STUDENT CHARACTERISTICS AND SELF-CONCEPT OF SECONDARY CAREER

AND TECHNICAL EDUCATION STUDENTS IN A NORTH CENTRAL TEXAS REGION

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Dissertation Prepared for the Degree of

DOCTOR OF PHILOSOPHY

UNIVERSITY OF NORTH TEXAS

May 2010

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Cox, Nancy Lynne. <u>Student characteristics and self-concept of secondary career and technical education students in a north central Texas region</u>. Doctor of Philosophy (Applied Technology and Performance Improvement), May 2010, 129 pp., 15 tables, 2 figures, references, 70 titles.

Self-concept, discussed as a scholarly topic since the time of Socrates and Plato, is an important theoretical construct in education because self-concept is considered to be a desirable trait and a facilitator of positive future behavior. The purpose of this study was to examine the relationship between the characteristics of students enrolled in career and technical education (CTE) programs and students' self-concept scores as measured by specific subscales from the Self-Description Questionnaire (SDQ). A total of 196 male and 89 female secondary students (Grades 9-12) enrolled in arts, audio/video technology and communications cluster courses in North Central Texas school districts participated in the study. Student characteristic variables of interest were age, gender, CTE program enrollment, and participation in CTE. The self-concept subscales analyzed were General, Academic, Verbal, Math, and Problem Solving.

A canonical correlation analysis was conducted using the four student characteristic variables as predictors of the five self-concept variables to evaluate the multivariate shared relationship between the two variable sets. The full model across all functions explained about 23% of the variance between the variable sets. Function 1 explained 15% of the shared variance and Function 2 explained 7% of the variance that remained.

This study detected a relationship between specific student characteristics and self-concept as measured on certain domain-specific first-order factors. Gender and

participation in CTE were found to be related to verbal self-concept and problem-solving self-concept. Results suggest that females in arts-based CTE programs have a higher verbal self-concept than their male counterparts; male students have a higher problem-solving self-concept. Results further suggest that students with a high level of participation in CTE also have high verbal and problem-solving self-concepts.

ACKNOWLEDGEMENTS

Personal Acknowledgements

I must first acknowledge my Lord and Savior, who guided my thoughts and actions throughout this journey.

I want to thank my family for supporting my pursuit of this goal; all of you gave more than you received these last few years. My husband, Kevin, was my stalwart companion. My children Catherine and Bradon gave me purpose in completing my degree; I hope I have set a good example for them to always pursue excellence with determination and perseverance. My parents, Lacie and Nancy Smith, along with my sisters, Laura and Libby, and extended family encouraged me without fail.

Many friends saw me through this degree; a few deserve special mention. Thank you: Linda Dulin, Leta Durrett, Mike Gentry, Pam Gentry, Mike Green, Deborah Mouser, Hilda Rachel, Kraig Springer, Jo Williams, and Kevin Wood. Thank you to the districts, teachers, and students participated in the study. Thank you to Drs. Jerry Wircenski, Frank Rachel, Mickey Wircenski, Robin Henson, and Kim Nimon. You set the bar high and supported me in achieving excellence.

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TABLE OF CONTENTS

Background and Significance of the Study

Need for the Study

Theoretical Framework

Purpose of the Study

Research Question

Limitations

Delimitations

Definition of Terms

Summary

Career and Technical Education

Super's Occupational Development Self-Concept Theory

Self-Concept

Summary

Introduction

Research Design

Instrument

Population

Data Collection Procedures

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

Background and Significance of the Study

Self-concept as a theoretical construct is important to the field of education because a positive self-concept is considered to be a desirable trait as well as a facilitator of positive future behavior (Marsh, 1993). Positive student self-concept has been linked to academic achievement in core classes (Marsh, Smith, & Barnes, 1985), outcomes of specific performance arts programs (Marsh & Roche, 1996), and positive classroom characteristics in the domains of cooperation, persistence, leadership, anxiety, expectations for future schooling, family support, behavior in class, and peer interactions (Hay, Ashman, & Van Kraayenoord, 1998).

Self-concept has been discussed as a scholarly topic since the time of Socrates and Plato (J. Hattie as cited in Vispoel, 2000). Initial research in the 1960s, published by Coopersmith and Piers, defined self-concept as a global, unidimensional construct, which resulted in conflicting findings and strong criticism from other researchers (Vispoel, 2000). Research by Shavelson, Hubner, and Stanton (1976) led to the development of a multidimensional, hierarchical model, referred to as the Shavelson model (Leach, Henson, Odom, & Cagle, 2006). Substantial progress has been made in self-concept research methodology, theory, and instrument development in subsequent years (Vispoel, 2000). Research by Marsh and Shavelson (1985) and Byrne and Shavelson (1986) confirmed the multidimensional, hierarchical nature of self-concept (Leach et al., 2006). Due to this multidimensionality, self-concept may vary according to domain; the way we think about and categorize ourselves as a "math" or "English"

1

person, as "creative" or "athletic," or as "beautiful" or "intelligent" is a practical example of the domain-specific nature of self-concept (Marsh, Craven, & McInerney, 2008). High or low self-concept in one domain does not necessarily correlate with high or low self-concept in another domain.

General self-concept, also called self-esteem, is an overall view of oneself that is not generally correlated with domain-specific self-concept. General self-concept, typically found to be stable over time (Marsh, 2005), is considered by laypersons and professionals to be an important component in understanding human behavior (Wylie, 1989) and is considered by many researchers to be the basis for all motivated behavior (Franken, 1994). General self-concept is based on personal thoughts, interpretations, and beliefs: "It is not how good (or bad) you really are, but how good (or bad) you *think* you are that determines your behavior" (Bandura, 2003, p.377). According to Bandura (2003), individuals with high general self-concept set more challenging goals for themselves and are more persistent in the face of adversity than their counterparts with low general self-concept.

<div align="center">Need for the Study</div>

The study of self-concept has a long history of appealing to researchers from many disciplines (Marsh, Relich, & Smith, 1983). According to Bracken and Mills (1994), "Over 11,000 research studies cited in the American Psychological Association's PyscINFO 1974-1992 database are related to self-concept or self-esteem and thousands more are cited in the ERIC database" (p.1). Identified through a search of the ERIC and PsycINFO databases using *self-description questionnaire*, *self description questionnaire*, and *SDQ* as the search terms, more than 100 peer-reviewed journal

articles were published prior to 2004 documenting self-concept research conducted utilizing Marsh's Self-Description Questionnaire (SDQ; Leach et al., 2006). From January 2004 to December 2008, an additional 35 peer-reviewed articles have been published documenting research conducted with one of the Marsh SDQ instruments. Topics of interest in these 35 recent peer-reviewed articles include self-concept in deaf students, high-ability college students, gifted secondary students, students with mild intellectual disabilities, children with cerebral palsy, and students from various cultures. One article identified in this search draws conclusions relative to the science, technology, engineering, and mathematics fields, which are part of the career and technical education (CTE) curriculum. Another search of the primary CTE journals (identified by the University Council for Human Resource Education), using *self-concept, self concept,* and *vocational* as search terms, yielded only one article (Greenan & Wu, 1994) that addressed the topic of self-concept of students in vocational programs. Considering the value of self-concept as a theoretical construct, there is an obvious lack of documented research in the area of self-concept as it relates to students participating in CTE programs.

In Texas public high schools (Grades 9-12), students spend approximately 8 hours a day in a classroom environment. Texas students may spend up to 2 hours each day, roughly one fourth of the school day, in one CTE class. In some districts students have the same CTE teacher all 4 years of high school as they work to complete a coherent sequence of courses. It seems logical, therefore, to investigate the particular relationship between participation in CTE and student self-concept.

Theoretical Framework

This section outlines the theoretical framework for the study. A brief overview is provided for Super's occupational development self-concept theory and for the Marsh/Shavelson model of self-concept.

Super's Occupational Development Self-Concept Theory

Donald Super believed that "the process of vocational development is essentially that of developing and implementing a self concept" (Super, 1953, p. 189). Super (1963a) referred to the 1950s work of Sarbin in his utilization of the term *self-concept* as an "individual's picture of himself, the perceived self with accrued meanings . . . a picture of the self in some role, some situation, in a position, performing some set of functions, or in some web of relationships" (p. 18). One component of Super's (1953) theory is the primary focus of this project:

> Vocational preferences and competencies, the situations in which people live and work, and hence their self concepts, change with time and experience (although self concepts are generally fairly stable from late adolescence until late maturity), making choice and adjustment a continuous process (p. 189).

The dynamic nature of Super's occupational choice and self-concept development theory may serve to increase an understanding of the development of self-concept related to occupational choice. There has been some expressed concern due to a lack of substantive research supporting Super's theory (Salomone, 1996). Investigating the entire developmental scaffold of the theory is beyond the scope of this research. This study focuses on the adolescent stage of development, investigating in

particular the relationship between characteristics of CTE students and various facets of their self-concepts.

Marsh/Shavelson Model of Self-Concept

The current, generally accepted self-concept model, referred to as the Marsh/Shavelson model of self-concept, is rooted in the work of Shavelson et al. (1976). Shavelson et al. defined self-concept as an individual's self-perceptions formed through experience with and interpretation of one's environment as influenced by the assessments of significant others, reinforcement, and personal ascriptions for one's own behavior (Marsh, 2005). The Shavelson et al. model includes an overall measure of self-concept (general self-concept), two higher order factors (academic self-concept and non-academic self-concept), and a number of domain-specific self-concept subscales.

In the early 1990s, as a result of experiencing difficulties with the existing self-concept measurement instruments in differentiating among the broad self-concept domains, Marsh developed the Self-Description Questionnaire (SDQ) instruments to support self-concept research (Marsh, 2005). Research based on the SDQ family of instruments (Marsh, n. d., 1989; Marsh & Shavelson, 1985; Marsh, Byrne, & Shavelson, 1988) led to the Marsh/Shavelson revision of the Shavelson et al. (1976) model. This Marsh/Shavelson revision called for the separation of the academic higher order factor into two higher order academic factors – math/academic and verbal/academic.

Additional research by Marsh et al. (1988) has led to support for another revision of the model, creating an even more complex self-concept structure that includes a wider variety of specific academic self-concept domains. In addition to measuring the generally agreed upon subscales (physical appearance, peer relations, parent relations,

and honesty self-concepts), the revised Marsh/Shavelson model also measures self-concept related to physical abilities, emotional stability, spiritual values/religion, problem solving, and a wide range of academic areas (Bracken & Mills, 1994; Marsh, 2005).

Purpose of the Study

The purpose of this study was to examine the relationship between the characteristics of students enrolled in arts, audio/video technology and communications (AAVTC) cluster CTE programs and students' self-concept scores as measured by specific subscales from the Self-Description Questionnaire (Marsh, n.d., 1989). Using a 6-point Likert scale with values ranging from false (*not like me at all*) to true (*very much like me*), students responded to a variety of questions relating to how they think and feel about themselves in terms of school-related subjects.

Research Question

In selected secondary CTE AAVTC cluster programs in Texas, the study sought to answer the following research question:

What is the relationship between CTE student characteristics and self-concept?

Limitations

1. This study considered only responses from students currently enrolled in five of the public secondary (Grades 9-12) courses in the AAVTC career cluster.

2. This study did not consider the self-concept of teachers assigned to teach in the classrooms identified for participation in the study.

3. This study was limited because of the lack of attention to the nestedness of the data in selecting a research methodology. Canonical correlation analysis (CCA)

methods, while honoring the complexities of the constructs, did not meet the assumption of independence of observations.

Delimitations

1. This research examined students' self-reported self-concept scores while in high school as measured by subscales of the SDQII and the SDQIII.

2. This study examined students' perceived self-concept. The study did not incorporate perceptions or reports from teachers, counselors, administrators, parents, peers, or others regarding individual students' self-concept.

3. This study focused on high school students enrolled in public CTE AAVTC cluster programs of study in a North Central Texas region in the United States. Based on the available student enrollment data, programs investigated in this study included (a) advertising design/visual arts and design; (b) animation; (c) commercial photography, (d) graphic arts/printing and imaging technology; and (e) media technology.

4. This study assumed that students enrolled in the CTE programs involved in the study participated in the CTE programs by their own choice.

5. Data collected using the SDQ II instrument were made available in electronic form to the SELF Research Centre as part of the Conditions of Use.

Definition of Terms

- Arts, audio/video technology and communications cluster (AAVTC): The AAVTC cluster focuses on designing, producing, exhibiting, performing, writing, and publishing multimedia content including visual and performing arts and design,

7

journalism, and entertainment services (States' Career Clusters Initiative [SCCI], 2008).

- Career and technical education (CTE): These are organized educational activities that—

(A) offer a sequence of courses that—

(i) provides individuals with coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in current or emerging professions;

(ii) provides technical skill proficiency, an industry-recognized credential, a certificate, or an associate degree; and

(iii) may include prerequisite courses (other than a remedial course) that meet the requirements of this subparagraph; and

(B) include competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of an industry, including entrepreneurship, of an individual. (Carl D. Perkins Career and Technical Education Improvement Act of 2006 [Perkins IV], 2006, p. 3)

- Coherent sequence of courses: A coherent sequence of courses is defined by the Texas Education Agency as two or more CTE courses for three or more credits (Texas Education Agency [TEA], 2007b).

- Community types: Districts are classified on a scale ranging from urban to rural. Community types are as follows:

  Major urban – The largest school districts in the state that serve the six metropolitan areas of Houston, Dallas, San Antonio, Fort Worth, Austin, and El Paso. Major urban districts are the districts with the greatest membership in counties with populations of 725,000 or more, and more than 35% of the students are identified as economically disadvantaged. In some cases, other size threshold criteria may apply.

  Major suburban – Other school districts in and around the major urban areas. Generally speaking, major suburban districts are contiguous to major urban districts. If the suburban district is not contiguous, it must have a student population that is at least 15% of the size of the district designated as major urban. In some cases, other size threshold criteria may apply.

  Other central city – The major school districts in other large, but not major, Texas cities. Other central city districts are the largest districts in counties with populations between 100,000 and 724,999 and are not contiguous to any major urban districts. In some cases, other size threshold criteria may apply.

  Other central city suburban – Other school districts in and around the other large, but not major, Texas cities. Generally speaking, other central city suburban districts are contiguous to other central city districts. If the suburban district is not contiguous, it must have a student population that is at least 15% of the largest district enrollment in the county. Its enrollment is greater than 3% of

the contiguous other central city district. In some cases, other size threshold criteria may apply.

Independent town – The largest school districts in counties with populations of 25,000 to 100,000. In some cases, other size threshold criteria may apply.

Non-metro: Fast growing – School districts that are not in any of the above categories and that exhibit a five-year growth rate of at least 20%. These districts must have at least 300 students in membership.

Non-metro: Stable – School districts that are not in any of the above categories, yet have a number of students in membership that exceeds the state median.

Rural – School districts that do not meet the criteria for placement into any of the above categories. These districts either have a growth rate less than 20% and the number of students in membership is between 300 and the state median, or the number of students in membership is less than 300. (TEA, 2009c)

- Economically disadvantaged students are those who are reported as eligible for free or reduced-price meals under the National School Lunch Program and Child Nutrition Program or other public assistance. Students reported with any one of these status codes may or may not be enrolled in a special program such as compensatory or special education (TEA, 2008).

- Educational Service Center (ESC): Established by the Texas State Legislature and State Board of Education in 1967, ESCs provide state leadership for special

education-related functions and services for school districts within defined geographical areas. There are 20 ESC regions in Texas (TEA, 2009d).

- Perkins IV: Perkins IV refers to the Carl D. Perkins Career and Technical Education Improvement Act of 2006, signed into law by President George W. Bush on August 12, 2006.

- Public Education Information Management System (PEIMS): The PEIMS encompasses all data requested and received by TEA about public education, including student demographic and academic performance, personnel, financial, and organizational information. Special education data are reported by local education agencies (school districts and charter schools) to the TEA throughout the school year (TEA, 2007).

- Self-concept: a person's self-perceptions formed through experience with and interpretation of one's environment as influenced by the assessments of significant others, reinforcement, and personal ascriptions for one's own behavior (Marsh, 2005).

- State Board of Education (SBOE): The Texas State Board of Education establishes policy and provides leadership for the Texas public school system. The board works with the commissioner of education and the Texas Education Agency to facilitate the operation of Texas' public school system consisting of 1,227 school districts and charter schools, approximately 7,900 campuses, more than 590,000 employees, and more than 4.5 million students (TEA, 2009e).

- Texas Education Agency (TEA): The Texas Education Agency is the administrative unit for primary and secondary public education. The mission of

the Texas Education Agency is to provide leadership, guidance, and resources to help schools meet the educational needs of all students (TEA, 2008).

Summary

This chapter provides background on self-concept as a theoretical construct and identifies a need to examine student self-concept with regard to CTE student characteristics. The chapter also outlines a theoretical framework and purpose for the proposed study. Lastly, the chapter defines the research questions, hypotheses, and assumptions that serve as the foundation of the study. Chapter 2 reviews existing literature related to the study.

CHAPTER 2

LITERATURE REVIEW

Chapter 2 reviews the literature relevant to the present study. This chapter is structured into three topics of interest. The first topic focuses on career and technical education (CTE). The second topic addresses Super's occupational development self-concept theory and current research testing various components of the theory. The third topic examines the Marsh/Shavelson model of self-concept and current self-concept research conducted with the Self-Description Questionnaire (SDQ).

Career and Technical Education

Prior to the passage of the Carl D. Perkins Career and Technical Education Improvement Act of 2006 (Perkins IV), the most current piece of federal CTE legislation, CTE had been referred to in legislation using the terms *vocational education*, *applied technology*, and *work*. The term *occupational education* has also been applied to describe the educational activities currently associated with CTE. "The history of work education (vocational education) is very, very old, perhaps beginning with the use of stone tools in the Paleolithic period (old stone age) about 2,500,000 years ago" (Scott and Sarkees-Wircenski, 1996, p.49). CTE has evolved over time from instruction regarding the use of stone tools to include such areas as audio and video technology, architectural and interior design, forensic science, and engineering and robotics.

CTE programs have been federally funded since the passage of the Smith-Hughes Act of 1917. Significant pieces of legislation have been enacted since the Smith-Hughes Act: the Vocational Education Act of 1963 (amended in 1968 and 1976); the Carl D. Perkins Vocational Education Act of 1984; the Carl D. Perkins Vocational

13

and Applied Technology Act of 1990 (Perkins II); the National School-to-Work

Opportunities Act of 1994; the Goals 2000: Educate America Act of 1994; and the Carl

D. Perkins Act of 1998 (Perkins III). Scott and Sarkees-Wircenski (1996) provided a

thorough discussion of the evolution of CTE, and Threeton (2007) provided a brief

sketch of legislative history related to CTE. A review of the history of CTE shows that

federal legislation has largely impacted the development and focus of CTE programs

since 1917 (Threeton, 2007).

Perkins IV defines CTE as organized education that provides students with a

coherent sequence of courses focusing on competency-based applied learning. CTE

curriculum, by definition, must include "academic knowledge, higher-order reasoning

and problem-solving skills, work attitudes, general employability skills, technical skills,

and occupation-specific skills, and knowledge of all aspects of an industry, including

entrepreneurship, of an individual" (Perkins IV, p.4) Many CTE teachers would likely

agree that these requirements, although new to the federal definition of CTE, have been

part of the curriculum in CTE programs for years.

Career Clusters

What began in 1996 as a joint effort between the National Skills Standards Board

(NSSB), the National School-to-Work Office (NSTWO), and the Office of Vocational and

Adult Education (OVAE) to create curricular frameworks in broad career areas related to

manufacturing and health services eventually became a project supported entirely by

the Department of Education (DOE) in 1997. Over the course of 2 years and a number

of successful states' grants, the DOE was able to develop standards and pathways for

three career clusters: information technology, transportation/distribution and logistics,

and arts/audio video technology. In 1999 OVAE identified 16 broad categories of

occupations, commonly referred to as the 16 career clusters (States' Career Clusters

Initiative [SCCI], 2008):

1. Agriculture and natural resources

2. Architecture and construction

3. Arts, audio/video technology and communications

4. Business management and administration

5. Education and training

6. Finance

7. Government and public administration

8. Health services

9. Hospitality and tourism

10. Human services

11. Information technology

12. Law, public safety, corrections and security

13. Manufacturing

14. Marketing

15. Science, technology, engineering and mathematics

16. Transportation, distribution and logistics

According to Ruffing (2006), in an interview with U.S. Secretary of Education

Richard Riley, Secretary Riley stated that the clusters were seen as "a whole new

approach" to CTE (p. 5). Clusters became a method of organizing new CTE curricula

which would focus on "higher order workplace skills; integrated career development;

occupational training that emphasized both breadth and depth; and integrated academics" (Ruffing, 2006, p. 5). Under the new framework, each cluster has three levels of knowledge and skills standards: foundational, pathway, and specialty. According to Ruffing, the cluster framework represented a change in CTE that was seen by CTE state directors as detrimental to the quality of programs currently offered. In response to this change, the CTE state directors drafted a vision paper to describe the future role of CTE. As the vision developed over the course of a year, the state directors began to see an opportunity to use the States Career Clusters Initiative (SCCI) as a vehicle to achieve their vision for CTE. About this same time, OVAE began requiring states to use career clusters as a method for reporting student enrollment to meet Perkins accountability requirements.

