questionnaire completed, with statistically significant results generally having small effect sizes. Need for cognition, then, must be addressed in terms of whether it is an appropriate measure to use within the CIP model.

It is possible that need for cognition may be related to how an individual approaches a task, but not necessarily related to its successful outcome. In a study by Coutinho et al. (2005), college students completing sample GRE questions who had higher levels of need for cognition spent more time viewing explanations of how to complete the problems, but showed a decrease in performance compared to individuals with lower levels of need for cognition. The researchers suggest that this may be due to individuals being distracted from the main task or having additional demands placed on their cognitive resources (S. Coutinho et al., 2005). As such, need for cognition may be an appropriate construct to assess *how* an individual uses DISCOVER (e.g., items on the questionnaire regarding DISCOVER use), but not adequate to predict performance outcomes (e.g., changes in level of vocational identity or level of dysfunctional career thinking).

This could account for the lack of significant results in associations between need for cognition and vocational identity and dysfunctional career thinking in this study.

Another concern pertains to the issue of stability within the executive processing domain. According to CIP theory, the executive processing domain is stable because the self-talk, self-awareness, and control and monitoring components associated with the career development process are ingrained in an individual as a result of their experiences (Sampson et al., 1996). In particular, self-talk is described as "silent conversations clients have with themselves about their past, present, and future capability to complete a specific task" associated with career decision making (Sampson, Lenz et al., 1999, p. 13). The concept of self-talk within the CIP model appears to be similar to the concept of perceived self-efficacy, which is defined as "people's judgments of their capabilities to organize and execute courses of action required to attain designated types of performances" (Bandura, 1986, p. 391). Self-efficacy is malleable; it is developed through repeated successes within a given domain (Bandura, 1986). As related to career decision-making self-efficacy, research has indicated a relationship between actively pursuing information about career options and increased levels of career decision-making self-efficacy, and in particular, that career decision-making self-efficacy can be enhanced through using a computer-assisted career guidance system (Hackett, 1995). Thus, it would appear that more positive experiences with DISCOVER may increase feelings of success and confidence in making a career decision, meaning that the executive processing domain may not be a stable component of the career development process. It is recommended that future research should examine the role of career decision-making self-efficacy (Lent, 2005) in the executive processing domain of CIP theory using career-related self-efficacy measures (Betz, 2004).

5.4 Vocational Identity and DISCOVER

Individuals with lower levels of vocational identity showed significantly higher levels of vocational identity after using DISCOVER. It should be noted that individuals classified as having high levels of vocational identity within this study also showed significantly higher levels of vocational identity after using DISCOVER. This increase in vocational identity in Group 2 may be due to the overall low level of vocational identity in the entire sample in this study. In other words, all individuals in this study had low levels of vocational identity, so all participants had the opportunity to achieve some degree of improvement in vocational identity. This study supports previous findings that DISCOVER facilitates improvement in vocational identity (Taber & Luzzo, 1999).

5.5 Dysfunctional Career Thinking and DISCOVER

Individuals with higher levels of vocational identity prior to using DISCOVER show greater decreases in level of dysfunctional career thinking after using the program than those with lower levels of vocational identity prior to using DISCOVER. Vocational identity is specifically defined as "clear and stable picture of one's goals, interests and talents" (J. L. Holland et al., 1980, p. 1). According to most theories of career development, a strong understanding of one's skills, interests, and values is necessary prior to addressing more advanced levels of career development/decision making (Niles & Harris-Bowlsbey, 2005). In CIP theory, such understanding is part of the knowledge domain, and increasing sophistication in this area should lead to better career decision-making ability (Gary W. Peterson et al., 1991). In

turn, the decision-making component of the CIP model occurs in the CASVE cycle, which was assessed in this study by level of dysfunctional career thoughts.