In 2000 the National Association of State Directors of Career and Technical Education consortium (NASDCTEc) applied for and received (in 2001) a grant to develop the remaining 11 clusters. The Oklahoma Department of Career and Technology Education (ODCTE) served as the clearinghouse and fiscal agent for this grant project. Validated by more than 1,000 people in all 50 states, the resources for all 16 career clusters were unveiled by NASDCTEc in September 2002. Around the time of the unveiling, OVAE notified Oklahoma that it would not renew funding under the original cooperative agreement. Consequently, NASDCTEc took ownership of both managing and funding the SCCI using reserve funds, voluntary state assessments, the annual Career Cluster Institute revenue, and the sale of products.

Around 2005 it was reported to NASDCTEc that, with the funding of a grant titled Career Pathways – A Framework for Career Planning and Preparation in the 21st

Century, Texas would begin investigating a plan to transition from the traditional six CTE service programs to full implementation of the career clusters framework. As part of that grant project, it was decided that Texas would adopt all 16 career clusters and utilize the SCCI resources as the framework for identifying and developing career pathways specific to Texas. The initiative that grew out of that grant came to be known as AchieveTexas. The AchieveTexas framework was rolled out to educational stakeholders in July 2006 to coincide with statewide professional development conferences. The initial roll-out included products related to (a) implementation of the entire framework for districts, administrators, and teachers and (b) identification of recommended pathways for students, parents, teachers, and guidance counselors (TEA, 2006). Subsequent products developed under the AchieveTexas initiative have included a cluster guide for each of the 16 career clusters, posters to promote AchieveTexas, and a resource guide for counselors in English and in Spanish.

In 2007 Texas began revisions of the Texas Essential Knowledge and Skills (TEKS) standards for CTE. In May 2007, the 80th Texas Legislature passed HB 3485, which required the State Board of Education (SBOE) to revise the CTE TEKS by September 1, 2009. In fall 2007, the SBOE appointed individuals from across the state to writing teams who were charged with the task of making recommendations for revisions to the CTE TEKS. Writing teams began meeting in spring 2008, to review the current CTE TEKS and make recommendations for revisions (TEA, 2009e). Much of the work related to CTE TEKS revision focused on aligning programs, courses, and standards with the framework of the 16 career clusters.

Arts, Audio/Video Technology and Communications Cluster

According to the SCCI, the arts, audio/video technology and communications cluster (AAVTC) includes the design, production, exhibition, performance, writing, and publishing of multimedia content (SCCI, 2008). The cluster, as federally defined, includes the following six pathways: (a) audio and video technology and film, (b) printing technology, (c) visual arts, (d) performing arts, (e) journalism and broadcasting, and (f) telecommunications. Each of the pathways identifies sample careers students might consider at various levels of education and training.

The pathways identified in Texas are a little narrower, based on the current structure of the curriculum division at the Texas Education Agency, which separates fine arts and CTE. Consequently, in Texas the AAVTC cluster does not address the performing arts or telecommunications pathways, nor does it address the full scope of the sample careers outlined in the visual arts pathway.

As mentioned in the preceding section, much of the focus of the CTE TEKS writing teams was to align programs and courses to the framework of the 16 career clusters. As a result of the CTE TEKS revision process, the new AAVTC TEKS include the following program areas: (a) animation, (b) audio/video technology, (c) commercial photography, (d) graphic design and illustration, (e) fashion, and (f) printing and imaging technology, which can be considered within the pathways framework. Printing and imaging technology directly corresponds to the printing technology pathway. Audio/video technology relates to the audio and video technology and the journalism and broadcasting pathways. Animation, commercial photography, graphic design and illustration, and fashion are all distinct components of the visual arts pathway. The arts,

audio/video technology and communications course crosswalk (TEA, 2009b) provides a

succinct comparison between the existing and proposed courses in the cluster. The

CTE coherent sequences: arts, audio/video technology and communication sequence of

courses (TEA, 2009a) illustrates the proposed organization of cluster courses within the

framework of the proposed CTE TEKS and, within the parameters outlined within the

TEA curriculum division, clearly parallels the federal pathways for the cluster.

<div align="center">Super's Occupational Development Self-Concept Theory</div>

Donald Super's occupational (career) development theory evolved over a period

of 4 decades. He believed that "the process of vocational development is essentially

that of developing and implementing a self concept" (Super, 1953, p. 189). According to

Harris-Bowlsbey (1984), Super's entire body of work can be organized into three broad

ideas: (a) occupational selection relates to self-concept implementation (Super, 1953;

Super et al., 1957); (b) career development is a continuous process that spans the life

of an individual and can be broken down into stages with specific activities associated

with each stage (Locke & Ciechalski, 1995; Super, 1963b; Super et al., 1957); and (c) a

career is a broad and rich combination of various life roles and various points in time.

The initial statement of Super's theory contained a "series of ten propositions" (Super,

1953) in response to statements made by Dr. Eli Ginzberg at the annual meeting of the

National Vocational Guidance Association and as part of a subsequent monograph by

Ginzberg in 1951. Over the next 40 years following the 1953 publication, Super would

refine, expand, and modify that list of propositions and add other elements to his theory

(Salomone, 1996).

Super (1963a) referred to the 1950s work of Sarbin in his utilization of the term *self-concept* as an "individual's picture of himself, the perceived self with accrued meanings . . . a picture of the self in some role, some situation, in a position, performing some set of functions, or in some web of relationships" (p. 18). Super's (1953) propositions include the following:

1. People differ in their abilities, interests, and personalities.

2. They are qualified, by virtue of these characteristics, each for a number of occupations.

3. Each of these occupations requires a characteristic pattern of abilities, interests, and personality traits, with tolerances wide enough, however, to allow both some variety of occupations for each individual and some variety of individuals in each occupation.

4. Vocational preferences and competencies, the situations in which people live and work, and hence their self concepts, change with time and experience (although self concepts are generally fairly stable from late adolescence until late maturity), making choice and adjustment a continuous process.

5. This process may be summed up in a series of life stages, characterized as those of growth, exploration, establishment, maintenance, and decline, and these stages may in turn be subdivided into (a) the fantasy, tentative, and realistic phases of the exploratory stage, and (b) the trial and stable phases of the establishment phase.

6. The nature of the career pattern (that is, the occupational level attained and the sequence, frequency, and duration of trial and stable jobs) is determined

by the individual's parental socioeconomic level, mental ability, and personality characteristics, and by the opportunities to which he is exposed.

7. Development through the life stages can be guided, partly by facilitating the process of maturation of abilities and interests and partly by aiding in reality testing and in the development of the self concept.

8. The process of vocational development is essentially that of developing and implementing a self concept: it is a compromise process in which the self concept is a product of the interaction of inherited aptitudes, neural and endocrine make-up, opportunity to play various roles, and evaluations of the extent to which the results of role playing meet with the approval of superiors and fellows.

9. The process of compromise between individual and social factors, between self concept and reality, is one of role playing, whether the role is played in fantasy, in the counseling interview, or in real life activities such as school classes, clubs, part-time work, and entry jobs.

10. Work satisfactions and life satisfactions depend upon the extent to which the individual finds adequate outlets for his abilities, interests, personality traits, and values; they depend upon his establishment in a type of work, a work situation, and a way of life in which he can play the kind of role which his growth and exploratory experiences have led him to consider congenial and appropriate. (pp.189-190)

In 1957 Super outlined his concept of life stages of self-concept development beginning in early childhood and continuing until young adulthood (Locke & Ciechalski, 1995). Super outlined a scaffold for self-concept development related to occupational choice and life stages. An individual begins to form a self-concept prior to adolescence as he/she identifies career models in parents, teachers, community leaders, and other significant adults in his/her life. As an individual continues through adolescence, he/she becomes more aware of personal likes and dislikes, interests, and needs. These preferences form the basis for educational and extracurricular decisions. An adolescent often begins to think of himself/herself as good or bad in certain areas and considers career options that are consistent with those self-concepts. At the end of the high school career and into young adulthood, an individual begins to consider career options from a realistic standpoint and attempts to implement a self-concept. At this stage of development, career choice is based on trial and error with low-level commitment. According to Super's theory, once a person establishes a career with a formal level of commitment, the amount of satisfaction obtained in the career area further develops the self-concept until a person is capable of making an explicit and definitive statement of self.

As noted by Salomone (1996), Super's theory evolved in segments without a clear connection to empirical research, and his propositions were general statements which related in part to career development and characteristics of people. According to Kerlinger (1973), Super's statements do qualify as hypotheses but require instruments with appropriate psychometric qualities in order to be measurable. As cited by Salomone (1996), Super acknowledged that his theory was segmental rather than

integrated, comprehensive, and testable. Super believed the segments in his theory

provided testable hypotheses that would eventually yield an integrated theory.

A festschrift issue of *Career Development Quarterly,* September 1994, provides

an extensive overview of Super's work and related studies. A couple of recent studies

have referenced Super's theory. Prediger (2004) investigated the relationship between

self-estimates of work-relevant abilities and the validity of test scores used to facilitate

career planning applications. Although beginning with what he terms "Super's Dictum,"

related to the implementation of a self-concept as a basis for choosing a career,

Prediger referred to the work of Holland in his theoretical framework and literature

review.

Code, Bernes, Gunn, and Bardick (2006) used the Comprehensive Career

Needs Survey to assess junior high and high school students' perceptions related to

career concerns. Code et al. specifically addressed the question as to whether or not

students' concerns change between the 7th and 12th grades. Using a constant

comparison process analysis, Code et al. collected responses from 6,481 Canadian

students in Grades 7 through 12. Demographic information for participants was divided

into age, grade, community size, and school size. The obtained data were divided

according to community size and then randomly sampled to include 24 responses from

each grade level in each community type. Findings from this study suggest that student

concerns are categorically similar to the career and development tasks proposed by

Super.

Self-Concept

Self-concept is not as easily defined as CTE. Reviews of literature have identified a minimum of 15 different "self" terms used by various authors (Strein, 1995). *Self-concept*, *self-esteem*, *self-efficacy*, *self-worth*, *self-image*, and *self-acceptance* are among the more common terms that many authors use interchangeably to refer to how people perceive themselves (Franken, 1994; Huitt, 2004). Huitt (2004) also identified other less common "self" terms common in the literature: *self-direction*, *self-determination*, *self-regulation*, and *self-transcendence*.

"Problems of definition related to self-concept research are now widely known" (Byrne, 1996, p. 1). Byrne contended that the problems can be related to these major factors: lack of a universally accepted definition of self-concept, lack of distinction between self terms, lack of clarity between self-concept and self-efficacy and between self-concept and self-esteem, and lack of formal theoretical definitions used in academic research. Investigating each of these factors is beyond the scope of this study, but acknowledging the problem underscores the importance of establishing a working definition of self-concept as the basis of the research question presented.

For the purposes of this study, the researcher relied on the Shavelson et al. (1976) definition of self-concept. Self-concept is a person's self-perceptions that are formed through experience with and interpretation of one's environment as influenced by the assessments of significant others, reinforcement, and personal ascriptions for one's own behavior. Shavelson et al. outlined seven critical components of the construct:

1. Self-concept allows individuals to categorize their opinions of themselves in an organized fashion to facilitate comparison to others.

2. Self-concept is multidimensional and reflects domains valued by the individual and shared by a group.

3. Self-concept is hierarchical with a global self-concept at the top, broad domains in the middle, and specific domains at the bottom.

4. Global self-concept is stable, but as one descends the hierarchy, self-concept becomes increasingly domain-specific and less stable.

5. Self-concept increases in multi-dimensionality as people mature from childhood (infancy) to adulthood.

6. Self-concept has descriptive and evaluative components allowing people to describe themselves and evaluate themselves according to some self-determined criteria.

7. Self-concept is different from other constructs such as achievement or ability.

Initial research based on this most recent revision indicates that while the more general higher order factors (math/academic, verbal/academic) can explain correlations among the more domain-specific first-order factors (math self-concept, science self-concept, foreign-language self-concept, English self-concept, etc.), actual levels of self-concept on domain-specific first-order factors cannot be accurately represented by the more general higher order factors (Marsh, 2005). Looking at Marsh's current version of the self-concept model along with his other self-concept instruments, one is amazed by the number of domain-specific first-order factors identified. According to Marsh (2006), because this diversity of academic self-concepts has not been considered in previous

research, an important current consideration in research is whether or not students are able to differentiate among self-concepts associated with specific school subjects. An important initial finding is that students can discriminate among more school-related self-concepts than was previously imagined. Consequently, Marsh has recommended selecting subscales directly related to particular academic subjects being investigated, along with the more general academic self-concept scales.

General Self-Concept

General self-concept has been found to be relatively stable over time (Shavelson et al., 1976; Super, 1953) and highly unlikely to change as the result of any intervention. Marsh (2005) reported a couple of exceptions to this generality, stating that the general self-concept scale tends to be one of the least stable scales on the SDQ instruments. Marsh and Peart (1988), using an experimental research design to test cooperative and competitive interventions on physical fitness and self-concept, found that intervention effects were specific to physical components of self-concept only. General and nonphysical components of self-concept were not affected by the intervention. Marsh, Richards, and Barnes (1986a, 1986b) conducted a series of studies based on an Outward Bound standard course, a 26-day residential program focusing on outdoor activities requiring physical and mental stamina. Marsh and Richards (1988) studied the effects of another Outward Bound bridging program focusing on academic gains for underachieving students. Results of both studies support a focus on intervention strategies tied to specific facets of self-concept rather than a single measure of general self-concept.

Self-concept and Arts-based Instruction

Recent research on self-concept has investigated a relationship with arts-based instruction as identified in the fine arts: visual art, drama, dance, and music. A recent compendium of research studies in the arts published by the National Endowment for the Arts catalogs the effects of learning in the arts on academic and social skills (Catterall, 2002) and various facets of self-concept. According to Catterall (2002), learning in multi-arts programs such as integrated arts/academics programs, intensive arts experiences, and arts-rich school environments produces effects in reading (also in visual arts learning experiences), math, creative thinking, and higher order thinking skills. Learning in these multi-arts also produces effects in achievement motivation, cognitive engagement, self-confidence, persevering, and educational aspirations.

Vispoel (1993) developed the Arts Self-Perception Inventory (ASPI) in response to what he saw as a lack of adequate attention to the measurement of artistic self-concepts in high school students. In 1995 Vispoel developed an adult version of the ASPI to parallel the SDQIII and utilized the instrument with university students. Vispoel (1995) proposed an extension of the Marsh/Shavelson model of self-concept to include artistic self-concept as a distinct higher order factor of self-concept. Marsh and Roche (1996) administered the ASPI and the SDQII to a group of 210 elite performing arts and 131 nonperforming arts students attending a prestigious performing arts school. Results from the Marsh and Roche study found responses from performing arts students to be highly reliable though systematically higher – particularly in their area of specialty. Results also confirm Vispoel's recommendation to focus on specific ASPI factors rather than a single dimension of artistic self-concept. Of primary interest in the Marsh and

27

Roche study is the finding that although modest, the performing arts self-concepts for the elite students were more highly correlated to general esteem ($r = .37$) than with school self-concept ($r = .29$).

Summary

This chapter reviews the literature relevant to the present study. This chapter is structured into three topics of interest: career and technical education (CTE), Super's occupational development theory, and the Marsh/Shavelson model of self-concept research. Chapter 3 discusses the design and methodology to be used in this study.

CHAPTER 3

METHODOLOGY

Introduction

The purpose of this study was to examine the relationship between the characteristics of students enrolled in arts, audio/video technology and communications (AAVTC) cluster career and technology education (CTE) programs and students' self-concept scores as measured by specific subscales from the Self-Description Questionnaire (SDQ) family of instruments (Marsh, n.d., 1989). This chapter describes the research design and methodology utilized in this study. The chapter begins with a discussion of the research design, followed by a description of the instrument, a description of the population for the research study, and a description of the process for collecting data. The chapter concludes with a discussion of the process for analyzing data.

Research Design

This study was designed to examine the relationship between public secondary (Grades 9-12), AAVTC CTE program student characteristics and their self-concept scores. I administered a 50-item survey to students enrolled in courses in these programs and analyzed the response data using general linear model (GLM) canonical correlation analysis. In order to improve the response rate and to ensure consistency across survey administration sessions, I personally administered the survey, which took approximately 10 to 15 minutes to complete, to all participants. Responses to the SDQ items, recorded on a 6-point Likert scale, were coded and scored according to instructions included in the Self-Description Questionnaire II (SDQII) survey manual.

Instrument

The instrument utilized in this research, the Self-Description Questionnaire II – Modified/CTE (SDQII-M/CTE), combines subscales from two SDQ instruments developed by Professor Herb W. Marsh, convenor of the Self-Concept Enhancement and Learning Facilitation (SELF) Research Group at the University of Oxford. The SDQII-M/CTE includes four subscales from the Self-Description Questionnaire II (SDQII; n.d.): Math, Verbal, General Academic, and General Self-Concept (Esteem) and one subscale from the Self-Description Questionnaire III (SDQIII; 1989): Problem-Solving/Creativity. All instruments are part of the public domain. Both the SDQII and SDQIII are available from http://www.self.ox.ac.uk/Instruments.htm; the SDQII-M/CTE is found in Appendix B.

The SDQ family of instruments was selected from the various self-concept instruments for three primary reasons, as discussed in a review of self-concept instruments (Bracken & Mills, 1994). First, the SDQ was originally designed to be a multidimensional instrument for assessing various domains. The Coopersmith Self-Esteem Inventory, the Piers-Harris Children's Self-Concept Scale, and the Rosenberg Self-Esteem Scale were originally designed as unidimensional instruments, which is contrary to the currently accepted multidimensional structure of self-concept. Second, the SDQ is reported for use with an age range and grade level most appropriate to the target population of this study. The Tennessee Self-Concept Scale is reported to have the broadest age range (12-68 years), which could be seen as an advantage for some researchers, but was seen as too broad for this study. Third, the SDQ is the only self-concept instrument that includes a problem-solving/creativity subscale, a scale I judged

to be closely aligned with AAVTC CTE program goals and instructional objectives (Marsh et al., 1986a, 1986b).

Rather than using subscales from the SDQII or SDQIII only, the SDQII-M/CTE utilizes subscales from two versions of the SDQ in response to a cautionary note from the instrument's author regarding the readability level of the SDQIII. The author's note prompted a readability analysis (including a Flesch-Kincaid grade level analysis, Gunning-Fog score, Coleman-Liau index, SMOG index, and automated readability index) of the various possible combinations of the SDQ items seen as relevant to this study. For comparison purposes, a readability analysis was also conducted on an exit-level TAKS test reading sample (average grade level: 4.5), which is administered to 10th-grade students in the target population.

Using a Google tool located at http://www.addedbytes.com/readability/, I conducted a readability analysis on three possible combinations of subscales from the SDQII and SDQIII: five SDQIII subscales, four SDQII subscales (required the elimination of the problem-solving subscale from the study), and four SDQIII subscales combined with one SDQIII subscale. The readability analysis on Option 1 indicated an average grade level of 9.72, which was considerably higher than the average grade level for an exit-level TAKS test reading sample. The readability analyses reported similar average grade level scores for Options 2 and 3 (5.36 and 5.44, respectively). As a result of the analysis, it seemed prudent to combine subscales from the SDQII and the SDQIII in order to produce a survey instrument that could be easily read and generally understood by most secondary students in Texas.

The SDQII-M/CTE utilizes the SDQII as a template for collecting demographic-and participant-level information, providing instructions, and formatting the survey questions. An example of the correct procedure for recording responses was added by me. For data scoring purposes, discussed further in Data Scoring Procedures, survey items were kept in their original order as per the SDQII and SDQIII instruments. Following the pattern in the SDQII survey, items were grouped into subsets and ordered according to subscale. Each subset had the same subscale order applied. Items were typeset with the same attributes (case and style) as those on the original instruments. For the purpose of clarifying terminology for Texas students, a parenthetical statement was added to Item 14 to read, "If I work really hard I could be one of the best students in my school year (grade level)." The parenthetical statement "(grades)" was added to Items 19, 31, and 38 to define the term *marks*. One spelling correction was made to Item 42 changing "all most" to "almost." The instrument was converted into a scan-able format by Academic Computing Services at the University of North Texas to ensure greater accuracy during the data entry process. The end result is the Modified SDQII (SDQII-M/CTE), which is found in Appendix B.

Validity

The SDQII is designed to measure multiple dimensions of self-concept for adolescents. The SDQII evolved from the original SDQ instrument, the Self-Description Questionnaire I (SDQI), and has a multidimensional structure based on the Shavelson et al. (1976) multidimensional/hierarchical theoretical model of self-concept. The SDQII is different from the SDQI in (a) the number of subscales, (b) the number of items, and (c) the number of response-scale points. The SDQII is designed to measure 11 facets

of self-concept: seven non-academic areas (Physical Ability, Physical Appearance, Same Sex Peer Relations, Opposite Sex Peer Relations, Parent Relations, Emotional Stability, and Honesty/Trustworthiness); three academic areas (Verbal, Mathematics, and General Academic); and one global perception of self (General Esteem). Initially designed for use with younger adolescents (Grades 7-10), Marsh now recommends its use with students in Grades 7-12. Byrne (1996) considers the SDQII to be the most validated self-concept measure available for the adolescent population.

Wylie (1989) observed that neither convergent validity coefficients nor multitrait-multimethod analyses were available for the SDQII. Wylie reported, based on a personal communication with Marsh (May 26, 1988), that factor-analyses of responses to the SDQII produced factor scores within each subgroup that were "highly correlated with factor scores derived from the factor analysis from the total Normative Archive SDQII Sample" (p. 84). A subsequent review of the SDQII (Byrne, 1996) revealed the additional information regarding validity. According to Byrne (1996), most validity research has focused on the construct validity on the SDQII. Within-network research used both exploratory and confirmatory factor analyses based on response pairs rather than single items.

> Overall, factor analytic findings relative to the SDQ-II stand in strong support of its clear 11-factor structure, the similarity of this structure across both sex and age, and the validity of its hypothesized structure within the framework of the Shavelson et al. (1976) theoretical model on which it is based. (Byrne, 1996, p. 152)

The SDQIII, initially designed for use with late adolescents and young adults (16-25 years of age), has been recommended by Marsh for use with college students and adults. Also derived from the SDQI, the SDQIII is designed to measure self-concepts related to eight non-academic areas (the same seven non-academic areas as the SDQII as well as Spiritual Values/Religion); four academic areas (the same three academic areas as the SDQII as well as Problem Solving); and one global perception of self (the same as the SDQII). After development, Marsh (1989b) cautioned the use of the instrument with younger respondents because the reading level may be inappropriate. He also cautioned use of the instrument with older respondents because the instrument is not designed to address many important facets of adult lives.

According to Wylie (1989), there are sufficient data to support convergent and divergent validity of the SDQIII scales. A test of convergent validity based on the coefficients between each SDQIII scale and corresponding inferences about the respondents' self-concepts made by others who knew them well supports the discriminant validity of the SDQIII scores. Three multitrait-multimethod (MTMM) matrices visually support the convergent and divergent validity of the scales.

A subsequent review of the SDQIII by Byrne (1996) indicated that MTMM studies have tested the concurrent validity of specific SDQIII subscales against the matching scales of other self-concept instruments: the Tennessee Self-Concept Scale, the Affective Perception Inventory, the Self-Concept of Ability Scale, and the Rosenberg Self-Esteem Scale. In addition to MTMM studies, within-network research for the SDQIII has been based on item pairs using exploratory and confirmatory factor analyses. Byrne's review (1996) also referred to confirmatory factor analyses which have shown

the SDQIII to be factorially invariant across gender (Marsh, 1987) and age (Marsh & Hocevar, 1985).

Reliability

The SDQII was normed on 5,494 sets of responses from approximately 3,073 students, Grades 7-11, enrolled in coeducational schools in a 4-year longitudinal study (Wylie, 1989). Internal consistency reliability coefficients range from .83 (Emotional Stability) to .91 (Physical Appearance), with a mean alpha of .87 for the 11 scales. Test-retest reliability ranged from .73 (Honesty/Trustworthiness) to .88 (Mathematics), with an overall mean correlation coefficient of .80. Wylie (1989) observed that, although the normative sample included both male and female subjects from a variety of educational, socioeconomic, and religious backgrounds, the samples were limited in geographic location, community type, and ethnicity. Generalizability, therefore, remains to be demonstrated. A subsequent review of reliability of the SDQII by Byrne (1996) also referred to both studies referenced by Wylie. Byrne concluded that "although admittedly based on a single, relatively small, and gender-specific sample, these indicators of measurement stability are nonetheless substantial and reflect strong evidence of the test-retest reliability in relation to the SDQ-II" (p. 151).

The SDQIII was normed on 2,410 responses from 1,202 individuals ages 15 and older from a Catholic school, Australian colleges and universities, a female powerlifting group, and Outward Bound program participants. Internal consistency reliability coefficients range from .72 to .94 across the 13 scales. Test-retest information is available only on a subset (Outward Bound participants) of the normative group; reliability coefficients ranged from .76 to .94 at month 1; .63 to .93 at month 2; and .49

to .87 for month 20. According to Wylie (1989), the normative sample for the SDQIII is "considerably smaller" than the samples used in developing the SDQI and SDQII (p.92). The samples over-represent males, students, and individuals under age 26. The generalizability of the data across groups remains to be determined. In a subsequent review of the SDQIII Byrne (1996) also considered comments from participants in the Outward Bound study, citing frequent participant reports of significant life changes during the period of observation. Given the range of stability coefficients, Byrne felt that the value of these life changes was "remarkably substantial" and concluded that "these indicators of measurement stability provide strong evidence of test-retest reliability in relation to the SDQ-III" (p. 200).

A reliability generalizability (RG) study conducted by Leach et al. (2006) concluded that, while frequency of instrument use is not necessarily indicative of a positive relationship to the strength of reliability estimates for an instrument's scores, there is strong evidence that the SDQ family of instruments yields reliable scores in most cases. Although Leach et al. encouraged caution regarding the interpretation of the findings (due to small sample sizes available for the SDQII), results from the RG study suggest that the SDQII may yield scores with higher reliability with CTE samples and mixed ages.

Population

The population for this study included students enrolled in public secondary (Grades 9-12) AAVTC cluster CTE programs in Texas Educational Service Center (ESC) Region XI during the spring semester of the 2008-2009 school year.

ESC Region XI is one of the 20 ESC regions in Texas. ESC Region XI is one of six ESC regions that has at least one district that is classified as a major urban city by TEA. These six regions are centered in the following urban centers: Houston (Region IV), Dallas (Region X), Fort Worth/Arlington (Region XI), Austin (Region XIII), El Paso (Region IXX), and San Antonio (Region XX).

Table 1 provides a demographic comparison of the six regions that include major urban districts.

Table 1

Demographic Composition of Student Population in Major Urban Regions in Texas

ESC	Enrollment (9-12)	%Eco. Dis.	% Ethnic composition					% Gender	
			AA	NA	W	AS	H	M	F
4	277,211	41.44	22.35	0.19	33.08	6.37	38.01	50.78	49.22
10	186,592	39.62	21.63	0.50	40.21	5.03	32.61	50.60	49.40
11	139,815	30.13	14.45	0.52	55.54	4.43	25.05	51.05	48.94
13	94,033	32.89	10.10	0.39	50.91	3.34	35.25	51.35	48.66
19	51,375	68.41	2.79	0.28	8.27	0.73	87.92	50.99	49.01
20	101,808	52.30	7.28	0.24	26.65	1.83	63.99	51.44	48.55
TX	1,268,548	44.47	14.60	0.36	39.13	3.45	42.46	51.04	48.96

Note. % Eco. Disadvantaged – Percent of Economically Disadvantaged Students, AA – African American, NA – Native American, W – White, AS – Asian, H – Hispanic.

As illustrated in Table 1, the six urban regions are similar to one another in demographic composition, as reflected in the number of students enrolled in Grades 9-12 (more than 100,000), the percentage of economically disadvantaged students (30.1%-52.3%), the

ethnic diversity of enrolled students, and the fairly equal distribution of male and female students, with a slightly higher percentage of males (51% on average), which is consistent with the percentages statewide. The ethnic diversity of enrolled students in these six regions mirrors the ethnic diversity of secondary students across the state (14.6% African Americans, .36% Native Americans, 39.1% White, 3.5% Asian, and 42.5% Hispanic). Exceptions to the similarities include Austin and El Paso. Austin has slightly fewer students enrolled in Grades 9-12 (approximately 94,000) and has fewer public, secondary AAVTC programs (six districts provide nine programs). El Paso has a small population of enrolled students in Grades 9-12 (approximately 50,000); a small number of districts (6) offering public, secondary AAVTC programs; a higher than average percentage of economically disadvantaged students (68.4%); and a higher than average Hispanic student population (87.9%). All six regions have a diversity of district community types (urban to rural) and a concentration of districts offering public, secondary AAVTC programs (11-14 districts per region).

The primary reason for targeting the AAVTC student population is the result of research by Marsh & Roche (1996), which established a relationship between positive self-concept and outcomes in specific performance arts programs. In Texas, performing arts programs are part of the Fine Arts Curriculum Division, which is a functional division separate from the Career and Technical Education Curriculum Division in the Texas Education Agency (TEA). A review of the proposed CTE curriculum standards, drafted in 2008-2009, and current fine arts curriculum standards reveals a great deal of program overlap in instructional concepts related to creativity. A primary difference

between the two program areas is a CTE focus on industry-related curriculum involving skill-based projects and problem solving.

There were four primary reasons for targeting the AAVTC student population in ESC Region XI. First, Region XI had a high concentration of AAVTC programs, accounting for approximately 5-10% of the 37,000 students enrolled in AAVTC cluster courses across the 20 ESC regions in Texas during the 2007-2008 school year as recorded in PEIMS data. According to the most current PEIMS data available at the time, there were 23 AAVTC programs in Region XI. Using the state average program enrollment figure (85 students/program), I estimated the population to be approximately 2,000 students. Second, the demographic composition of students, reflected in the 2008-2009 PEIMS data, in Region XI closely mirrored the composition of students in the other regions with major urban cities as well as the composition of students across the state. The demographic composition of ESC Region 11 students enrolled in Grades 9-12 in 2007-2008 was as follows: 51% males and 49% females; 30.1% economically disadvantaged; 14.5% African American, .5% Native American, 55.5% White, 4.4% Asian, and 25.1% Hispanic. I anticipated that the demographic composition of the subject population would be consistent with that of the region. Third, Region XI has two major universities with arts-based programs aligning with those coherent sequences of courses offered at the secondary level in the AAVTC cluster. Fourth, the University of North Texas has a positive working relationship with the public school districts and CTE programs in Region XI.

The programs selected for this study offered coherent sequences of courses that aligned with five of the six major cluster pathways identified by the AAVTC cluster

writing team appointed in 2008 by the Texas State Board of Education, pursuant to HB 3485 passed in May 2007 by the 80th Texas Legislature. The selected cluster programs included advertising design/graphic design and illustration; animation; commercial photography; graphic arts/printing and imaging technology; and media technology/audio/video production. I excluded fashion, the sixth program, from this study because fashion programs were structured and implemented differently from the other five AAVTC programs at the time the study was conducted.

Data Collection Procedures

Using the 2006-2007 PEIMS data, the most current PEIMS data available at the time, CTE AAVTC programs in Texas Educational Service Center (ESC) Region XI were identified in March 2009. The following 11 Texas public school districts in ESC Region XI were contacted in March 2009 to request their participation in the study: Arlington, Birdville, Burleson, Cleburne, Denton, Fort Worth, Grapevine-Colleyville, Hurst Euless Bedford, Lewisville, Little Elm, and Mansfield. Keller ISD was identified as a participating district when the new PEIMS data were released at the end of March 2009 and was also contacted in April 2009 to request participation in the study. Approval letters from Hurst Euless Bedford ISD and Lewisville ISD were received in March 2009 and filed with the IRB application. Birdville ISD approved participation contingent upon IRB approval, which was received in April 2009. Approval letters from Birdville, Burleson, Denton, and Keller ISDs were received and submitted to UNT IRB after the study was approved. No response was received from Arlington, Cleburne, Grapevine-Colleyville, or Little Elm ISDs. Mansfield ISD declined participation in the

study. Fort Worth ISD was eliminated from consideration for the study because of the district's out-of-district research policy.

In April 2009 an outbreak of the H1N1 influenza spread across North Central Texas, resulting in a mass school district closing for up to 2 weeks. Initially, teachers were to be contacted in April 2009. Due to school closings, teacher contact was delayed until May 2009. The teachers of the identified programs were contacted via school email which is (a) included in PEIMS data, (b) available on listservs, or (c) available via public school Web sites. Teachers were asked to help recruit their students as participants in the study. One week after sending the initial recruitment email, a second follow-up email was sent to each identified teacher. Upon confirmation of interest in the study, I (a) delivered to teachers the appropriate number of informed consent/assent packets (in English and Spanish) to send home with their students and (b) scheduled a time to visit the classroom to administer the survey. A total of 505 (386 in writing and 119 in person) informed consent/assent packets were requested by teachers for distribution to students.

A total of 343 students (68%) returned completed informed consent/assent packets to their CTE teachers, and 292 students completed the survey. I collected the completed informed consent/assent forms from the classroom teachers at the time the survey was administered and made a copy of each form for each student who participated in the study. I returned a copy of the appropriate form, along with a thank-you letter to each participating student at each school. I also sent a thank-you letter to each participating teacher, with a copy to the teacher's CTE director, who recruited students for the study. I planned to obtain twelve $50 gift cards to use as incentives for

41

teachers to encourage their students to return informed consent/assent forms. Students

needed only to return a completed consent/assent form in order for the teacher to be

eligible for the incentive; students did not have to agree to participate in the study for

incentive eligibility. Those teachers who had 90% of their students complete and return

informed consent/assent forms would be entered into a drawing for a gift card. Because

not all districts participated in the study and the flu-related school closings resulted in

project implementation delays, all 10 participating teachers received gift cards to thank

them for their participation. Gift cards were hand-delivered to the teachers at their

official school address.

During SDQII-M/CTE administration, I referenced the standard administration

procedure developed for the SDQ II (Marsh, n.d.). I used the following protocol:

1. Handed out a copy of the SDQII-M/CTE and a pencil with an eraser to each
   student.

2. Asked the students to complete the identifying and background information at the
   top of the front page.

3. Told the students that their responses would be kept confidential and would not
   be made public or given to the teacher.

4. Told the students that they could stop taking the survey at any time.

5. Asked the students to listen and follow along while the instructions on the front of
   the questionnaire were read aloud. Held up the instrument and pointed to the
   response scale while reading and explaining the instructions in paragraph 3.

6. When ready to begin, said, "You may begin. Once you have started, PLEASE
   DO NOT TALK."

7. Stopped any talking, commenting, and deliberate or unconscious vocalization.

8. Answered individual students' questions. If the student had trouble understanding a few words or expressions, I paraphrased the expression without changing the meaning of the sentence and then asked the student to answer the question as well as he / she could. If the student had trouble understanding a number of words or expressions or had another problem, which could not be quickly and easily rectified, I made a note on the front of the instrument. If the student marked an answer in the wrong place for a large number of responses, it was necessary to transfer the correct responses to a new questionnaire.

I collected completed surveys at the end of each survey administration period. Completed surveys were grouped according to teacher and class period and stored in pre-labeled envelopes for processing at a later time. Processing involved (a) removing personally identifiable data from demographic data and survey responses, (b) visually scanning surveys to make sure responses were recorded according to directions (i.e., circles filled in darkly and completely and all stray lines and marks completely erased), and (c) transcribing student responses to a blank questionnaire if appropriate. Two surveys were transcribed.

Personally identifiable data (student, teacher, campus, and district names) were recorded on a separate location from demographic information (ethnicity, gender, age, and program area), participation in CTE, and survey responses. A secure/password-protected electronic database, including student, teacher, campus, and district identifiers, was created and managed only by me for the purposes of matching survey responses to students. I stored the secure electronic database on a personal external

hard drive. A duplicate copy of the electronic database was burned to a CD and stored in my personal safe deposit box.

The original and duplicate copies of the electronic database containing personally identifiable information will be maintained by me for 3 years per federal IRB regulations. Once the 3-year record-maintenance period expires, both copies of the electronic database will be destroyed. Hard copies of personally identifiable information are stored in a locked file cabinet at my home and will be kept for 3 years per federal IRB regulations. Once the 3-year record maintenance period expires, those copies will be shredded with a cross-cut shredder.

Once personally identifiable information was separated from the remaining pieces of the survey instrument (demographic information and survey responses), the survey instruments were grouped using a single-digit, teacher-based, alphanumeric key code and numbered within each group. To reduce data entry and calculation error based on the potential size of the data set, student responses to the survey were scanned into a Microsoft Excel worksheet by the Data Management Department in the Computing and Information Technology Center at the University of North Texas. The electronic data set is stored on a password-protected computer in my private office located in the Department of Learning Technologies at the University of North Texas. A duplicate copy of the electronic data set is stored on my password-protected laptop. I will maintain the electronic data set for a minimum of 3 years per federal IRB regulations. Once the 3-year record-maintenance period expires, I may destroy both copies of the electronic data set. Original survey instruments (demographic information and survey responses) are stored in a locked file cabinet in my private office located in

the Department of Learning Technologies at the University of North Texas. At the end of the 3-year record-maintenance period, I will shred original survey instruments with a cross-cut shredder. I may send a copy of the electronic data set to the SELF Research Center at the University of Oxford for inclusion in subsequent SDQ norms and related analyses.

<div align="center">Data Scoring Procedures</div>

Instructions in the SDQ manuals outline procedural options for scoring responses to the SDQ instruments by hand (yielding raw scores and scaled scores) and using computer-based software (yielding factor scores). Marsh (n.d.) has encouraged users to use the computer-based software option to calculate factor scores derived from factor analyses on the normative sample for large-scale research, "particularly when the focus of research is to distinguish between different facets of self-concept" (p.17). Due to the likely differences between this population and students surveyed in previous studies, responses were tabulated electronically by the researcher using Microsoft Excel functions and following the hand-scoring procedures to yield raw scores and scaled scores.

The data collected in this study yielded self-concept variables and student characteristic variables. The self-concept variables were calculated for each participant by summing the participant's raw scores for all items in a subscale, yielding five raw scale scores, one for each SDQ subscale (general self-concept, academic self-concept, math self-concept, verbal self-concept, and problem-solving self-concept). Student characteristic data (age, gender, ethnicity, and years of CTE participation) were collected and coded as follows: age recorded as date of birth and then converted by the

researcher into years and months; gender coded 0 for males and 1 for females; ethnicity coded 1=African American, 2=Caucasian/White, 3=Hispanic, 4=Asian or Pacific Islander, 5=American Indian, 6=Alaskan Native, and 7=Other; and participation in CTE transcribed from student responses and converted by the researcher into number of credits of CTE courses taken (.5-14 credits). Program area was dummy coded as PROG_1 and PROG_2. PROG_1 coded as 0=advertising design and 1=animation and media technology; PROG_2 coded as 0=advertising design and media technology and 1=animation.

Data Analysis Procedures

The purpose of this study was to examine the relationship between the characteristics of students enrolled in AAVTC cluster CTE programs and students' self-concept scores as measured by specific subscales from the Self-Description Questionnaire (Marsh, n.d., 1989). Due to the multifaceted nature of these two variables and in order to reduce Type I "experimentwise" error (Thompson, 1991), a general linear model (GLM) canonical correlation analysis (CCA) was performed between CTE student characteristics (multioperationalized as participation, program, age, and gender) and self-concept (multioperationalized as general self-concept, academic self-concept, math self-concept, verbal self-concept, and problem-solving/creativity self-concept). Statistical analyses were performed using SPSS Release 17.0.0 and R. Figure 1 represents the variable relationships in the CCA with four predictor and five criterion variables. The correlation between the two synthetic (also called canonical, unobserved or latent) variables is a Pearson *r*.