Previous research indicated that DISCOVER consistently improved individuals' level of vocational identity, but had mixed results regarding measures of more advanced levels of career development (Taber & Luzzo, 1999). This study suggests that the mixed results found in previous research examining more advanced levels of career development after DISCOVER use may be the result of samples in those studies that included individuals at different levels of vocational identity. In other words, studies that have participants with lower levels of vocational identity may not show as great effects in measures of advanced levels of the career development process after using DISCOVER. Individuals in these studies may still benefit from using DISCOVER by increasing their levels of vocational identity, but the effect on the measure in question for a particular study may be negligible.

This study also demonstrated a significant difference in level of dysfunctional career thinking in both Group 1 and Group 2 after individuals used DISCOVER; individuals in both groups had significantly lower levels of dysfunctional career thinking after using DISCOVER. These findings regarding dysfunctional career thinking, combined with this study's findings indicating that DISCOVER increases level of vocational identity, suggest that the DISCOVER computer program aids the career development of college students who are uncertain about their career plans.

5.6 Other Study Findings

Although not related specifically to the major research questions and hypotheses of this study, several themes emerged in the research. This section will discuss these additional findings.

Individuals tended to report not planning a strategy before using DISCOVER. The questionnaire item pertaining to this had the highest mean of all the items on the survey, and there were significant correlations between this item and other measures in this study. Of particular note, those not planning a strategy were more likely to want assistance from a career advisor or other students when using DISCOVER. A research question not addressed by this study is whether "jumping right into" using a new computer program is generally representative of college students (i.e., the Millennial Generation). Because Millennials have integrated computers into their lives to a greater degree than any previous generation, they tend to have a higher comfort level with new technologies (Howe & Strauss, 2000). This may result in a greater likelihood of not reviewing instructions prior to using a new computer program, which in turn, may have affected the negative aspects associated with DISCOVER use found in this study. In other words, by trying to understand how to use the program at the same time they are inputting information germane to the career development process, students may be exerting cognitive effort on understanding the operation of the program itself, rather than on the cognitive task of career decision making. Further research in this area is recommended.

The implications of this finding can impact career development programs in colleges in that career counselors may need to provide more thorough instruction in DISCOVER use to clients prior to having the students begin the program, rather than allowing students to explore the program on their own. As suggested by McCarthy, Moller, & Beard (2003), college career counselors should offer opportunities for clients using the Internet for career development issues

to speak with a counselor face-to-face in order to help clients process and evaluate the information they receive online. Such interventions, however, may not be cost-effective and many colleges may continue to offer the DISCOVER program to students without any requirement that the students speak to a career advisor before using the program. Because of this, programmers for DISCOVER (and other CACG systems) may need to consider revising the programs to make them more "user friendly" for the generation of college students more apt to begin using a computer program without prior instruction.

According to Howe & Strauss (2000), the Millennial Generation is more likely to want to use computer programs in a social setting. This is study does not support that claim. Participants in this study generally reported a low desire to use a CACG system like DISCOVER in a group setting (the item on the post-DISCOVER questionnaire related to this aspect had the lowest mean of all items on the survey). There may be several explanations for this finding. The structure of the DISCOVER program itself may foster individual effort. For example, users are provided with a number of different examples of skills and are asked to rate their aptitude for each. A task such as this does not lend itself well to a group setting while seated in front of a computer monitor. Another possibility is that individuals may view the career decision-making process itself as highly individualized, in which each person has a unique decision to make that has no relevance to others in a group process. Further research will need to be conducted to determine if college students view the career decision-making process as an inherently solitary endeavor or whether a different structure to a computer program can foster the career decision-making process in a group setting.

5.7 Limitations

Several limitations with this study must be noted. As with any study involving self-reports, accuracy of the participants' responses must be viewed with caution, as well as whether the study is representative of a real-world application. For example, participants report using DISCOVER for approximately one hour. Additionally, slightly more than half of the study participants (57%) report using DISCOVER in only one session. Questions arise regarding whether participants were able to accurately assess the time and whether this pattern of use is representative of individuals' experiences with DISCOVER outside of a research study.

Limitations associated with this study sample must also be considered. As previously noted, the study sample may be an "extreme" sample of individuals at lower overall levels of career development. The mean pre- vocational identity score of the study sample was 4.86 (*SD* = 2.16), yet previous research indicates that university career counseling clients typically have an average vocational identity score of 8 (Mau, 1999). Given the low level of vocational identity found in the participants in this study, this research should be replicated using a sample with a greater range of vocational identity scores prior to using DISCOVER to ensure that the effects found within this study are not due to individuals within both Group 1 and Group 2 having extremely low overall levels of vocational identity.

Another concern is related to the demographics of this sample, which is very narrow in a number of measures: all participants were freshmen; all were either 18 or 19 years of age; and the majority of participants (92%) were white. This last point is of particular concern, as the career counseling field has prioritized the need for services and research related to individuals within traditionally underrepresented populations (Savickas, 2003). As such, it is recommended

that this study be replicated using a sample(s) that focus on participants from traditionally underrepresented populations.

The demographics of this study may also be related to the selective loss of participants. Initial level of vocational identity formed the basis of the group assignments; however those with higher initial levels of vocational identity were less likely to complete the second set of assessments. If some individuals with higher levels of vocational identity had been retained in this study, the value used to establish group assignments could have been altered. Changing the vocational identity score used to assign individuals to groups in this study by one point from five to six would have resulted in 21 participants originally in Group 2 (one third of the total participants) being assigned into Group 1. Such a change could have profound impact on the statistical analyses. Replication of this study with more diversity in initial vocational identity scores is recommended in an attempt to address these concerns.

Finally, this study did not address the specific mechanisms of how individuals used DISCOVER. For example, this study did not track user movements (i.e., clicks on links) within the program itself, which would identify the order of components of the program used. Similarly, the program does not track the amount of time spent engaging in a specific task on a webpage. An examination of how individuals at different levels of vocational identity and dysfunctional career thinking use a CACG system in this way could provide a wealth of information regarding how these measures may influence DISCOVER use, as well as the relationship of these measures to the career decision-making process itself. For example, specific use patterns could be related to specific components of the CASVE cycle. An understanding of this process could be particularly beneficial to career counselors, enabling them to assess individuals prior to using

DISCOVER, and providing them with information that could be used to give specific instruction in the use of the program to clients in order to foster the best use of the program.

5.8 Conclusions

Findings in this study support the notion that evaluation of the effectiveness of the DISCOVER program must take into consideration multiple components of the career decision-making process. Specifically, effectiveness of DISCOVER cannot be assessed strictly in terms of career decision outcomes; rather, various measures associated with the decision-making process must be examined. Previous studies related to DISCOVER indicated mixed results when evaluating DISCOVER in terms of outcome variables associated with the career development process. For this study, CIP theory was used as the model to guide the evaluation of effectiveness of DISCOVER because it emphasizes how career decisions are made, rather than the outcome of the decision.

This study indicates that the career decision-making process involved in DISCOVER is comprised of multiple components that interact depending upon an individual's level of vocational identity (which was used to assess the foundational knowledge domain of the CIP model) and dysfunctional career thinking (which was used to assess the more advanced decision-making skills domain of CIP). Of greatest importance in this area is the finding that individuals with higher initial levels of vocational identity have greater decreases in dysfunctional career thinking after using DISCOVER than those with lower initial levels of vocational identity. This may help explain why some studies of outcome variables after using DISCOVER did not show effects – the samples in those studies may have been comprised of some individuals with lower

levels of vocational identity. Even though these individuals may have benefited from using DISCOVER by increasing their vocational identity, they did not make gains on the construct being assessed in those studies.

The potential for DISCOVER to foster gains in vocational identity is an important practical consideration, as most career development theories view a strong understanding of one's skills, interests, and values as necessary prior to addressing more advanced levels of career development/decision making (Niles & Harris-Bowlsbey, 2005). Because the sample in this study had extremely low levels of vocational identity, this study's findings are particularly relevant to those individuals who most need to build a foundation of vocational identity before moving on to more advanced levels of the career decision-making process, which is often the case with college freshmen. It should be noted that this study consisted entirely of freshmen, and while such narrow demographics may limit the generalizability of these results to upperclass students, the significance of establishing a foundation of vocational identity in first-year college students is an important practical consideration. By building a foundation of skills for self-management of their career decision making – in other words, focusing on the process of career counseling, rather than on the outcomes – college career counselors can aid clients in the post-modern world (Niles, 2003; Savickas, 2003; Whiston, 2003).