The variables that combine to create the synthetic predictor CTE student characteristic variable were obtained from the student demographic and participant information at the beginning of the survey. Participation was determined by the number of credits students completed in CTE courses in middle school and high school (.5 – 14 credits). Program was defined as the type of AAVTC course in which the students were enrolled at the time the survey was administered (advertising design, animation, commercial photography, graphic design, or media technology). Age was recorded as the date of birth, and gender was reported as male or female.
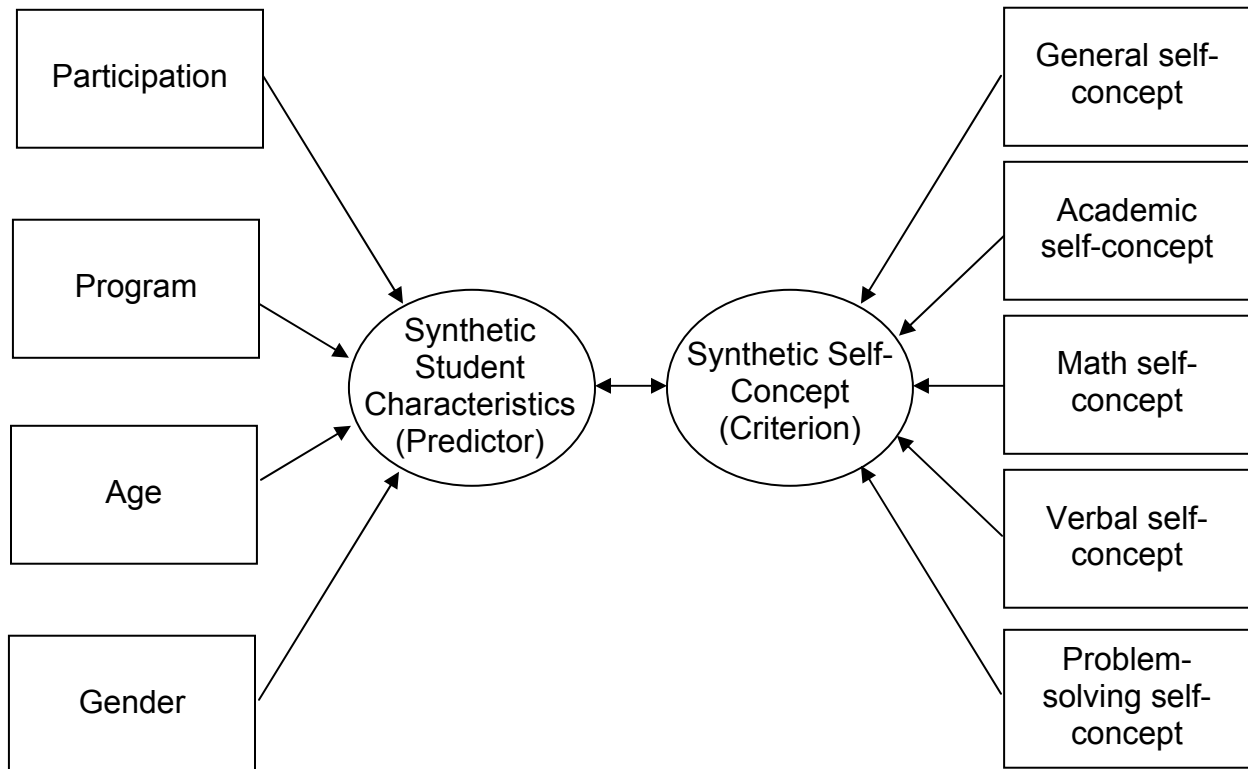
Figure 1. Diagram of the canonical correlation analysis.

The variables that combined to create the synthetic criterion self-concept variable were based on responses to SDQII-M/CTE survey Questions 1-50. General self-

concept, a global construct, reflects a student's general feelings about himself/herself (also referred to as esteem). Research has shown general self-concept to be fairly stable over time. Academic self-concept is one of two higher order factors (the other is non-academic self-concept) identified in the Marsh/Shavelson model of self-concept. Math self-concept, verbal self-concept, and problem-solving self-concept are first-order factors in the model. Research has shown that, although the higher-order factors are able to explain correlations among the first-order factors, "the actual levels of self-concept on many of the first-order factors cannot be accurately inferred from the two higher-order factors" (Marsh, 2005, p. 16). Practically speaking, this means that all levels must be investigated to get a true sense of students' self-concept because students' self-concepts in any of the first-order factors are not necessarily best represented by a generic academic self-concept score.

To perform this analysis, CCA used standardized weights to create two linear equations, one for the predictor variables and one for the criterion variables. These two linear equations yielded the two synthetic variables (illustrated in Figure 1). It is important to note that the two linear equations in the CCA are always created to yield the largest possible correlation between the synthetic predictor and criterion variables. The correlation of the two synthetic variables creates a canonical function. In a CCA, there will be as many canonical functions as there are variables in the smaller of the two variable sets; in this study, because of the dummy coding described previously in Data Scoring Procedures, there were five functions.

Unfortunately, there is not a "point-and-click" solution in SPSS for CCA. Using Sherry and Henson (2005) as a model, the procedure to conduct the analysis followed these steps:

1. Click "File"

2. Click "New"

3. Click "Syntax sequence"

4. Type the following syntax in the window provided:

        MANOVA
        gensc acadsc mathsc verbsc probsc WITH partic prog_1 prog_2 age gender
        /PRINT=SIGNIF (MULTIV EIGEN DIMENR)
        /DISCRIM=(STAN ESTIM COR ALPHA(.999)).

5. Click "RUN"

Assumptions

As with other GLM analyses, CCA comes with some basic assumptions: linearity of relationships, use of interval data, and proper specification of the model. Other assumptions include homoscedasticity (the variability in scores is roughly the same at all values of the other variable), untruncated variables, lack of multicollinearity (little or no presence of correlation between predictors), and multivariate normality for purposes of hypothesis testing.

Multivariate normality requirements include satisfying univariate normality for each variable as well as calculating a measure of multivariate normality. To evaluate univariate normality, *M* (mean), *SD* (standard deviation), kurtosis, and skewness descriptives were calculated for the continuous variable in the data set. Henson (1999) outlined multiple options for evaluating multivariate normality. For the purposes of this

study, Thompson's MULTINOR technique, illustrated by Henson, was used to evaluate multivariate normality.

"Power considerations are as important in canonical correlation as in other techniques" (Tabachnick & Fidell, 2001, p. 180). Unfortunately, software is not currently readily available to assist researchers in determining appropriate sample sizes for expected effects and desired power. Tabachnick and Fidell (2001) have recommended 10 cases for every variable in which reliability is generally around .80. Barcikowski and Stevens (1975) conducted a Monte Carlo study on the stability of the coefficients and the correlations for a canonical correlation. Their study concluded that the number of subjects per variable necessary to achieve reliability in determining the most important variables in a canonical correlation ranges from 42/1 to 68/1. Stevens (2002) considered that estimate to be somewhat conservative and subsequently recommended a ratio of 20/1 to be sufficient for accurate interpretation. Thompson (2000) recommended 15-20 participants per measured variable. Based on the target population, a ratio of 20/1 was easily met.

Practical Significance

As with all GLM analyses, interpretation of results should be based on a hierarchical decision-making strategy (Henson, 2002; Thompson, 1997) to answer the following questions: Do I have anything? and If I do have something, where did it come from?

In answering the question "Do I have anything?" the researcher followed the three-step process outlined in Sherry and Henson (2005). Through the use of tests of statistical significance paired with effect size interpretation, the full model was evaluated

for statistical significance using an *F* statistic and Wilks's lambda (λ), the most common method due to its general applicability (Sherry & Henson, 2005). Because of the large sample size associated with this study and with CCA, it was possible to get a statistically significant outcome for a small, unimportant effect. Therefore, I also interpreted effect size indices. Using Wilks's lambda (λ), effect size for the full model was calculated by taking 1- λ= R_c^2. The second step was to evaluate each canonical function, referring back to the calculated variance-accounted-for effect size or squared canonical correlation (R_c^2) and interpreting only those functions with a noteworthy effect. It is possible that each function may not contribute significantly to the total solution, but the total solution may be statistically significant and even noteworthy. In this case, interpreting any of the individual functions would be irrelevant. The third step in answering Question 1 is to review the dimension reduction analysis which reports the statistical significance of each of the function sets.

If it was reasonable to respond to the question "If I do have something, where did it come from?" I followed the hierarchical process outlined in Sherry and Henson (2005), which is a continuation of the three-step process used to answer the first question. The step(s) utilized to answer this question required examination of the standardized weights and structure coefficients to interpret each of the functions deemed noteworthy when answering the first question. In addition, when examining each function, it was helpful to look at the communality coefficients, which represent the amount of variance in the observed variable that was reproducible across the functions.

An option provided by Nimon (2009) is to conduct a canonical commonality analysis to help in further understanding the structure of CCA and interpret results. This

type of analysis may be helpful in situations in which the values of the standardized

weights and structure coefficients appear to contradict one another regarding the

importance of a variable. Based on the software package, R, code already exists to

perform this type of analysis. When necessary to conduct a canonical commonality

analysis, I followed the procedure outlined by Nimon.

One final consideration for interpreting the data deals with reporting corrected

effects. Because GLM analyses tend to maximize shared variance between sets of

variables, the analyses capitalize on the sampling error variance in any given sample to

yield the largest possible effect size. This sampling error variance is unique to the

sample and unlikely to be replicable in future samples or the population. To account for

this difference, corrected effects are calculated to "shrink" effect size indices.

A number of formulae are available to use in calculating corrected effects (Leach,

2006). Results from a Yin and Fan (2001) Monte Carlo study demonstrated that the

most critical factor influencing the performance of corrected effects formulae is the ratio

between the sample size and the number of predictor variables (N/p). Leach created a

reference guide for correction formulae selection based on a number of factors normally

encountered when conducting CCA. Formula selection criteria identified by Leach

include the sample size to predictor variable ratio, number of variables in the variable

sets, shape of the distributions, and the correlations between and within the variables.

Summary

This chapter described the design and methodology used in this research study.

The chapter included a description of the research design, the instrument used, the

population to be surveyed, the process for collecting data, and the process for analyzing

data.

CHAPTER 4

RESULTS

Introduction

The purpose of this study was to examine the relationship between the characteristics of students enrolled in arts, audio/video technology and communications (AAVTC) cluster career and technology education (CTE) programs and students' self-concept scores as measured by specific subscales from the Self-Description Questionnaire (SDQ) family of instruments (Marsh, n.d., 1989). This chapter reports the study's findings. The Data Evaluation section outlines procedures for data imputation and for calculation methods employed on self-concept variables and student characteristic variables. The Statistical Assumptions section addresses the issue of multivariate normality. The Data Analysis section provides results from the canonical correlation analysis. The chapter concludes with a summary.

Data Assessment

Beginning with 292 student responses, I scanned, evaluated, and modified the dataset. Of the responses, 285 remained for analysis. Self-concept and student characteristic variables were assessed and treated independently.

Self-Concept Variables

I visually scanned and evaluated the self-concept variables in the dataset following the instructions in the SDQ manuals. Decisions were made with regard to missing data and calculation of raw scale scores.

Missing data. From the initial 292 submitted surveys, 7 surveys were deleted because the respondents omitted three or more (5%) answers on the questionnaire.

This exclusion criterion is consistent with criteria established by Marsh (n.d., 1989) for other SDQ measures. Of the remaining 14,250 values (285 participants * 50 measures), a total of 45 (0.3%) values were missing. Two of the missing values were obtained from the original survey instrument. All other missing values were imputed by substituting the mean response for the missing item score as outlined and reported in the appropriate SDQ manual.

   Calculation of raw scale scores. Responses to the 25 negatively-worded survey statements identified by Marsh (n.d., 1989; Items 3, 5, 6, 7, 9, 13, 15, 16, 17, 19, 23, 25, 26, 27, 29, 33, 35, 36, 37, 39, 43, 45, 46, 47, and 49) were reverse-scored by subtracting the student's response from 7 per guidelines in the SDQ manuals. Table 2 lists all of the negatively-worded survey statements requiring the application of a reverse-scoring calculation function.

Table 2

Negatively-Worded Survey Statements

Item	Statement
03.	I am hopeless in **ENGLISH** classes
05.	I am never able to think up answers to problems that haven't already been figured out
06.	I often need help in **MATHEMATICS**
07.	Overall, I am no good
09.	I am too stupid at school to get into a good university
13.	I do badly on tests that need a lot of **READING** ability

(table continues)

Table 2 (*continued*).

Item	Statement
15.	I wish I had more imagination and originality
16.	I have trouble understanding anything with **MATHEMATICS** in it
17.	Nothing I do ever seems to turn out right
19.	I get bad marks (grades) in most **SCHOOL SUBJECTS**
23.	I am not very good at **READING**
25.	I am not much good at problem solving
26.	I do badly in tests of **MATHEMATICS**
27.	I don't have much to be proud of
29.	I am stupid at most **SCHOOL SUBJECTS**
33.	I hate **READING**
35.	I am not very original in my ideas, thoughts, and actions
36.	I never want to take another **MATHEMATICS** course
37.	I feel that my life is not very useful
39.	I have trouble with most **SCHOOL SUBJECTS**
43.	I have trouble expressing myself when I try to write something
45.	I would have no interest in being an inventor
46.	I hate **MATHEMATICS**
47.	Overall, I am a failure
49.	Most **SCHOOL SUBJECTS** are just too hard for me

Once negatively-worded items were reverse-scored, a raw scale score was calculated for each of the five SDQ subscales (GENSC, ADACSC, MATHSC, VERBSC, and PROBSC) by summing the values of all items in the subscale. GENSC = General Self-Concept, ACADSC = Academic Self-Concept; MATHSC = Math Self-Concept, VERBSC = Verbal Self-Concept; and PROBSC = Problem Solving Self-Concept. Table 3 shows the survey item numbers of the SDQ statements included in each subscale. When a scale score contained an imputed item mean, the raw scale score was rounded up to the next whole number.

Table 3

SDQ Subscale Items

GENSC	ACADSC	MATHSC	VERBSC	PROBSC
02	04	01	03	05
07	09	06	08	10
12	14	11	13	15
17	19	16	18	20
22	24	21	23	25
27	29	26	28	30
32	34	31	33	35
37	39	36	38	40
42	44	41	43	45
47	49	46	48	50

Note. GENSC = General Self-Concept; *ACADSC* = Academic Self-Concept; *MATHSC* = Math Self-Concept; *VERBSC* = Verbal Self-Concept; *PROBSC* = Problem Solving Self-Concept.

Student Characteristic Variables

The researcher visually scanned and evaluated the student characteristic variables in the dataset. Several student characteristic variables contained missing data. Calculations were performed to compute participant age and level of participation in CTE courses.

Missing data. All students reported gender and level of participation in CTE. Program area was assigned by the researcher based on the student's enrollment at the time the survey was administered. A total of 285 students participated in this study. There were 196 male participants and 89 female participants. There were approximately 119 students enrolled in advertising design programs, 52 students in animation programs, and 114 students enrolled in media technology programs. In one participating district, many of the students were concurrently enrolled in multiple program areas.

The following student characteristic response categories were missing data: date of birth and ethnicity. Two students omitted the correct year of birth. The appropriate teacher was contacted via electronic mail to obtain the year of birth only from school records. Written documentation noting the correct birth year was received from each teacher and recorded in the dataset.

Students were asked to report ethnicity on the survey instrument according to the following groups: 1=African American, 2=Caucasian/White, 3=Hispanic, 4=Asian or Pacific Islander, 5=American Indian, 6=Alaskan Native, and 7=Other. During review of data it was observed that 3 students did not select an ethnic group, 5 students selected "Other," and 25 students selected more than one group to reflect their ethnicity. The

researcher grouped these 33 responses together in the "Other" category. Table 4

compares the demographics of the students involved in this study with the

demographics of students enrolled in ESC Region 11 and in all Texas public, secondary

schools.

Table 4

Demographic Composition of Student Population in Study, Region, and State

		% Ethnic composition						*% Gender*	
Group	*AA*	*NA*	*W*	*AS*	*H*	*O*		*M*	*F*
Study	3.16	0.003	63.51	3.86	16.49	12.62		68.77	31.22
Region 11	14.45	0.52	55.54	4.43	25.05	N/A		51.05	48.94
TX	14.60	0.36	39.13	3.45	42.46	N/A		51.04	48.96

Note. AA = African American; *NA* = Native American; *W* = White; *AS* = Asian; *H* = Hispanic; *O* = Other.

Calculation of age and student level of participation. To obtain the most accurate

age of each participant at the time of survey administration, the researcher subtracted

the date of birth from the date of survey administration. The original scanned dataset

contained two date columns: survey date and date of birth, which were formatted as

"Text." In order to perform the age calculation, it was necessary to transpose the data in

the two date columns to a "Date" format. Modifying the cell formatting alone resulted in

a misinterpretation of the date information. Consequently, a series of Excel calculations

was performed to convert the data into a usable format. The first column containing the

survey administration date was manually re-entered in the dataset as MM/DD/YYYY

and the cells formatted as a "Date." The second column containing the date of birth

information in "Text" format was used as the conversion base. Four additional columns

were added to perform the series of Excel functions below on the date of birth text

(DOB) in order to convert the information into a usable format.

Column 1: SURVEYDATE
    (Formatted as "Date" MM/DD/YYYY)
Column 2: DOB
    (Formatted as "Text")
Column 3: MONTH
    =INT("DOB"/10000)
    (Formatted as "General")
Column 4: DAY
    =INT("DOB"/100)-"MONTH"*100
    (Formatted as "General")
Column 5: YEAR
    ="DOB"-("MONTH"*10000)-("DAY"*100)+1900
    (Formatted as "General")
Column 6: BIRTHDATE
    =DATE("YEAR," "MONTH," "DAY")
    (Formatted as "Date," MM/DD/YYYY)

The final two Excel functions below were performed in two additional columns to

calculate each participant's age as (a) a continuous variable and (b) in a format

consistent with other SDQ reporting conventions.

Column 7: AGE IN MONTHS
    =DAYS360("BIRTHDATE","SURVEYDATE")/30
    (Formatted as "Number")
Column 8: AGE IN YEARS AND MONTHS
    ="AGE IN MONTHS"/12
    (Formatted as "Custom," # ?/12)

Student level of participation in CTE was determined from information obtained in

the demographic portion of the survey. Students were asked to indicate whether they

had completed CTE courses in middle school. Students were also asked to list all of the

CTE courses they had taken in middle school and in high school. Student responses were scanned as part of the initial dataset and evaluated by the researcher. Courses listed as completed in high school were matched to course titles listed in the current 1997 Texas Essential Knowledge and Skills (TEKS). A total of 28 courses were removed from consideration in determining level of participation in CTE courses. Fourteen courses were removed from the dataset because they are not CTE courses: 2 English courses, 5 fine arts courses, and 7 technology applications courses commonly misidentified as CTE courses. Fourteen additional courses were removed because no matching title could be found in the TEKS. Table 5 lists the courses eliminated from the dataset, the frequency of listing by students, and the reason each course was eliminated from the dataset.

Table 5

Courses Listed on Survey and Reason for Elimination From Dataset

Course listed	*Frequency*	*Reason for elimination*
JOURNALISM	1	English
SPEECH	1	English
ART	1	Fine Arts
ART 18-4	1	Fine Arts
ART II (ELECTRONIC MEDIA)	1	Fine Arts
BAND	1	Fine Arts
TECH THEATER	1	Fine Arts
CAMP SCIENCE	1	No match found in TEKS
DESTINATIONS	5	No match found in TEKS
ENGINEERING	2	No match found in TEKS
GIS	1	No match found in TEKS
IFC	1	No match found in TEKS

(table continues)

Table 5 (*continued*).

Course listed	Frequency	Reason for elimination
INTRO TO ENGINEERING	3	No match found in TEKS
INTRO TO GIS	1	No match found in TEKS
INTRO TO TECH	3	No match found in TEKS
TECH ED	3	No match found in TEKS
TECH INDUSTRIES	1	No match found in TEKS
TECH LAB	1	No match found in TEKS
TECHNOLOGY	1	No match found in TEKS
TYPING	1	No match found in TEKS
WOOD WORKING	3	No match found in TEKS
COMPUTER SCIENCE	3	Technology Applications
COMPUTER SCIENCE II	1	Technology Applications
DESKTOP PUBLISHING	1	Technology Applications
DIGITAL GRAPHICS/ANIMATION	2	Technology Applications
ELECTRONIC MEDIA	1	Technology Applications
MULTIMEDIA	8	Technology Applications
WEB MASTERING	34	Technology Applications

For each remaining CTE course listed as completed in high school, a credit range was identified in the current TEKS (adopted in 1997), and a corresponding weight was assigned. The assigned weight was calculated as an average of the available course credit range. Table 6 provides a list of all courses reported on the survey instrument, the credit range available for each course, and the weight assigned and used in the calculation of student level of participation. Middle school courses listed as completed at the high school level were eliminated from the dataset. Level of participation in CTE was calculated by summing all of the weights for each participant.

A weight of .5 was added to each sum if the participant reported completing one or

more middle school CTE courses.

Table 6

CTE Courses Taken, Credit Range, and Weight Used to Calculate Student Level of Participation in CTE

Course listed	Frequency	Credit range	Weight
AG METAL FAB	1	.5	.5
BUSINESS MANAGEMENT	5	.5	.5
BUSINESS OWNERSHIP	1	.5	.5
CHILD DEVELOPMENT	2	.5	.5
FOOD SCIENCE AND TECHNOLOGY	3	.5	.5
INTERIOR DESIGN	2	.5	.5
NUTRITION AND FOOD SCIENCE	7	.5	.5
ARCHITECTURAL GRAPHICS	3	.5-1	.75
BCIS	87	.5-1	.75
BIMM	43	.5-1	.75
CMAT	6	.5-1	.75
COMMUNICATION GRAPHICS	2	.5-1	.75
COMPUTER INTEGRATED MANUFACTURING	1	.5-1	.75
COURTS & CRIMINAL PROCEDURES	1	.5-1	.75
CRIME IN AMERICA	3	.5-1	.75
CRIMINAL JUSTICE	11	.5-1	.75
E-COMMERCE/PERSONAL FINANCE	1	.5-1	.75
FUNDAMENTALS OF CRIMINAL LAW	2	.5-1	.75
INTRO TO AD DESIGN	34	.5-1	.75
INTRO TO ANIMATION	25	.5-1	.75
INTRO TO BROADCAST JOURNALISM	1	.5-1	.75
INTRO TO BUSINESS	9	.5-1	.75
INTRO TO COMPUTER MAINTENANCE	1	.5-1	.75

(table continues)

Table 6 (*continued*).

Course listed	Frequency	Credit range	Weight
INTRO TO CRIMINAL JUSTICE	6	.5-1	.75
INTRO TO ELECTRONICS	4	.5-1	.75
INTRO TO MEDIA TECH	46	.5-1	.75
KEYBOARDING	73	.5-1	.75
MARKETING	1	.5-1	.75
BUSINESS COMPUTER PROGRAMMING	7	.5-3	1.75
COMPUTER APPLICATIONS	2	1	1
PERSONAL FAMILY DEVELOPMENT	4	1	1
PRINCIPLES OF ENGINEERING	2	1	1
TECHNOLOGY SYSTEMS	11	1	1
ANIMATION I	57	1-2	1.5
HSTE I	1	1-2	1.5
AD DESIGN I	95	2-3	2.5
AD DESIGN II	32	2-3	2.5
AD DESIGN III	14	2-3	2.5
ANIMATION II	17	2-3	2.5
ANIMATION III	2	2-3	2.5
AUTO TECH	1	2-3	2.5
BROADCAST JOURNALISM	1	2-3	2.5
COMPUTER AIDED DRAFTING	2	2-3	2.5
COMPUTER MAINTENANCE	2	2-3	2.5
COSMETOLOGY	1	2-3	2.5
CULINARY ARTS	4	2-3	2.5
DRAFTING	1	2-3	2.5
ELECTRONICS I	4	2-3	2.5
HOSPITALITY I	2	2-3	2.5
HOSPITALITY II	1	2-3	2.5
MEDIA TECHNOLOGY I	82	2-3	2.5

(table continues)

Table 6 (*continued*).

Course listed	Frequency	Credit range	Weight
MEDIA TECHNOLOGY II	27	2-3	2.5
MEDIA TECHNOLOGY III	2	2-3	2.5
READY SET TEACH	3	2-3	2.5
TICP	1	2-3	2.5
HSTE II	1	2-4	3

Statistical Assumptions

The dataset was processed using SPSS Release 17.0.0, and it was assessed by evaluating the multivariate normality of each case of data. Multivariate normality, which satisfies bivariate normality requirements, was evaluated by assessing univariate normality and by calculating the Mahalanobis distance (D^2) for each case of data and plotting results.

Univariate Normality

The self-concept measures analyzed in this study tended to be slightly negatively skewed. All self-concept variables were normally distributed with the exception of general self-concept (GENSC), which indicated a trend toward the higher end of the Likert scale in the student responses (kurtosis = 2.57). The student characteristic variables tended to be positively skewed except age (skewness = -0.93) and normally distributed. Table 7 presents the distributional descriptive statistics for all continuous variables in the study. For the purposes of data analysis, age was calculated in months. For ease of interpretation, age was also calculated in years and months (*M* = 17 years-5 months; *SD* = 1.09; *Min.* = 14 years-5 months; *Max.* = 19 years-7 months).

Table 7

Distributional Descriptives for Study Data

Variable				Statistic			
	n	*M*	*SD*	*Min.*	*Max.*	*Kurtosis*	*Skewness*
GENSC	285	50.91	7.49	16.00	60.00	2.57	-1.38
ACADSC	285	48.17	8.20	11.00	60.00	1.61	-1.04
VERBSC	285	46.68	10.16	16.00	60.00	0.32	-0.89
MATHSC	285	36.03	13.40	10.00	60.00	-0.90	-0.25
PROBSC	285	46.78	6.98	24.00	60.00	-0.01	-0.50
AGE	285	211.49	13.09	175.60	238.57	0.38	-0.93
PARTIC	285	4.05	2.39	0.75	12.75	0.37	0.79

Multivariate Normality

Henson (1999) discussed a variety of approaches to assessing multivariate normality, including Thompson's MULTINOR, which is based on the calculation of the Mahalanobis distance (D^2) for each case of data. Henson provided SPSS syntax for MULTINOR; sample size information and variables were replaced to match conditions in this study. In addition, to accommodate changes in SPSS syntax between release versions, the PLOT command sequence in the last four lines of the original Henson syntax was replaced with the GRAPH command sequence in the last three lines of code presented below:

```
COMPUTE y=$casenum.
PRINT FORMATS y(F5).
EXECUTE.
```

```
DATASET ACTIVATE DataSet1.
REGRESSION
   /MISSING LISTWISE
   /STATISTICS COEFF OUTS R ANOVA
   /CRITERIA=PIN(.05) POUT(.10)
   /NOORIGIN
   /DEPENDENT y
   /METHOD=ENTER gensc acadsc mathsc verbsc probsc participate prog_1
prog_2 age gender
   /SAVE MAHAL.

SORT CASES BY MAH_1.
EXECUTE .

LIST VARIABLES=y MAH_1
   /FORMAT=NUMBERED.

LOOP #i=1 to 285.
COMPUTE p=($casenum-.5)/285.
COMPUTE chisq=idf.chisq(p,10).
END LOOP.

PRINT FORMATS p chisq (F8.5).
LIST VARIABLES=y p MAH_1 chisq
   /FORMAT=NUMBERED.

GRAPH
   /SCATTERPLOT(BIVAR)=MAH_1 WITH chisq
   /MISSING=LISTWISE.
```

The MULTINOR program calculated Mahalanobis distances for all cases and placed the D^2 values in ascending order. Then a percentile and related chi-square value was computed for each case. Finally, the Mahalanobis distances and paired chi-square values were plotted in a scatterplot as shown in Figure 2. The plotted values, with the exception of 6-8 extreme outliers, form a relatively straight diagonal line, and multivariate normality is tenable.
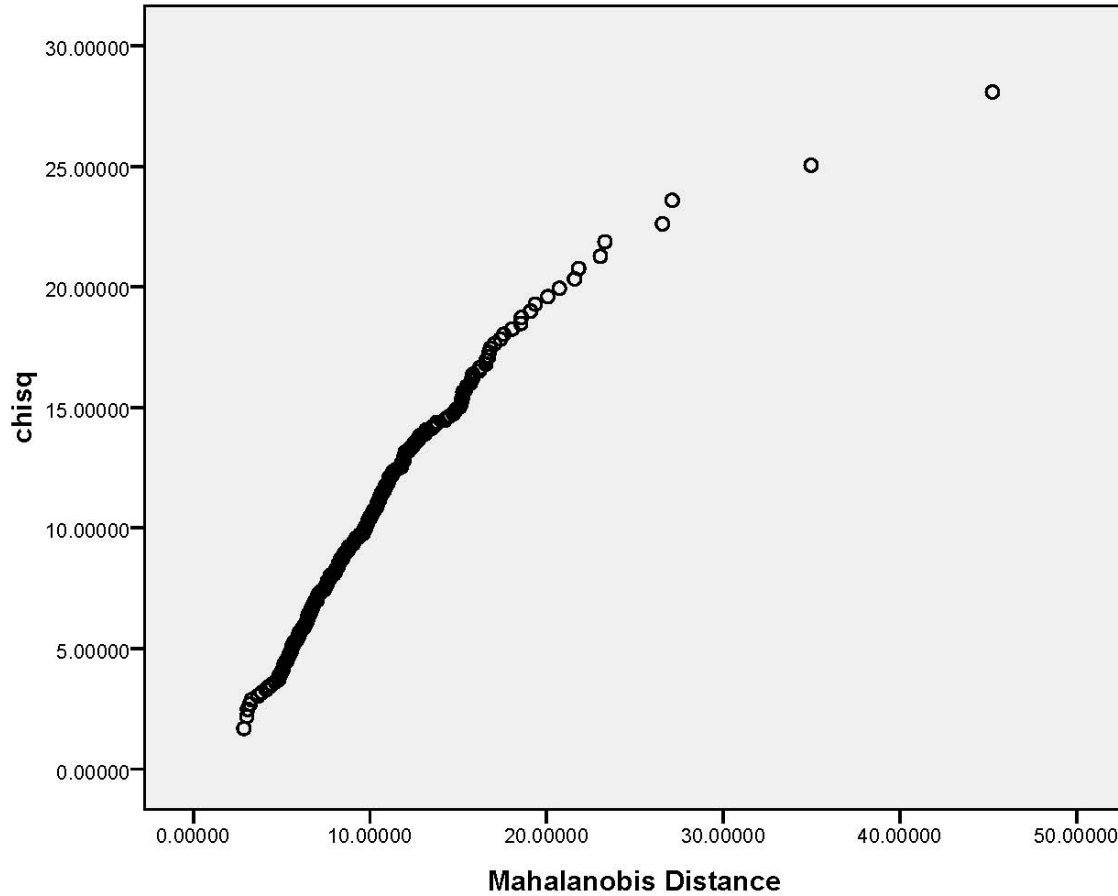
Figure 2. Chi-square by Mahalanobis distance for 285 cases on all research variables.

Data Analyses

To answer the research question, a canonical correlation analysis was conducted using the four (five total variables with the coding required for program area) student characteristic variables as predictors of the five self-concept variables to evaluate the multivariate shared relationship between the two variable sets (i.e., student characteristics and self-concept). The analysis yielded five functions with squared canonical correlations (R_c^2) of .154, .066, .036, .014, and .002 for each successive function. Collectively, the full model across all functions was statistically significant using the Wilks's λ = .749 criterion, F (25, 1023.08) = 3.300, $p < .001$. Because Wilks's λ

represents the variance unexplained by the model, 1- λ yields the full model effect size

in an r^2 metric. Thus, for the set of five canonical functions, the r^2 type effect was .251.

Using the Wherry-2 formula recommended by Leach (2006), the adjusted r^2 type effect

was .226, which indicates that the full model explained a moderate proportion, about

23%, of the variance shared between the variable sets.

    The dimension reduction analysis, illustrated in Table 8, allows the researcher to

test the hierarchical arrangement of functions for statistical significance. As noted, the

full model (Functions 1 to 5) was statistically significant. Functions 2 to 5 were also

statistically significant F (16, 843.83) = 2.13, p = .006. Functions 3 to 5, 4 to 5, and

Function 5, the only function tested in isolation, did not explain a statistically significant

amount of shared variance between the variable sets, F (9, 674.30) = 1.63, p = .102, F

(4, 556.00) = 1.13, p = .342, and F (1, 279.00) = 0.54, p = .465, respectively.

Table 8

Canonical Correlation Dimension Reduction Analysis

	Statistic			
Function	*F*	*Hypoth. DF*	*Error DF*	*Sig.*
1 to 5	3.30	25.00	1023.08	<.001
2 to 5	2.13	16.00	843.83	.006
3 to 5	1.63	9.00	674.30	.102
4 to 5	1.13	4.00	556.00	.342
5 to 5	0.54	1.00	279.00	.465

    Given the R_c^2 effects for each function, only the first two functions were

considered noteworthy in the context of this study. Function 1 explained 15% of the

shared variance. Of the variance that remained, Function 2 explained 7%. The last three functions explained only 4%, 1%, and less than 1%, respectively, of the remaining variance in the variable sets after the extraction of the prior functions.

Table 9 presents the standardized canonical coefficients (β), structure coefficients (r_s), squared structure coefficients (r_s^2), and commonality coefficients for Function 1 across both variables. Looking at Function 1 coefficients, one sees that relevant self-concept variables were primarily verbal (VERBSC) and problem-solving (PROBSC) with academic (ACADSC) and math (MATHSC) making a secondary contribution to the synthetic variable. General self-concept (GENSC) made little or no contribution to the synthetic self-concept variable. This conclusion was supported by the squared structure coefficients. These self-concepts also tended to have the larger commonality coefficients. With the exception of problem-solving and general self-concept, the variables' structure coefficients had the same sign, indicating that they were all positively related. Problem-solving was inversely related to the other self-concepts. General self-concept was negatively related to the other self-concepts, which is generally supportive of the theoretically expected relationships between general self-concept and higher order self-concepts.

Regarding the student characteristic variable set in Function 1, gender was the primary contributor to the synthetic variable, with a secondary contribution by participation in CTE (PARTIC). Age and program area make little or no contribution to the latent student characteristics variable. Because the structure coefficient for GENDER was negative, it was positively related to all of the self-concepts except problem-solving (PROBSC) and general (GENSC). Males were coded "0" and females

coded "1," which means that females tend to have a higher verbal, academic, and math self-concept and a lower problem-solving self-concept than males. Because the structure coefficient for participation (PARTIC) was positive, it was negatively related to all the self-concepts except problem-solving (PROBSC). These results are generally supportive of the theoretically anticipated relationship between participation in these particular CTE programs and students' problem-solving self-concepts.

Table 9

Canonical Analyses for Function 1

Variable (V)	β	r_s	r_s^2	Unique	Common	Total
GENSC	-.035	.014	<.001	<.001	<-.001	<.001
ACADSC	-.280	-.344	.118	.004	.014	.018
VERBSC	-.856	-.589	.346	.067	-.013	.053
MATHSC	-.263	-.041	.002	.005	-.005	<.001
PROBSC	.922	.423	.179	.089	-.062	.028
R_c^2			.154			
GENDER	-.908	-.948	.898	.123	.015	.138
AGE	.030	.269	.072	<.001	.011	.011
PARTIC	.308	.369	.136	.010	.011	.021
PROG_1	.072	.043	.002	.001	<-.001	<.001
PROG_2	.132	.114	.013	.002	<.001	.002

Note. β = standardized canonical function coefficient; r_s = structure coefficient; r_s^2 = squared structure coefficient; R^2_c= squared canonical correlation; Unique = variable's unique effect; Common = Σ variable's common effects; Total = Unique + Common.

In Function 2, the coefficients in Table 10 suggest that the primary self-concept variables of relevance were problem-solving (PROBSC), verbal (VERBSC), and academic (ACADSC), with a secondary contribution by general (GENSC) and almost no contribution by math (MATHSC). On this function, the primary contributors were all positively related. Math self-concept was inversely related, and general self-concept was negatively related. As for student characteristics, participation in CTE (PARTIC) was the primary contributor, with gender and program area (PROG_1) making secondary contributions. Gender was positively associated, and program area (PROG_1) was inversely associated with participation (PARTIC), indicating a rotation from Function 1. Looking at the structure coefficients for the entire function, we see, therefore, that problem-solving, verbal, and academic self-concepts were positively associated with participation in CTE. Math self-concept was negatively associated with participation in CTE. Gender had the same pattern. All self-concepts were negatively associated with program area (PROG_1) with the exception of math (MATHSC). Because of the way the program area variable was coded, this can be interpreted as students in Animation and Media Technology programs having lower problem-solving, verbal, and academic self-concepts and higher math self-concepts than their counterparts in Advertising Design programs.

Table 10

Canonical Analyses for Function 2

Variable (V)	B	r_s	r_s^2	Unique	Common	Total
GENSC	.392	-.185	.034	.006	-.004	.002

(table continues)

Table 10 (*continued*).

Variable (V)	B	r_s	r_s^2	Unique	Common	Total
ACADSC	-.525	-.546	.298	.007	.013	.020
VERBSC	-.245	-.696	.485	.002	.030	.032
MATHSC	.327	.013	<.001	.004	-.004	<.001
PROBSC	-.750	-.815	.664	.025	.019	.044
R_c^2			.066			
GENDER	-.316	-.274	.075	.006	-.001	.005
AGE	-.014	-.383	<.001	<.001	.010	.010
PARTIC	-.841	-.881	.776	.033	.019	.052
PROG_1	.331	.506	.256	.006	.011	.017
PROG_2	.006	-.017	<.001	<.001	<.001	<.001

Note. β = standardized canonical function coefficient; r_s = structure coefficient; r_s^2 = squared structure coefficient; R^2_c= squared canonical correlation; Unique = variable's unique effect; Common = Σ variable's common effects; Total = Unique + Common.

Tables 11, 12, 13, and 14 present commonality analyses for each variable set in each canonical function discussed in this section. The analyses clarify the contributions of each variable to the overall effect size of the functions. Table 11 confirms the contribution of GENDER to Function 1 (R_c^2= 0.1230, 79.94%). Table 12 confirms the contributions of VERBSC (R_c^2=0.0665, 43.21%) and PROBSC (R_c^2=0.0893, 58.03%) to Function 1 and also clarifies the suppressor effect of these two variables. Of note, the sum of their unique contributions is larger than the total effect. Additionally, the negative combined contribution of VERBSC and PROBSC (R_c^2= -0.0350, -22.75%)

indicates that these two variables are performing better together than they would alone.

Tables 13 and 14 confirm the contributions of PARTIC (R_c^2=0.0327, 49.28%) and

PROBSC (R_c^2=0.0254, 38.32%) to Function 2.

Table 11

Commonality Data: Partitioned Variance of Function 1's Student Characteristics (Predictor) Canonical Variate

```
[[1]][[1]]
[[1]][[1]]$CC
                                                        Coefficient  % Total
Unique to AGE                                               0.0001      0.07
Unique to PROG_1                                            0.0006      0.40
Unique to PROG_2                                            0.0020      1.33
Unique to GENDER                                            0.1230     79.94
Unique to PARTIC                                            0.0102      6.61
Common to AGE, and PROG_1                                   0.0001      0.06
Common to AGE, and PROG_2                                   0.0004      0.23
Common to PROG_1, and PROG_2                               -0.0006     -0.38
Common to AGE, and GENDER                                   0.0004      0.24
Common to PROG_1, and GENDER                                0.0045      2.93
Common to PROG_2, and GENDER                                0.0042      2.74
Common to AGE, and PARTIC                                   0.0046      2.98
Common to PROG_1, and PARTIC                               -0.0006     -0.38
Common to PROG_2, and PARTIC                               -0.0018     -1.15
Common to GENDER, and PARTIC                                0.0072      4.71
Common to AGE, PROG_1, and PROG_2                          -0.0001     -0.05
Common to AGE, PROG_1, and GENDER                           0.0005      0.32
Common to AGE, PROG_2, and GENDER                           0.0009      0.60
Common to PROG_1, PROG_2, and GENDER                       -0.0028     -1.84
Common to AGE, PROG_1, and PARTIC                          -0.0001     -0.06
Common to AGE, PROG_2, and PARTIC                           0.0000     -0.02
Common to PROG_1, PROG_2, and PARTIC                        0.0007      0.46
Common to AGE, GENDER, and PARTIC                           0.0050      3.25
Common to PROG_1, GENDER, and PARTIC                       -0.0032     -2.09
Common to PROG_2, GENDER, and PARTIC                       -0.0026     -1.70
Common to AGE, PROG_1, PROG_2, and GENDER                  -0.0003     -0.22
Common to AGE, PROG_1, PROG_2, and PARTIC                   0.0002      0.11
Common to AGE, PROG_1, GENDER, and PARTIC                  -0.0004     -0.28
Common to AGE, PROG_2, GENDER, and PARTIC                   0.0000     -0.02
Common to PROG_1, PROG_2, GENDER, and PARTIC                0.0018      1.20
Common to AGE, PROG_1, PROG_2, GENDER, and PARTIC           0.0000      0.01
                                                   Total    0.1538    100.00

[[1]][[1]]$CCTotalbyVar
          Unique       Common       Total
AGE       0.0001       0.0110       0.0111
PROG_1    0.0006      -0.0003       0.0003
PROG_2    0.0020       0.0000       0.0020
GENDER    0.1230       0.0151       0.1381
PARTIC    0.0102       0.0108       0.0210
```