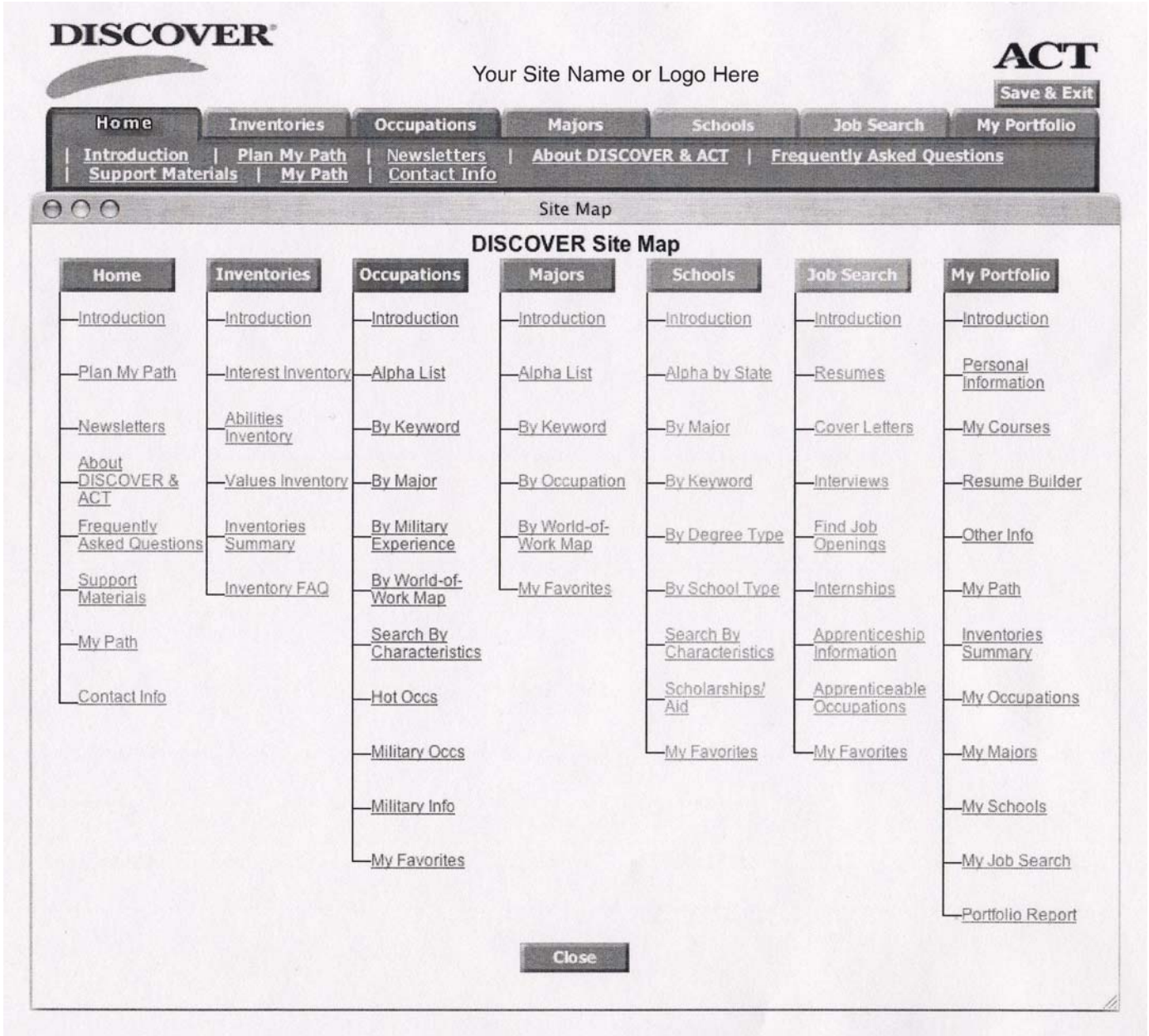
Finally, this study has another important practical consideration in the career counseling field regarding the merger of theory related to CACG systems into career development practice (Harris-Bowlsbey, 2003). By relating DISCOVER to the CIP model, career counselors can foster opportunities for clients to gain self knowledge and/or to lower their levels of dysfunctional career thinking, in turn, fostering a more effective decision-making process. Knowledge of how a theoretical framework applies to DISCOVER may help career counselors better explain the

program to clients, in turn, allowing clients to better use it (D. S. Osborn et al., 2003). This study, then, may help begin a dialogue related to ways career counselors can use theory to guide their use of CACG systems such as DISCOVER to provide the best services to their clients.

APPENDIX A

DISCOVER INTERNET VERSION SITE MAP

From *DISCOVER Internet Version Site Map*, by ACT, Inc., 2007. Retrieved March 14, 2007, from http://www.act.org/discover/pdf/SiteMap.pdf


DISCOVER
Your Site Name or Logo Here
ACT
Save & Exit
Home
Inventories
Occupations
Majors
Schools
Job Search
My Portfolio
Introduction | Plan My Path | Newsletters | About DISCOVER & ACT | Frequently Asked Questions
Support Materials | My Path | Contact Info
Site Map
DISCOVER Site Map
Home
Introduction
Plan My Path
Newsletters
About DISCOVER & ACT
Frequently Asked Questions
Support Materials
My Path
Contact Info
Inventories
Introduction
Interest Inventory
Abilities Inventory
Values Inventory
Inventories Summary
Inventory FAQ
Occupations
Introduction
Alpha List
By Keyword
By Major
By Military Experience
By World-of-Work Map
Search By Characteristics
Hot Occs
Military Occs
Military Info
My Favorites
Majors
Introduction
Alpha List
By Keyword
By Occupation
By World-of-Work Map
My Favorites
Schools
Introduction
Alpha by State
By Major
By Keyword
By Degree Type
By School Type
Search By Characteristics
Scholarships/ Aid
My Favorites
Job Search
Introduction
Resumes
Cover Letters
Interviews
Find Job Openings
Internships
Apprenticeship Information
Apprenticeable Occupations
My Favorites
My Portfolio
Introduction
Personal Information
My Courses
Resume Builder
Other Info
My Path
Inventories Summary
My Occupations
My Majors
My Schools
My Job Search
Portfolio Report
Close