Table 12

Commonality Data: Partitioned Variance of Function 1's Self-Concept (Criterion) Canonical Variate

```
[[2]][[1]]
[[2]][[1]]$CC
                                                       Coefficient % Total
Unique to MATHSC                                          0.0053     3.47
Unique to GENSC                                           0.0001     0.08
Unique to VERBSC                                          0.0665    43.21
Unique to ACADSC                                          0.0044     2.86
Unique to PROBSC                                          0.0893    58.03
Common to MATHSC, and GENSC                              -0.0001    -0.07
Common to MATHSC, and VERBSC                              0.0000     0.01
Common to GENSC, and VERBSC                               0.0011     0.69
Common to MATHSC, and ACADSC                              0.0161    10.45
Common to GENSC, and ACADSC                               0.0019     1.21
Common to VERBSC, and ACADSC                              0.0478    31.07
Common to MATHSC, and PROBSC                             -0.0047    -3.05
Common to GENSC, and PROBSC                               0.0069     4.52
Common to VERBSC, and PROBSC                             -0.0350   -22.75
Common to ACADSC, and PROBSC                             -0.0013    -0.82
Common to MATHSC, GENSC, and VERBSC                      -0.0001    -0.09
Common to MATHSC, GENSC, and ACADSC                       0.0037     2.42
Common to MATHSC, VERBSC, and ACADSC                     -0.0195   -12.70
Common to GENSC, VERBSC, and ACADSC                       0.0014     0.92
Common to MATHSC, GENSC, and PROBSC                       0.0006     0.38
Common to MATHSC, VERBSC, and PROBSC                      0.0049     3.21
Common to GENSC, VERBSC, and PROBSC                       0.0020     1.30
Common to MATHSC, ACADSC, and PROBSC                     -0.0104    -6.78
Common to GENSC, ACADSC, and PROBSC                      -0.0047    -3.03
Common to VERBSC, ACADSC, and PROBSC                     -0.0182   -11.84
Common to MATHSC, GENSC, VERBSC, and ACADSC              -0.0021    -1.38
Common to MATHSC, GENSC, VERBSC, and PROBSC              -0.0011    -0.72
Common to MATHSC, GENSC, ACADSC, and PROBSC              -0.0066    -4.29
Common to MATHSC, VERBSC, ACADSC, and PROBSC              0.0086     5.61
Common to GENSC, VERBSC, ACADSC, and PROBSC             -0.0086    -5.60
Common to MATHSC, GENSC, VERBSC, ACADSC, and PROBSC      0.0057     3.71

                                            Total        0.1538   100.00


[[2]][[1]]$CCTotalbyVar
          Unique       Common      Total
MATHSC    0.0053      -0.0050     0.0003
GENSC     0.0001      -0.0001     0.0000
VERBSC    0.0665      -0.0132     0.0533
ACADSC    0.0044       0.0138     0.0182
PROBSC    0.0893      -0.0618     0.0275
```

Table 13

Commonality Data: Partitioned Variance of Function 2's Student Characteristics
(Predictor) Canonical Variate

```
[[1]][[2]]
[[1]][[2]]$CC
                                                  Coefficient % Total
Unique to AGE                                         0.0000     0.01
Unique to PROG_1                                      0.0056     8.45
Unique to PROG_2                                      0.0000     0.00
Unique to GENDER                                      0.0064     9.66
Unique to PARTIC                                      0.0327    49.28
Common to AGE, and PROG_1                             0.0000     0.07
Common to AGE, and PROG_2                             0.0000     0.00
Common to PROG_1, and PROG_2                          0.0012     1.85
Common to AGE, and GENDER                             0.0000    -0.01
Common to PROG_1, and GENDER                          0.0018     2.75
Common to PROG_2, and GENDER                          0.0001     0.12
Common to AGE, and PARTIC                             0.0111    16.68
Common to PROG_1, and PARTIC                          0.0119    17.91
Common to PROG_2, and PARTIC                          0.0032     4.79
Common to GENDER, and PARTIC                         -0.0022    -3.39
Common to AGE, PROG_1, and PROG_2                    -0.0001    -0.08
Common to AGE, PROG_1, and GENDER                     0.0001     0.15
Common to AGE, PROG_2, and GENDER                     0.0000     0.01
Common to PROG_1, PROG_2, and GENDER                 -0.0003    -0.50
Common to AGE, PROG_1, and PARTIC                     0.0000    -0.01
Common to AGE, PROG_2, and PARTIC                    -0.0012    -1.74
Common to PROG_1, PROG_2, and PARTIC                 -0.0044    -6.60
Common to AGE, GENDER, and PARTIC                    -0.0011    -1.61
Common to PROG_1, GENDER, and PARTIC                  0.0004     0.58
Common to PROG_2, GENDER, and PARTIC                  0.0005     0.75
Common to AGE, PROG_1, PROG_2, and GENDER            -0.0001    -0.09
Common to AGE, PROG_1, PROG_2, and PARTIC             0.0012     1.87
Common to AGE, PROG_1, GENDER, and PARTIC            -0.0004    -0.57
Common to AGE, PROG_2, GENDER, and PARTIC            -0.0001    -0.19
Common to PROG_1, PROG_2, GENDER, and PARTIC         -0.0002    -0.32
Common to AGE, PROG_1, PROG_2, GENDER, and PARTIC     0.0001     0.16

                                          Total       0.0663   100.00


[[1]][[2]]$CCTotalbyVar
          Unique      Common      Total
AGE       0.0000      0.0097      0.0097
PROG_1    0.0056      0.0114      0.0170
PROG_2    0.0000      0.0000      0.0000
GENDER    0.0064     -0.0014      0.0050
PARTIC    0.0327      0.0188      0.0515
```

Table 14

Commonality Data: Partitioned Variance of Function 2's Self-Concept (Criterion)
Canonical Variate

```
[[2]][[2]]
[[2]][[2]]$CC
                                                      Coefficient % Total
Unique to MATHSC                                          0.0036      5.38
Unique to GENSC                                           0.0063      9.52
Unique to VERBSC                                          0.0023      3.54
Unique to ACADSC                                          0.0067     10.08
Unique to PROBSC                                          0.0254     38.32
Common to MATHSC, and GENSC                             -0.0011     -1.71
Common to MATHSC, and VERBSC                             0.0065      9.73
Common to GENSC, and VERBSC                              0.0016      2.47
Common to MATHSC, and ACADSC                            -0.0034     -5.19
Common to GENSC, and ACADSC                             -0.0040     -5.99
Common to VERBSC, and ACADSC                             0.0085     12.86
Common to MATHSC, and PROBSC                            -0.0024     -3.58
Common to GENSC, and PROBSC                             -0.0053     -7.93
Common to VERBSC, and PROBSC                             0.0077     11.56
Common to ACADSC, and PROBSC                             0.0009      1.42
Common to MATHSC, GENSC, and VERBSC                      0.0002      0.31
Common to MATHSC, GENSC, and ACADSC                      0.0015      2.19
Common to MATHSC, VERBSC, and ACADSC                    -0.0045     -6.75
Common to GENSC, VERBSC, and ACADSC                     -0.0022     -3.38
Common to MATHSC, GENSC, and PROBSC                      0.0009      1.42
Common to MATHSC, VERBSC, and PROBSC                     0.0021      3.21
Common to GENSC, VERBSC, and PROBSC                     -0.0009     -1.43
Common to MATHSC, ACADSC, and PROBSC                     0.0030      4.52
Common to GENSC, ACADSC, and PROBSC                      0.0030      4.54
Common to VERBSC, ACADSC, and PROBSC                     0.0122     18.37
Common to MATHSC, GENSC, VERBSC, and ACADSC              0.0003      0.52
Common to MATHSC, GENSC, VERBSC, and PROBSC             -0.0004     -0.66
Common to MATHSC, GENSC, ACADSC, and PROBSC             -0.0010     -1.49
Common to MATHSC, VERBSC, ACADSC, and PROBSC            -0.0046     -6.90
Common to GENSC, VERBSC, ACADSC, and PROBSC              0.0040      6.02
Common to MATHSC, GENSC, VERBSC, ACADSC, and PROBSC     -0.0007     -1.00

                                                Total  0.0663    100.00


[[2]][[2]]$CCTotalbyVar
            Unique        Common      Total
MATHSC      0.0036       -0.0036      0.0000
GENSC       0.0063       -0.0040      0.0023
VERBSC      0.0023        0.0299      0.0322
ACADSC      0.0067        0.0131      0.0198
PROBSC      0.0254        0.0186      0.0440
```

Table 15

Complete Sample Correlation Matrix

	1	2	3	4	5	6	7	8	9	10
1. AGE	1.000									
2. PROG_1	-.041	1.000								
3. PROG_2	.125*	-.386**	1.000							
4. GENDER	-.092	-.087	-.044	1.000						
5. PARTIC	.459**	-.178**	-.110	-.082	1.000					
6. GENSC	-.024	-.044	-.077	-.007	.042	1.000				
7. ACADSC	-.021	-.084	-.020	.163**	.073	.555**	1.000			
8. MATHSC	-.102	-.090	.084	.006	-.040	.267**	.550**	1.000		
9. VERBSC	.009	-.114	-.038	.264**	.069	.159**	.359**	-.194**	1.000	
10.PROBSC	.086	-.140*	.028	-.107	.233**	.445**	.441**	.236**	.349**	1.000

Note. *Correlation is significant at the 0.05 level (2-tailed); ** Correlation is significant at the 0.01 level (2-tailed).

Summary

This chapter reported the study's findings. The Data Evaluation section outlined procedures for handling missing data and calculation methods employed on Self-Concept Variables and Student Characteristic Variables. The Statistical Assumptions section addressed the issue of multivariate normality and reported descriptive statistics. The Data Analysis section provided results from the canonical correlation analysis. Chapter 5 discusses the study's finding and presents conclusions and recommendations for future research in the area of self-concept.

CHAPTER 5
DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

Introduction

This chapter includes three sections: (a) Discussion of Findings, (b) Conclusions, and (c) Recommendations. In the Discussion of Findings, the researcher addresses the results of the canonical correlation analysis (CCA) in light of the research question. The Conclusions section relates the study's findings back to the existing literature. In the Recommendations section, the researcher provides options for additional research and inquiry.

Discussion of Findings

The purpose of this study was to examine the relationship between the characteristics of students enrolled in arts, audio/video technology and communications (AAVTC) cluster career and technology education (CTE) programs and students' self-concept scores as measured by specific subscales from the Self-Description Questionnaire (SDQ) family of instruments (Marsh, n.d., 1989). Findings from this study indicate that, for this particular population, a relationship exists between specific student characteristics and self-concept as measured on certain domain-specific first-order factors.

Demographic data collected from participants reveal a slight difference between the sample population and the regional population. Of particular interest is the percentage of the sample whose ethnicity was categorized as "Other" (12.62%). During the data collection process, students indicated a desire to select multiple ethnic groups to most accurately represent their ethnicity. It is likely that, if forced to select a single group to best describe ethnicity, the sample population would begin to closely resemble

the regional population. In terms of gender, the sample population contained a noticeably large percentage of male students as compared to female students, which is inconsistent with enrollment data at the region and state levels. In general, the demographic composition of the sample population is somewhat similar to the regional population, but in no way resembles the composition of the state population, and results of this study are thus limited in their generalizability.

Data collected on the number of CTE courses completed in high school were more diverse than I anticipated. Course titles ranged across at least 13 of the 16 federally defined career clusters, with a primary concentration in arts, A/V technology & communications (AAVTC); business management & administration (BMA); and information technology (IT) and a secondary concentration in law, public safety, corrections & security (LPSCS) and science, technology, engineering & mathematics (STEM). The primary concentrations are less surprising than the secondary concentrations, which seem highly unrelated to the career cluster of interest in this study. Concurrent enrollment of students in multiple program areas was also unexpected based on my previous CTE teaching experience at the secondary level. The wide variety of courses completed may indicate a number of issues of concern, including (a) a lack of guidance during the student course selection process, (b) a shift in or refinement of career goals during high school, or (c) the student identification of a highly specified career goal. Consequently, it is difficult to interpret or theorize about these data beyond the calculation of a participation score.

A canonical correlation analysis (CCA) was conducted using the four student characteristic variables as predictors of the five self-concept variables to evaluate the

multivariate share relationship between the two variable sets (i.e., student characteristics and self-concept). The analysis of the contributing variables indicates that gender and level of participation in CTE are related to verbal self-concept and problem-solving self-concept. Gender was found to be the most important contributor to the latent student characteristic variable based on beta weights, structure coefficients, and commonality coefficients. A weaker contribution to the latent student characteristic variable is made by participation in CTE. Verbal self-concept and problem-solving self-concept are the most important contributors to the latent self-concept variable. Looking at the beta weights, it would appear that problem-solving contributes the most to the latent variable. The structure coefficients and commonality coefficients reveal, however, that the contribution of the problem-solving self-concept variable is a shared or common contribution and its contribution is being subsumed by the contribution of the verbal self-concept variable.

Conclusions

Findings from this study indicate that for this particular population there is a relationship between specific student characteristics and self-concept as measured on certain domain-specific first-order factors. The findings add to the literature concerning the area of self-concept as it relates to student participation in CTE programs. Given the lack of research in this general area, this study represents a first step in examining a relationship between CTE students and the development of self-concept.

Data from this study support the research by Marsh regarding the relationships between higher order factors and domain-specific first-order factors of self-concept. In this study, although academic self-concept (higher order factor) contributes to the latent

82

self-concept variable, it does not accurately reflect the contributions of the lower domain-specific first-order factors. Indeed, verbal self-concept (domain-specific first-order factor) contributes as much or more than academic self-concept to the latent variable, thereby accounting for any unique contribution of the higher order factor. Furthermore, math self-concept (domain-specific first order factor) contributes very little to the creation of the latent self-concept variable. Simply put, consistent with Marsh's findings, research results involving the SDQ subscales may be more meaningful when interpreted at the domain-specific first-order factor level and at the higher order factor level.

Gender was found to be related to verbal self-concept and problem-solving self-concept. Results suggest that females in arts-based CTE programs have a higher verbal self-concept than males enrolled in the same programs, which is in line with prior research in the area of giftedness and self-concept (Rinn, Jamieson, Gross, & McQueen, 2009). Findings indicate that male students in arts-based CTE programs have a higher problem-solving self-concept than their female counterparts.

Participation in CTE programs was found to be related to verbal and problem-solving self-concepts. Results from this study, although inconclusive based on effect size interpretation, suggest that students with a high level of participation also have high verbal and problem-solving self-concepts. Considering the instructional activities required in these particular CTE programs, this is a logical outcome and is consistent with self-concept studies of secondary students in specialized arts programs (Vispoel, 2000).

Age was found to be unrelated to self-concept. This lack of relationship, especially when compared to the relationship between participation in CTE and self-concept, is in line with Super's theory that individuals develop self-concepts as a direct result of the interactions and activities they choose to participate in over time. Because students choose to participate in activities that help them develop their verbal and problem-solving abilities, it makes sense that their verbal and problem-solving self-concepts will improve.

<div align="center">Recommendations</div>

Recommendations for future research were based on the limitations of this study. Results were limited by (a) statistical analysis, (b) data collection methods, (c) student characteristic variables, and (d) intended population. Recommendations are presented in order of importance.

Statistical Analysis

This study utilized CCA to evaluate the relationship between student characteristics and self-concept. Due to the nested nature of the data collected, it is recommended that the data be analyzed utilizing hierarchical linear modeling. This would allow for a more precise interpretation of relationships in the data based on teacher/classroom, campus, and district effects.

Data Collection Methods

This study used self-report measures to collect all data except program area, which was based on the course the student was taking at the time of the survey administration. Future research should consider an alternative method for collecting data used to determine level of participation in CTE.

One option for collecting these data would be to provide students with a list of courses from which to select. Several reasons why this option could be problematic include potential length of course lists, mobility of students across districts and educational service center (ESC) regions, and local implementation decisions regarding course name and credit awarded. In Texas, students may participate in CTE courses from more than one career cluster. At the time of this study there were more than 600 CTE courses listed across clusters in the Texas Essential Knowledge and Skills (TEKS). Subsequent to the 2010 TEKS revisions adopted in 2009, approximately 200 CTE courses remained in the TEKS, resulting in a more manageable, yet still cumbersome, list for students to select from. It might seem logical to limit such a list to courses offered in a district or campus except for the fact that students may have transferred in from other districts or campuses. In addition, students might be confused by a master CTE course list because the Texas Education Agency (TEA) offers flexibility to districts in the naming of courses.

A second option for collecting data related to level of participation in CTE would be to mine specific course information from student transcripts. Using this method provides a more accurate picture of the actual number of credits attempted and completed and eliminates the need for researcher interpretation based on local course name. This option would present a challenge in terms of accessibility to student records. This option would also require considerable time to review and code each transcript.

Student Characteristic Variables

This study considered student age, gender, level of participation in CTE, and program participation area as contributing variables to the student characteristic

construct. Due to the nature of the development of self-concept, it is likely that many other mediating variables exist as influences on the development of self-concept. As such, additional variables should be investigated in future research. Student variables of interest might include socioeconomic status, participation in co-curricular leadership activities, and participation in extracurricular activities. Additional variables of interest include teacher self-concepts, parental influences, religious influences, and social interactions among peers.

Intended Population

This study focused on the self-perceptions of students currently enrolled in Texas public, secondary (Grades 9-12) AAVTC cluster CTE programs in ESC Region XI. Because there are 19 other ESC regions in Texas and a total of 16 clusters implemented in CTE in Texas, it is recommended that this study be replicated for other populations. This would require a review of the CTE curriculum in place in each cluster as well as a review of the self-concept subscales currently available in the SDQ family of instruments to determine whether additional question sets deserve consideration for inclusion in the survey instrument. It is also recommended that this study be replicated with students who have not participated in any CTE courses. This would provide a direct comparison to CTE participants within campus, district, and region groups.

<center>Summary</center>

This study found a relationship between student characteristics and self-concept. Gender and participation in CTE over time were found to be the most important contributors to the student characteristic variable. Verbal self-concept and problem-solving self-concept contributed the most to the self-concept variable. The interaction

between student characteristics and self-concept, for this study, indicates that while participation in CTE does positively relate to problem-solving self-concept, gender is still the primary variable in predicting a student's self-concept.

APPENDIX A

IRB APPLICATION

Application for Initial Review

University of North Texas Institutional Review Board
OHRP Federalwide Assurance: FWA00007479

Save this file as a Word document on your computer, answer all questions completely within Microsoft Word (with track changes turned off), and submit it along with all supplemental documents to the UNT Office of Research Services as described on the Signature Page. Type only in the yellow fields, and closely follow all stated length limits. Handwritten forms will not be accepted.

1. Principal Investigator Information

Must be the same Principal Investigator named in any proposal for external or internal funding.

Nancy Lynne	Cox	LynneCagle.Cox@unt.edu
First Name	Last Name	E-mail

If UNT faculty or staff:

Learning Technologies	Discovery Park/3940 N. Elm St.	G150
UNT Department	UNT Building	Room Number
940.565.2299	940.369.7665	███████
Office Phone Number	Fax Number	EMPL ID

If UNT student:

████████
Home address

████████████
City, State, and Zip Code

██████	N/A
Home Phone Number	Fax Number

Dr. Jerry Wircenski	Jerry.Wircenski@unt.edu
Faculty Advisor's Name	Faculty Advisor's E-mail
Learning Technologies	940.565.2714
Faculty Advisor's UNT Department	Faculty Advisor's Office Phone Number

Is this study for your master's thesis or doctoral dissertation?

[x] Yes   [   ] No

Is this study for your other course work?

[   ] Yes   [x] No

Under the UNT IRB Guidelines, research conducted solely for satisfying course requirements does not require IRB review for approval. Contact the IRB office (shelia.bourns@unt.edu) for clarification if you believe a project conducted for course work may qualify as "Human Subjects Research" under federal guidelines and therefore requires IRB approval.

2. Co-Investigator Information

If applicable; students should include their Faculty Advisor as Co-Investigator only if he/she will be actively involved in conducting the study.

First Name	Last Name	E-mail

Office Phone Number	University or Other Entity

The Co-Investigator's classification is:

[   ] Faculty/Staff   [   ] Graduate Student

3. Key Personnel

List the names of all other Key Personnel who are responsible for the design, conduct, or reporting of the study.

Kim Nimon, PhD

4. Project Title

Must be identical to the title of any associated internal or external grant proposal.

The Effect of Participation in Career and Technical Education on the Self-Concept of Secondary Students in Texas

5. Funding Information (if applicable)
Identify the source (project sponsor) of any external and/or internal funding for this project, and attach a complete copy of the funding proposal:
N/A

Study dates as listed in the funding proposal:

        Start Date (mm/dd/year)   End Date (mm/dd/year)

Significant Financial Conflict of Interest
If any external funding is proposed, have you and all Key Personnel submitted a Significant Financial Interest Disclosure form in compliance with the UNT Conflict of Interest Policy for Sponsored Projects? (For more information, see UNT Policy Number 16.12.3.3 at http://www.unt.edu/policy/UNT_Policy/volume3/16_12_3_3.html.)

       Yes   No

6. NIH Training
Have you and all key personnel completed the required NIH training course ("Protecting Human Research Participants") and submitted a copy of the completion certificate to the Office of Research Services?
   x   Yes   No
If "No," this training is required for all key personnel before your study can be approved. This free on-line course may be accessed at: http://phrp.nihtraining.com

7. Purpose of Study
In no more than half a page, briefly state the purpose of your study in **lay language** appropriate for the UNT IRB's community members and faculty members outside of your field; include the hypotheses or research question(s) you intend to answer; avoid cutting and pasting from any funding proposal, master's thesis, or doctoral dissertation; applications submitted with overly-technical or unclear language will be returned to the Principal Investigator for revision before review by the IRB.

The purpose of this study is to determine the impact of students' participation (in years) in high school (grades 9-12) Texas Career and Technical Education (CTE) Arts, A/V Technology and Communication Cluster (ARTS/AV/COM) programs on their self-concepts. For the purposes of this study, the researcher will administer a multi-dimensional self-concept survey to students (grades 9-12) enrolled in five (5) of the six (6) ARTS/AV/COM Cluster programs. The five (5) programs identified for the study are: Advertising Design, Animation, Commercial Photography, Graphic Design, and Media Technology. The researcher excluded Fashion, the sixth program, from this study because the teacher certification for Fashion does not currently require industry work experience like the other five (5) ARTS/AV/COM areas.

Students in the five (5) programs will be surveyed using combined subscales from two versions of the Self-Description Questionnaire developed by Professor Herb W. Marsh, Convenor of the Self-Concept Enhancement and Learning Facilitation (SELF) Research Group at the University of Oxford. The survey will include four (4) subscales from the Self Description Questionnaire II (SDQII): Math, Verbal, General Academic, and General Self-Concept (Esteem). The survey will also include one (1) subscale from the Self Description Questionnaire III (SDQ III): Problem-Solving/Creativity.

In the selected CTE programs, the proposed study seeks to answer the following research questions:
1. To what degree is a student's academic self-concept impacted by length of time (in years) in the program?
2. To what degree is a student's problem-solving/creative self-concept impacted by length of time (in years) in the program.
3. To what degree is a student's general self-concept impacted by length of time (in years) in the program, academic self-concept, math self-concept, verbal self-concept, and problem-solving/creative self-concept?

8. Previous Research
In no more than half a page, summarize previous research leading to the formulation of this study, including any past or current research conducted by the Principal Investigator or key personnel that leads directly to the formulation of this study.

Self-concept as a theoretical construct is important to the field of education because a positive self-concept is considered to be both a desirable trait as well as a facilitator of positive future behavior (Marsh, 1993). Positive student self-concept has been linked to academic achievement in core classes (Marsh, et. al., 1985), specific performing arts programs (Marsh, et. al., 1996) and positive classroom characteristics in the domains of cooperation, persistence, leadership, anxiety, expectations for future schooling, family support, behavior in class, and peer interactions (Hay, et. al., 1998). General self-concept (esteem) is considered by laypersons and professionals to be an important component in understanding human behavior (Wylie, 1989) and is considered by many researchers to be the basis for all motivated behavior (Franken, 1994). Self-esteem is based on personal thoughts, interpretations, and beliefs: "It is not how good (or bad) you really are, but how good (or bad) you *think* you are that determines your behavior" (Bandura, 2003, p.377). According to Bandura (2003), individuals with high self-esteem set more challenging goals for themselves and are more persistent in the face of adversity than their counterparts with low self-esteem.

Initial research, published by Coopersmith (1967) and Piers (1969), defined self-concept as a global, unidimensional construct and resulted in conflicting findings and strong criticism from other researchers (Vispoel, 2000). Research by Shavelson, Hubner, and Stanton (1976) led to the development of a multidimensional, hierarchical model, referred to as the Shavelson Model (Leach, et. al., 2006). Research by Marsh and Shavelson (1985) and Byrne and Shavelson (1986) confirmed the multidimensional, hierarchical nature of self-concept (Leach, et. al., 2006).

The current, generally accepted self-concept model, referred to as the Marsh/Shavelson model of self-concept, is predicated on the idea that individuals "construct complex perceptions of themselves through their experiences with their world and their interpretations of their own place within it" (Smith and Croom, p. 312). Given how much time students spend in school each day, it seems logical to investigate the impact of classroom interactions on students' self-concepts. At the secondary level, 1.2 million Texas students may spend anywhere from 50 minutes to 2 hours each day in a Career and Technical Education (CTE) class (Texas Education Agency, 2008). In some districts students have the same CTE teacher all four years of high school as they work to complete a coherent sequence of courses. It seems logical, therefore, to investigate in particular the relationship between participation in CTE and student self-concept.

A 1996 study by Marsh linked self-concept to performance in specific performing arts programs. In Texas, performing arts programs are part of the Fine Arts Curriculum Division, which is a different functional division than CTE in the Texas Education Agency (TEA). A review of the proposed CTE curriculum standards, drafted in 2008-2009, and current Fine Arts curriculum standards reveals a great deal of overlap in concepts related to creativity. A primary difference between the two curriculum areas is a CTE focus on industry-related curriculum involving skill-based projects and creative problem-solving.

Based on previous research related to performing arts programs and self-concept, it seems logical, therefore, to investigate the relationship between participation in ARTS/AV/COM CTE programs and student self-concept.

9. Informed Consent Forms
Written Informed Consent Forms signed by the subject or the subject's legally authorized representative are required for most research projects with human participants (exceptions include telephone surveys, internet surveys, and special circumstances for which an Informed Consent Notice may be substituted). If any subjects will be children (under 18 years of age in Texas), the parent/guardian Informed Consent Form must be accompanied by a Child/Student Assent Form for obtaining assent by children ages 7-17. Templates for creating consent/assent forms are located on the Office of Research Services website at http://research.unt.edu/ors/compliance/human.htm. **All consent/assent documents to be used must be submitted before IRB review can begin.**
Indicate types of consent/assent documents to be used (check all that apply):
| x | Informed Consent Form | | x | Student/Child Assent (children ages 7-17) |

| | Consent Notice |

10. Foreign Languages
Will your study involve the use of any language other than English for Informed Consent Forms, data collection instruments, or recruitment materials?
| x | Yes | | | No |
If "Yes", identify all foreign languages below (Please do not submit any foreign language forms or materials until after the IRB has approved the English versions):
Informed Consent Forms will be translated to Spanish.

11. Informed Consent
Describe the steps for obtaining the subjects' informed consent/assent (by whom, where, when, etc.).

Using the most current PEIMS data available, CTE programs in Texas Educational Service Center (ESC) Region 11 will be identified in March, 2009. In April, 2009, the teachers of the identified programs will be contacted via email and asked to help recruit their students as participants in the study. Upon confirmation of interest in the study, the researcher will immediately send teachers the appropriate number of Informed Consent/Assent packets to send home with their students. Informed Consent/Assent packets will need to be returned to the teacher within a week. The researcher will collect the informed consent/assent forms from the classroom teacher in April and May, 2009, at the time the survey is administered.

12. Medications

Do you have reason to expect that potential subjects will be under the influence of any medication, drugs or stressful condition which could diminish their ability to give effective informed consent?

| | Yes | | x | No |

If "Yes," please explain and describe what steps you will take to verify that potential subjects possess the mental capacity to give meaningful informed consent to participate in the study.

13. Location of Study

Identify all locations where the study will be conducted. For each data collection site other than UNT, attach a signed and dated original of a letter on the cooperating institution's letterhead giving approval for collection of data at that site. This letter should reflect an understanding of the nature of the study and how it will be conducted. Note: review of the application by the IRB can begin without the outside approval, if obtaining such approval at this stage is not practicable. However, request for review prior to submitting approval letters must be accompanied by an explanation for why site approval is not yet available AND acknowledgement that approval letters must be submitted, reviewed, and approved prior to data collection at any site.

An initial review of 2006-2007 PEIMS data resulted in the identification of the following eleven (11) districts in ESC Region 11 (Fort Worth) that offer ARTS/AV/COM programs. The researcher has contacted each of the districts to obtain district approval letters for IRB review and approval prior to data collection:

1. Arlington ISD (application requested)
2. Birdville ISD (DISTRICT APPROVAL GRANTED CONTINGENT UPON UNT IRB APPROVAL)
3. Burleson ISD (district contacted)
4. Cleburne ISD (district contacted)
5. Denton ISD (application filed – TWO WEEK PROCESSING TIME)
6. Fort Worth ISD (application filed – ONE MONTH PROCESSING TIME)
7. Grapevine-Colleyville ISD (district contacted)
8. Hurst Euless Bedford ISD (APPROVAL LETTER RECEIVED)
9. Lewisville ISD (APPROVAL LETTER RECEIVED)
10. Little Elm ISD (district contacted)
11. Mansfield ISD (district contacted)

District approval is not yet available for all districts due to (1) the availability of current PEIMS data from the TEA which is used to identify target districts and (2) calendar conflicts with district Spring Break schedules. Additional districts may be identified when the new PEIMS data is released at the end of March, 2009. Any changes to the district list will be submitted to IRB for approval. The researcher understands that only those districts with approval letters on file with UNT IRB may participate in the study.

14. Recruitment Population

Describe the population from which the subjects (including controls, if applicable) will be recruited.

Subjects will be recruited from secondary ARTS/AV/COM Cluster CTE programs in districts in ESC Region 11. Targeted ARTS/AV/COM programs include: Advertising Design, Animation, Commercial Photography, Graphic Arts, and Media Technology.

There are twenty (20) ESC Regions in Texas. Each region is comprised of school districts of various sizes. Of those twenty (20) regions, six (6) of the ESC regions have at least one district that is classified as a major urban city by TEA. These six (6) regions are centered around the following urban centers: Houston (Region 4), Dallas (Region 10), Fort Worth/Arlington (Region 11), Austin (Region 13), El Paso (Region 19), and San Antonio (Region 20).

The six (6) regions are similar to one another in demographic composition reflected in (1) number of students enrolled in grades 9-12 (more than 100,000), (2) diversity of district community types (urban to rural), (3) number of districts offering public, secondary ARTS/AV/COM programs (11-14 districts), (4) percentage of economically disadvantaged students (30.1%-52.3%), and (4) ethnic diversity of enrolled students. The ethnic diversity of enrolled students in these six (6) regions mirrors the ethnic diversity of secondary students across the state (14.6% African-Americans, .36% Native Americans, 39.1% White, 3.5% Asian, and 42.5% Hispanic). Exceptions to the similarities include Austin and El Paso. Austin has slightly fewer students enrolled in grades 9-12 (approximately 94,000) and has fewer public, secondary ARTS/AV/COM programs (six (6) districts provide nine (9) programs). El Paso has a small population of enrolled students in grades 9-12 (approximately 50,000), a small number of districts (6) offering public, secondary ARTS/AV/COM programs, a higher than average percentage of economically disadvantaged students (68.4%), and a higher than average Hispanic student population (87.9%). All six (6) regions have a fairly equal distribution of male and female students with a slightly higher percentage of males (51% on average), which is consistent with the percentages statewide.

15. Subject Recruitment
Describe how you will recruit subjects to participate in the study; attach a copy of all recruitment materials (newspaper advertisements, posters, telephone scripts, etc.).

Subjects will be recruited for participation in the study through their ARTS/AV/COM Cluster classroom teachers; teachers will be contacted by school email which is (1) included in PEIMS data, (2) available on listservs managed by the researcher, or (3) available via public school websites.

16. Subject Population Composition
Describe the anticipated gender, racial/ethnic composition, age range and health status of the study population and the criteria for inclusion or exclusion of any subpopulation.

Demographic data is not available for the target population, but is available for ESC Region 11. The demographic composition of ESC Region 11 students enrolled in grades 9-12 is as follows: 51% males and 49% females; 30.1% economically disadvantaged; 14.5% African-American, .5% Native American, 55.5% White, 4.4% Asian, and 25.1% Hispanic. The researcher anticipates the demographic composition of the subject population to be consistent with that of the region.

The general health of students is irrelevant to this study and the researcher will not collect data related to student health. No students will be excluded from the study on the basis of demographic subpopulation classification.

17. Vulnerable Populations
Please identify any vulnerable populations who will specifically be targeted for participation in this study:

| [x] | Children (under 18 years of age) | [ ] | Pregnant women |
| [ ] | Prisoners, including juveniles | [ ] | Mentally impaired or mentally retarded |

If any boxes are checked, describe any special precautions to be taken in your study due to the inclusion of these populations:

In addition to obtaining required signed Informed Consent and Student Assent forms, the Principal Investigator, who has a valid Texas Teacher Certification (K-6 and 7-12 CTE), will work with the appropriate CTE classroom teachers of record to ensure the appropriate treatment of minor subjects involved in this study during the in-class administration of the survey instrument.

18. Number of Participants
Total number of subjects (separate numbers for experimental participants and controls, if applicable):

The researcher estimates the total number of subjects to be about 2,000 students. This estimate is based on the number of identified ARTS/AV/COM programs (23) multiplied by the average number of students enrolled in ARTS/AV/COM programs in Texas (85). Additional programs may be identified with the updated PEIMS data (available at the end of March, 2009).

19. Data Collection
Describe all procedures you will use to collect data (interventions, interviews, surveys, focus groups, observation, review of existing records, etc.). ***Attach a copy of all intervention protocols, data collection instruments and interview scripts to be used.***

Data will be collected via survey using the Self-Description Questionnaire developed by Professor Herb W. Marsh, Convenor of the Self-Concept Enhancement and Learning Facilitation (SELF) Research Group at the University of Oxford. The survey will include four (4) subscales from the SDQ II: Math, Verbal, General Academic, and General Self-Concept (Esteem). The survey will also include one (1) subscale from the SDQ III: Problem-Solving/Creativity.

During the survey administration, the researcher will reference the standard administration procedure developed for the SDQ II, which is validated for use with secondary students (grades 7-12). The researcher will:

1. Handout a copy of the SDQ II Questionnaire and a pencil with an eraser to each student.
2. Ask the students to complete the identifying and background information at the top of the front page.
3. Tell the students that their responses will be kept confidential and will not be made public or given to the teacher.
4. Tell the students that they may stop taking the survey at any time.
5. Ask the students to listen and follow along while the instructions on the front of the Questionnaire are read aloud. Hold up the instrument and point to the response scale while reading and explaining the instructions in paragraph 3.
6. When ready to begin, say, "You may begin. Once you have started, PLEASE DO NOT TALK."
7. Stop any talking, commenting, and deliberate or unconscious vocalization.
8. Answer individual student's questions. If the student has trouble understanding a few words or expressions, the researcher will paraphrase the expression without changing the meaning of the sentence and then ask the student to answer the question as well as he or she can. If the student has trouble understanding a number of words or expressions or has another problem which cannot be quickly and easily rectified, the researcher will make a note on the front of the instrument. If the student marks an answer in the wrong place for a large number of responses, it may be necessary for the researcher to transfer the correct responses to a new questionnaire.
9. Collect completed surveys and store them in pre-labeled envelopes for processing at a later time.

20. Time
Estimate the total time each subject will be involved in the study (include time per session, total number of sessions, etc.).
10-15 minutes to complete the survey; 2-3 minutes for survey instruction.

21. Compensation
Describe any payment or other compensation subjects will receive for participating in the study; include description of the timing for payment and any conditions for receipt of such compensation:
The researcher will obtain twelve (12) $50 gift cards to use as incentives. After administering all surveys, teachers who have 90% of their students complete and return informed consent/assent forms will have their names entered into a drawing for a gift card. Gift cards will be delivered via U.S. Mail to the winning teachers at the official school address.

22. Risks and Precautions
Describe any foreseeable risks to subjects presented by the procedures described above in the Data Collection section, including any physical, psychological, social, economic, legal, or confidentiality risks (see the UNT IRB Guidelines for more information about these risks). Include your assessment of the degree of likelihood for each risk presented and all precautions you will take to minimize such risks or to respond to adverse events:
There are no foreseeable physical, social, economic, or legal risks or discomforts to subjects presented by the procedures involved in this study. In an attempt to reduce test anxiety, the researcher will inform students (1) that there are no right or wrong answers to the survey questions, (2) that their responses will be kept confidential and not be made public or given to the classroom teacher for grading purposes, and (3) that students may stop taking the survey and withdraw from the study at any time. To address confidentiality risks, personally identifiable data will be kept in a separate location from demographic information and survey responses.

23. Benefits
Describe the benefits to the subjects (explain how the subjects will benefit from participating in the study, **other than any compensation** described in the Compensation section above). Even if the subjects will not directly benefit from the research, explain how the study will benefit others or contribute to your field of research:
At the end of each survey administration, teachers whose students participated in the study will receive information that defines the benefits of a strong, positive self-concept and outlines classroom strategies that may help students improve their self-concept. Though participating students may not realize a direct benefit of completing the survey, they will have an increased awareness of self-concept, which may result in an increased interest in and an additional investigation of the topic. Teachers will also have increased awareness of self-concept issues and strategies they can incorporate into their daily lessons. In addition to benefitting students and teachers, the study represents a unique contribution to the existing body of research on self-concept because of the emphasis on CTE participation.

24. HIPAA

Will your study involve obtaining individually identifiable health information from health care plans, health care clearinghouses, or health care providers?

[ ] Yes   [x] No

If "Yes," describe the procedures you will use to comply with the HIPAA Privacy Rule. (For more information about HIPAA, see the HIPAA Guidance page on the UNT Research Services website at http://research.unt.edu/ors/compliance/hipaa.htm.)

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25. Confidentiality of Research Records

Describe the procedures you will use to maintain the confidentiality of any personally identifiable data (including any video-recordings and/or audio-recordings of the participants).

The researcher will not use video or audio methods to record any part of the survey collection process.

Personally identifiable data (student, teacher, campus, and district names) will be kept in a separate location from demographic information (ethnicity, gender, age, and program area) and survey responses.

A secure/password-protected electronic database, including student, teacher, campus, and district identifiers, will be created and maintained only by the researcher for the purposes of matching survey responses to students. Matching survey responses to personally identifiable information will be impossible without access to this database. The secure electronic database will be stored on the researcher's personal external hard drive. A duplicate copy of the electronic database will be burned on a DVD (or other similar electronic storage device) and stored in ████████████████ ██ The original and duplicate copy of the electronic database containing personally identifiable information will be maintained by the researcher for three (3) years per federal IRB regulations. Once the three-year record-maintenance period expires, both copies of the electronic database will be destroyed.

Hard copies of personally identifiable information will be maintained in a locked file cabinet ███████████ ██████████ ████████████ ████████████████████ Those copies will be stored for three (3) years per federal IRB regulations. Once the three-year record maintenance period expires, those copies will be shredded with a cross-cut shredder.

Please specify where your research records will be maintained, any coding or other steps you will take to separate participants' names/identities from research data, and how long you will retain personally identifiable data in your research records. Federal IRB regulations require that the investigator's research records be maintained for 3 years following the end of the study.

Once personally identifiable information is separated from the remaining pieces of the survey instrument (demographic information and survey responses), the survey instruments will be grouped according to CTE program and numbered within each group. The researcher will work with Academic Computing Services (JoAnn Luksich, Data Manager, 940-369-7416, joann.luksich@unt.edu) at the University of North Texas to scan each of the survey instruments and create an electronic data set.

The electronic data set will be stored on a password-protected computer in the researcher's private office located in the Department of Learning Technologies at the University of North Texas/Discovery Park, 3940 N. Elm St., G150, Denton, TX 76207. A duplicate copy of the electronic data set will be stored on the researcher's password-protected laptop. The researcher will maintain the electronic data set for a minimum of three (3) years per federal IRB regulations. Once the three-year record-maintenance period expires, the researcher may destroy both copies of the electronic data set. Original survey instruments (demographic information and survey responses) will be stored in a locked file cabinet in the researcher's private office. At the end of the three-year record-maintenance period, the researcher will shred original survey instruments with a cross-cut shredder.

The researcher may send a copy of the electronic data set to the SELF Research Center at the University of Oxford for inclusion in subsequent SDQ norms and related analyses.

Identify the categories of all persons other than the investigator(s) to whom *personally identifiable data* of participants will be disclosed and the purpose of such disclosure.

No persons other than the principle investigator will have access to the personally identifiable data of participants.

---

26. Publication of Results

Please identify all methods in which you plan to publicly disseminate the results of your study (academic journal, academic conference, thesis or dissertation, etc.).

Dissertation, Academic Conferences (Regional, State, National), Academic Journals

IRB Application Signature Page

Principal Investigator

I certify that the information in this application is complete and accurate. I agree to conduct this study in accordance with the UNT IRB Guidelines and the study procedures and forms approved by the UNT IRB. I agree that I will not make any changes to the approved procedures or forms without prior written approval from the UNT IRB. I understand that I can not initiate any contact with human subjects until I have received written UNT IRB approval.