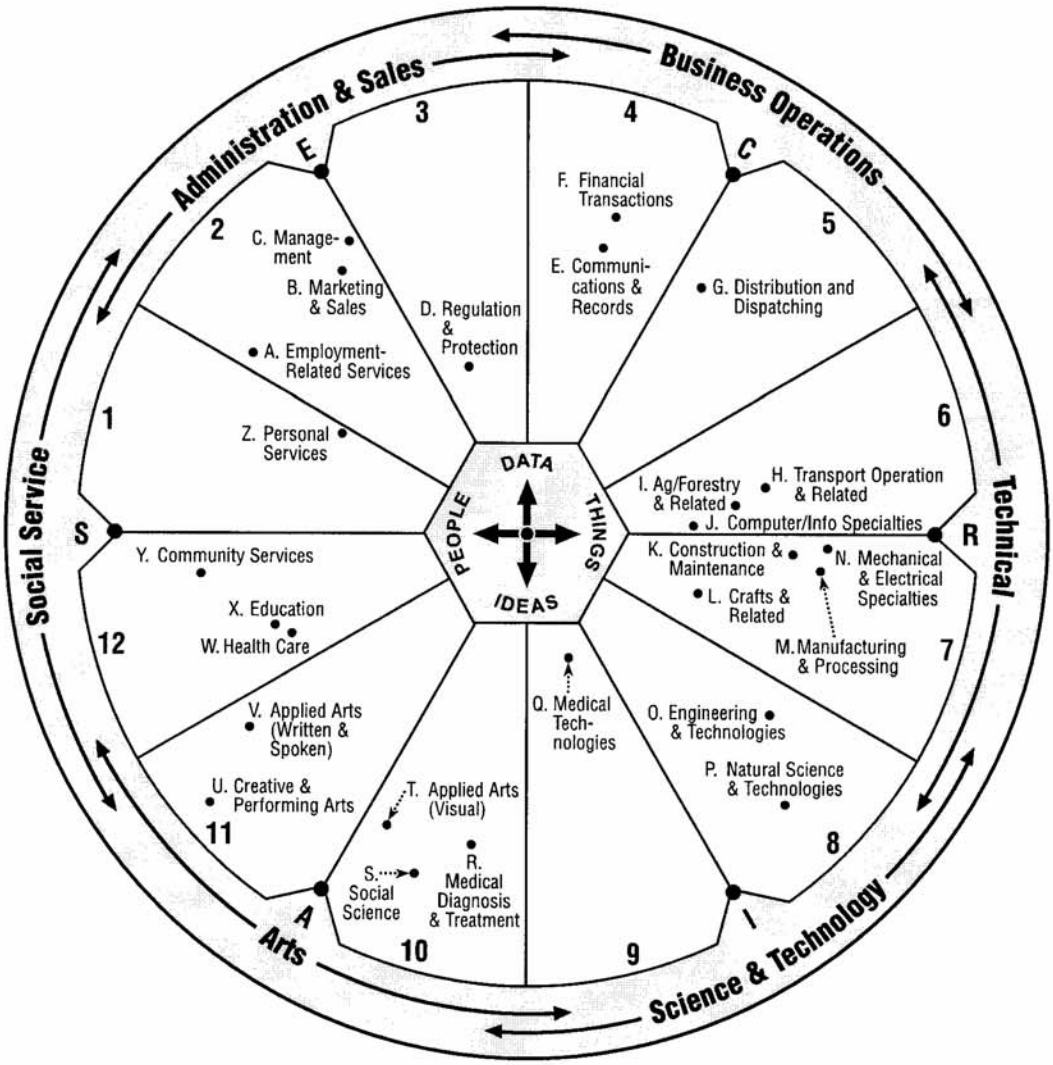
APPENDIX B

WORLD-OF-WORK MAP

From *World-of-Work Map*, by ACT, Inc., 2000. Retrieved March 14, 2007, from http://www.act.org/discover/pdf/disc-wwm.pdf

World-of-Work Map

(Third Edition)



About the Map

- The World-of-Work Map arranges 26 career areas (groups of similar jobs) into 12 regions. Together, the career areas cover all U.S. jobs. Most jobs in a career area are located near the point shown. However, some may be in adjacent Map regions.
- A career area's location is based on its primary work tasks. The four primary work tasks are working with—

  DATA: Facts, numbers, files, accounts, business procedures.
  IDEAS: Insights, theories, new ways of saying or doing something—for example, with words, equations, or music.
  PEOPLE: People you help, serve, inform, care for, or sell things to.
  THINGS: Machines, tools, living things, and materials such as food, wood, or metal.

- Six general types of work ("career clusters") and related Holland types (RIASEC) are shown around the edge of the Map. The overlapping career cluster arrows indicate overlap in the occupational content of adjacent career clusters.
- Because they are more strongly oriented to People than Things, the following two career areas in the Science & Technology Cluster are located toward the left side of the Map (Region 10): Medical Diagnosis & Treatment and Social Science.

APPENDIX C

QUESTIONNAIRE REGARDING DISCOVER USE

Study ID # _____

PLEASE COMPLETE THESE QUESTIONS AFTER USING DISCOVER

1. ***Did you save your work and go back to it later, or did you do everything all at one time? (mark one choice)***

   _____ *I did it all at once*
   _____ *I saved it and returned to it at least one time*

2. ***How much time did you spend using DISCOVER?***

   _____ *minutes (please estimate if you do not know exactly)*

For the remaining questions, please circle the number that best matches your response using the scale ranging from 1 (strongly disagree) to 6 (strongly agree)

3. ***I thought the DISCOVER program was easy to use.***

1	2	3	4	5	6
strongly disagree					strongly agree

4. ***When I first began using DISCOVER, I jumped right in and started without planning much of a strategy for how I would use it.***

1	2	3	4	5	6
strongly disagree					strongly agree

5. ***I would have liked to have had the opportunity to talk to a person such as a career advisor or counselor as I was using DISCOVER.***

1	2	3	4	5	6
strongly disagree					strongly agree

6. ***I would like to be able to use a computer program for career decision making together with other students at the same time in a group setting.***

1	2	3	4	5	6
strongly disagree					strongly agree

7. ***I will use the DISCOVER program in the future.***

1	2	3	4	5	6
strongly disagree					strongly agree

APPENDIX D

SAMPLE RECRUITMENT FLYER

Are you uncertain about your major or career plans?

We are conducting a research study examining how a computer-assisted career guidance system may help college students decide on a career direction

Eligibility Requirements:

- You must be a Pitt undergraduate between 18-24 years of age

Study Participation Involves:

- A half hour meeting to review the study and complete a set of written surveys
- Using the DISCOVER computer program on your own time for as long as you wish
- Completing a second set of surveys after using DISCOVER on your own time that you will return to the investigator

We are flexible about scheduling, including evening and weekend times.

For more details about this study or to schedule a time to begin your participation, contact David Hornyak (hornyak@pitt.edu or 412-624-6884).

APPENDIX E

DEMOGRAPHIC INFORMATION SHEET

Study ID # _____

DEMOGRAPHIC INFORMATION

TITLE: Utilizing Cognitive Information Processing Theory to Assess the Effectiveness of DISCOVER on College Students' Career Development

Gender

_____ Male

_____ Female

Age

_____ Years

Year in School

_____ Freshman

_____ Sophomore

_____ Junior

_____ Senior

_____ Other

Ethnicity

_____ American Indian or Alaska Native

_____ Asian

_____ Black or African American

_____ Native Hawaiian or Other Pacific Islander

_____ White

_____ Other Race

APPENDIX F

INSTRUCTIONS FOR ACCESSING AND USING THE DISCOVER COMPUTER PROGRAM

Instructions for Accessing and Using the DISCOVER Computer Program

DISCOVER is accessible through Pitt's Career Services website:

http://www.careers.pitt.edu

On the menu on the left side of this page, click on "Undergraduate Students"

This will bring up an entire page of links to other webpages. In the first column of links, in the first section (called Career Planning), click on the link named "DISCOVER"

You will then be provided with a description of the DISCOVER program. Read over this description and click the "Next" button at the bottom of the page

Clicking the "Next" button will bring up a dialogue box asking you to enter your Pitt username and password; enter your username and password in the areas provided and click the "OK" button

You will be prompted for the following information: your academic program, your academic year, and your email address. Once you have entered this information, click on the "Next" box

Clicking on "Next" will give you a page with a link to the DISCOVER program and a specific identification number (called a Token ID) that you will use to log onto the program as your User ID when you click on the link to the DISCOVER program

Once you click on the link to the DISCOVER program, enter the Token ID you were given into the User ID box. You will also need to enter a password that you create yourself in the Password box on this page. After you have done this, click on the "Submit" button

You will now be asked to enter your password twice; do so and click on the "Submit" button

This will formally launch the DISCOVER program. One of the features of DISCOVER is that it personalizes information you enter, allowing you to save data and return to it at a later time. In order to be able to use the program in this way, you will be prompted to enter more information, such as your name. (Please note that we do not have access to any information you provide while using DISCOVER.)

For this study, feel free to use DISCOVER as long as you wish; you may save your work and return to it later. When you feel you have used the program as much as you would like, complete the second set of assessments, returning them to David Hornyak via the campus mail in the envelope provided.

Mailboxes for campus mail are located in many buildings on campus, such as the lobby of the William Pitt Union and the ground floor of the Cathedral of Learning. If you live in the residence halls, you can also drop off the envelope at the student mail center for your building. If you have difficulty locating a campus mailbox, feel free to contact David Hornyak for assistance.

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