Sign ████████████████████   Date 3/8/2009

Faculty Advisor (if applicable)

DO NOT SIGN until you can fully attest to the following: I have thoroughly reviewed and approved this completed application. I am satisfied with the adequacy of the proposed research design and the precautions to be taken for the protection of human subjects. I am also satisfied that this IRB application is clear and complete. My oversight of this study will include verification that it is being conducted in accordance with the UNT IRB Guidelines and the study procedures and forms approved by the UNT IRB. I agree that no changes will be made to the approved procedures or forms without prior written approval from the UNT IRB.

████████████████████   Date 3\8\09

Supplementary Documents

1. Print and sign this page. If you are a student, your Faculty Advisor must review the application and also sign this page.

2. Assemble all supplementary documents, including:
   a. Copies of all NIH Training completion certificates not previously submitted to the Office of Research Services;
   b. A copy of any proposal for internal or external funding for this study;
   c. The original of the approval letters from all cooperating institutions (other than UNT) where you will collect data;
   d. A copy of all recruitment materials;
   e. A copy of all informed consent forms; and
   f. A copy of all data collection instruments, interview scripts, and intervention protocols.

3. Send/deliver the entire application (including this Signature Page) and all supplementary documents as follows:
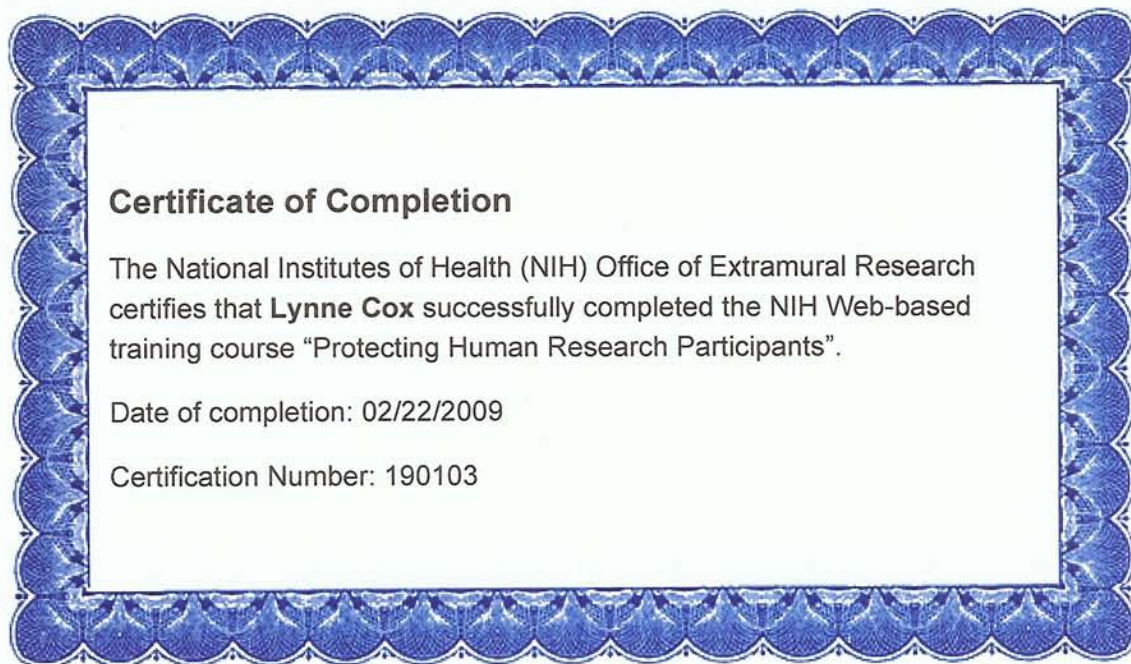
   Option 1: E-mail (preferred*) to sbourns@unt.edu

   *Note: if e-mailing entire application, image files (i.e., scanned copies) of the signature page, approval letters, and other non-word-processor documents ARE acceptable; please maintain the originals, which must be supplied to the IRB upon request.

   Option 2: Hand-deliver to: UNT Office of Research Services
   Hurley Admin. Bldg. 160

   Option 3: Mail to: UNT Office of Research Services
   P.O. Box 305250-5250
   Denton, TX 76203

Contact Shelia Bourns at (940) 565-3940 or sbourns@unt.edu for any questions about your application.

Certificate of Completion

The National Institutes of Health (NIH) Office of Extramural Research certifies that **Lynne Cox** successfully completed the NIH Web-based training course "Protecting Human Research Participants".

Date of completion: 02/22/2009

Certification Number: 190103

97

1849 Central, Building E
Bedford, Texas 76022-6096
PHONE: 817-354-3541
FAX: 817-354-3546
lisakarr@hebisd.edu

HEB
HURST - EULESS - BEDFORD
Independent School District

Career and Technical
Education

Lisa Karr, Director

March 10, 2009

Lynne Cox
University of North Texas
Department of Learning Technologies
3940 N. Elm Street, G150
Denton, TX 76207

Dear Committee Members:

Nancy Lynne Cox, principle researcher, is authorized to conduct a doctoral research project in HEB ISD during the 2008-2009 school year. Specifically, Lynne has permission to administer a self-concept survey to students and teachers in the Arts, A/V Technology, and Communication Media Technology program.

Since this is a voluntary study, the researcher will inform students (1) that there are no right or wrong answers to the survey questions, (2) that their responses will be kept confidential, and (3) that they may stop taking the survey and withdraw from the study at any time.

Sincerely,

Lisa Karr
Director of Career & Technical Education

LISD Lewisville
Independent
School District

COMMITTED TO EXCELLENCE

1597 S. Edmonds Lane
Lewisville, Texas 75067

469-948-7502
Fax (972) 350-9346
email: killingsb@lisd.net

LISD CAREER CENTER

BRAD KILLINGSWORTH
Director of Career & Technical Education
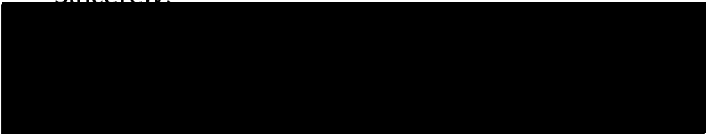
March 11, 2009

Ms. Lynne Cagle Cox
University of North Texas
Department of Learning Technologies
3940 North Elm Street, G150
Denton, Texas   76207

Dear Committee Members:

Nancy Lynne Cox, principle researcher, is authorized (per Mr. Kevin Rogers, Assistant Superintendent for Secondary Education) to conduct a doctoral research project in the Lewisville ISD during the 2008-2009 school year.   Specifically, Lynne has permission to administer a self-concept survey to students and teachers in the Arts, A/V Technology, and Communication Media Technology programs.

Since this is a voluntary study, the researcher will inform students (1) that there are no right or wrong answers to the survey questions, (2) that their responses will be kept confidential, and (3) that they may stop taking the survey and withdraw from the study at any time.

Sincerely,

Brad Killingsworth, Director
Career and Technical Education
killingsb@lisd.net

pc: Mr. Kevin Rogers

Denton Independent School District
Dr. Roger D. Rutherford
Assistant Superintendent
Academic Programs
1307 N. Locust
Denton, Texas 76201
(940) 369-0133
Fax (940) 369-4983

Nancy Lynne Cox

██████████████

March 30, 2009

Dear Ms. Cox:

I am pleased to inform you that your request "The Effects of participation in Career and Technical Education on the Self-Concept of Secondary Students in Texas" has been approved by Carla Ruge, Assistant Principal of the Advanced Technology Complex, and the Academic Programs Division.

Please contact Mrs. Ruge at (940) 369-4852 to initiate your approval for research activities.

Sincerely yours,

██████████████

Roger Rutherford, Ed.D.
Assistant Superintendent
Instructional Services Division

RR/cc

April 3, 2009

Lynne Cox
University of North Texas
Department of Learning Technologies
3940 N. Elm Street, G150
Denton, TX 76207

Dear Committee Members:

Nancy Lynne Cox, principle researcher, is authorized to conduct a doctoral research project in Burleson ISD during the 2008-2009 school year. Specifically, Lynne has permission to administer a self-concept survey to students and teachers in the Arts, A/V Technology, and Communication Cluster programs.

Since this is a voluntary study, the researcher will inform students (1) that there are no right or wrong answers to the survey questions, (2) that their responses will be kept confidential, and (3) that they may stop taking the survey and withdraw from the study at any time.

Sincerely,

Sandra Hines
Director of Instructional Technology
Burleson Independent School District

CHECK-OFF LIST FOR:
REQUESTS BY DISTRICT STAFF TO CONDUCT RESEARCH STUDIES

REQUESTOR'S NAME: _____Lynne Cox_____

DATE REVIEWED: _____5-12-09_____

☑ Request submitted in writing

Includes the following:

☑ Purpose of the research study

☑ Cooperating organization

☑ Scope of research study

☑ Identified participants

☑ Anticipated amount of time required by participants

Includes Expected Outcomes:

☑ Staff member participation will be on a voluntary basis

☑ Student participation requires written consent from a parent

☑ Results of any research studies must be shared in writing with the District

☑ Expected outcome/benefit to the District

===

☑ Approved

☐ Denied based on the following: _____

_____

███████████████ _____   _____5-12-02_____
Deana Lopez   Date
Assistant Superintendent of Curriculum & Instruction

Stephen F. Waddell, Ed.D.
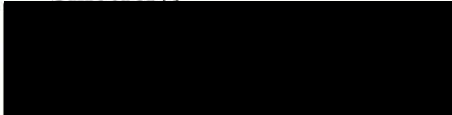   Superintendent

May 15, 2009

Lynne Cox
University of North Texas
Department of Learning Technologies
3940 N. Elm Street, G150
Denton, TX 76207

Dear Committee Members:

Nancy Lynne Cox, principle researcher, is authorized to conduct a doctoral research project in Birdville ISD during the 2008-2009 school year. Specifically, Lynne has permission to administer a self-concept survey to students and teachers in the Arts, A/V Technology, and Communication Cluster programs.

Since this is a voluntary study, the researcher will inform students (1) that there are no right or wrong answers to the survey questions, (2) that their responses will be kept confidential, and (3) that they may stop taking the survey and withdraw from the study at any time.

Sincerely,

Jay Thompson, Ph.D.
Associate Superintendent for Staff and Student Services

Proposed Calendar of District/Teacher Communication

April 8, 2009 -　　　Send initial **Announcement Email #1** to identified teachers

　　　　　　　　　　Send out **Informed Consent/Assent packets** upon teacher request

April 14, 2009 -　　Send follow up **Announcement Email #2** to teachers

　　　　　　　　　　Send out **Informed Consent/Assent packets** upon teacher request

April 8-30, 2009 -　Work with teachers to schedule time for survey administration

May 1-22, 2009 -　　Administer surveys

May 26, 2009 -　　　Send **Thank You Letters** to participating teachers and CTE Directors (include gift cards for winning teachers)

　　　　　　　　　　Send **Thank You Letters** to participating students.

Announcement Email #1

Hi (insert teacher's name),

I am finishing my doctoral degree at UNT and would like to know if you would be willing to help me recruit students from your (insert program name) classes to complete a brief survey. I would like to survey as many students as possible in your program.

PURPOSE:

The purpose of my research study is to determine if student participation in Career and Technical Education (CTE) programs positively impacts student self-concept. There is an enormous body of research on student self-concept. The research indicates that a positive self-concept is an important facilitator of positive future behavior. General self-concept, also known as self-esteem, is considered to be an important component in understanding human behavior and is considered by many researchers to be the basis for all motivated behavior. According to the research, individuals with high self-esteem set more challenging goals for themselves and are more persistent in the face of adversity than their counterparts with low self-esteem.

PROCESS:

The study involves administering a 50-item self-concept survey to your (insert program name) students in grades 9-12. The survey gives students a chance to consider how they think and feel about themselves in relation to various aspects of school, including participation in CTE courses.

STEP 1: INFORMED CONSENT

Prior to taking the survey, your students who are under 18 must have a completed **Informed Consent and Assent** form turned in. If 90% of your students turn in an Informed Consent and Assent form (whether or not they can participate in the study), then your name will be entered into a drawing for a $50 gift card for your class.

You may encourage your students in any way you wish to turn in the signed Informed Consent/Assent Form. **This is a voluntary study, though, so the students do not have to take the self-concept survey in order for you to be eligible for one of the prizes, they just have to turn in the Informed Consent/Assent form. Under no circumstances should students feel pressure to participate in the study.**

There are 12 gift cards available for 25-30 teachers, so you have a 40-50% chance of winning $50 just for getting students to return forms!

I will also give you information on the benefits of a positive self-concept and some strategies you can use in your classroom to help your students improve their self-concept.
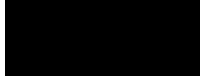
STEP 2: THE SURVEY

The survey takes less than 15 minutes to complete and I will personally come to your classroom to administer the survey. I will collect all completed Informed Consent/Assent forms at that time. Since this is a voluntary study, I will inform students (1) that there are no right or wrong answers to the questions, (2) that their responses will be kept confidential, and (3) that they may stop taking the survey and withdraw from the study at any time.

TIMELINE:

April 17, 2009 -   Deadline to indicate interest in participating in the study

April 8-30, 2009 -   Collect student Informed Consent/Assent Forms and schedule time for survey administration

May 1-22, 2009 -   I will administer surveys in classrooms

CONTACT INFORMATION:

Lynne Cox

███████████ (cell)
███████████ (home)
Lynne@unt.edu

I look forward to hearing from you and working with you to benefit our CTE students!

Lynne

Lynne Cagle Cox
Project Coordinator I
 - Architecture & Construction Cluster
 - Arts, A/V Technology, & Communications Cluster
 - Law, Public Safety, Corrections & Security Cluster
University of North Texas
Learning Technologies
3940 N. Elm Street, G150
Denton, TX 76207

940.565.2299
Lynne@unt.edu

COLLEGE OF INFORMATION, LIBRARY SCIENCE, AND TECHNOLOGIES
Department of Learning Technologies

Wednesday, May 13, 2009

Dear _____,

Thank you so much for agreeing to recruit students from your classes to participate in my doctoral research study! I really appreciate your support!

Enclosed are _____ Informed Consent/Assent Packets in English and Spanish to go home with students. Please let students know ahead of time that there is NO PENALTY if they do not want to participate in the study.

If students do want to participate, the parent/guardian must sign and date page 2 and the student must sign and date page 3.

Once the forms are returned to you, I will arrange to pick them up, sign my name and date where appropriate, and make a copy for the participants to give their parents/guardians (to comply with UNT guidelines).

If you have any questions, please feel free to contact me via email (Lynne@unt.edu) or on my cell ███████████.

Lynne
Lynne Cagle Cox
Project Coordinator I
 - Architecture & Construction Cluster
 - Arts, A/V Technology, & Communications Cluster
 - Law, Public Safety, Corrections & Security Cluster
University of North Texas
Learning Technologies
3940 N. Elm Street, G150
Denton, TX 76207

940.565.2299
Lynne@unt.edu

Announcement Email #2

Hi (insert teacher's name),

Last week I sent you an email with information regarding my doctoral research project. I hope you have had time to go over the information and that you are interested in participating in the study.

Please confirm your interest with me via email as soon as possible so I can send you Informed Consent/Assent packets to go home with your students.

The end of the school year is quickly approaching!

Lynne

Lynne Cagle Cox
Project Coordinator I
 - Architecture & Construction Cluster
 - Arts, A/V Technology, & Communications Cluster
 - Law, Public Safety, Corrections & Security Cluster
University of North Texas
Learning Technologies
3940 N. Elm Street, G150
Denton, TX 76207

940.565.2299
Lynne@unt.edu

UNT™
UNIVERSITY OF
NORTH★TEXAS
Discover the power of ideas.

COLLEGE OF INFORMATION
Department of Learning Technologies

May 29, 2009

Lance Moran
HEB ISD Technical Education Center
1849 Central Drive
Bedford, TX 76022

Dear Lance:

Thank you very much for participating in my research project on student self-concept and CTE participation. Your contribution ensures growth in the research areas that serve to enhance the quality of CTE education in the state of Texas and beyond.

I hope you found your participation as a useful opportunity to learn more about self-concept and ways you can help facilitate growth in your students.

I appreciate the time and energy you have devoted to the process and look forward to working with you in future endeavors to support our students.

Warmest regards,

Lynne Cagle Cox
Principal Researcher
Project Coordinator, Arts, A/V Technology and Communications
University of North Texas

C: Lisa Karr, CTE Director

![UNT University of North Texas — Discover the power of ideas.]

COLLEGE OF INFORMATION, LIBRARY SCIENCE, AND TECHNOLOGIES
Department of Learning Technologies

May 29, 2009

Student Name
HEB Technical Center
1849 Central Drive
Bedford, Texas 76022

Dear Student:

Thank you very much for participating in my research project! Your contribution ensures growth in the research areas that serve to enhance the quality of education in the state of Texas and beyond.

I hope you found your participation a useful opportunity to learn more about how you think and feel about yourself with regard to your schoolwork. Self-concept is considered to be a desirable trait as well as a facilitator of positive future behavior. According to research, a person's self-concept may vary by area of interest (i.e., English, math, CTE courses, etc.). Research has also shown that individuals with high general self-concept tend to make better choices and have higher achievements.

I enjoyed meeting you and I sincerely appreciate the time and energy you devoted to this process. I look forward to hearing great stories of your future achievements!

Warmest regards,

Lynne Cagle Cox
Principal Researcher
Project Coordinator, Arts, A/V Technology and Communications
University of North Texas

UNT

UNIVERSITY OF NORTH★TEXAS

Discover the power of ideas.

April 7, 2009

Nancy Lynne Cox
Department of Learning Technologies
University of North Texas

Re: Human Subjects Application No. 09135

Dear Ms. Cox:

As permitted by federal law and regulations governing the use of human subjects in research projects (45 CFR 46), the UNT Institutional Review Board has reviewed your proposed project titled "The Effect of Participation in Career and Technical Education on the Self-concept of Secondary Students in Texas." The risks inherent in this research are minimal, and the potential benefits to the subject outweigh those risks. The submitted protocol is hereby approved for the use of human subjects in this study with the stipulation that an approval letter from each cooperating institution is received, reviewed and approved by the UNT IRB before contact with human subjects begins at that site.. **Federal Policy 45 CFR 46.109(e) stipulates that IRB approval is for one year only, April 7, 2009 to April 6, 2010.**

Enclosed is the consent document with stamped IRB approval. Please copy and **use this form only** for your study subjects.

It is your responsibility according to U.S. Department of Health and Human Services regulations to submit annual and terminal progress reports to the IRB for this project. The IRB must also review this project prior to any modifications.

Please contact Shelia Bourns, Research Compliance Administrator, or Boyd Herndon, Director of Research Compliance, at extension 3940, if you wish to make changes or need additional information.

Patricia L. Kaminski, Ph.D.
Associate Professor
Chair, Institutional Review Board

PK:sb
CC: Dr. Jerry Wircenski

1155 Union Circle #305250 | Denton, Texas 76203-5017 | TEL 940.565.3940 | FAX 940.565.4277
TTY 940.369.8652 | www.unt.edu

111

University of North Texas Institutional Review Board
Informed Consent Form

Before agreeing to your child's participation in this research study, it is important that you read and understand the following explanation of the purpose and benefits of the study and how it will be conducted.

Title of Study: The Effect of Participation in Career and Technical Education on the Self-Concept of Secondary Students in Texas

Principal Investigator: Lynne Cox, a doctoral student in the University of North Texas (UNT) Department of Learning Technologies.

Purpose of the Study: You are being asked to allow your child to participate in a research study to determine if participation in Career and Technical Education (CTE) programs impacts student self-concept. These CTE programs are classes your children are currently taking in school (Media Technology, Animation, and Advertising Design). This is a chance for your child to consider how he/she thinks and feels about himself/herself regarding academic/CTE classes.

Study Procedures: Your child will be asked to complete a 50-item survey that will take about 15 minutes of your child's CTE class time.

Foreseeable Risks: There are no foreseeable risks or discomforts to students presented by the procedures involved in this study. There are no right or wrong answers to the survey, students may stop answering questions at any time, and all responses will be kept private.

Benefits to the Subjects or Others: This study increases student and teacher awareness of the area of self-concept. Teachers will receive information on strategies they can use in their daily lessons to help students improve their self-concept. The study represents a unique contribution to the existing research on self-concept because of the emphasis on CTE.

Compensation for Participants: Students will not receive individual compensation for participating in the study. Your child's teacher will be entered in a drawing for a $50 gift card as compensation for class participation. Eligibility for the drawing is contingent upon 90% of the students turning in a signed Informed Consent/Assent form.

Procedures for Maintaining Confidentiality of Research Records: The researcher will take all reasonable precautions to protect students' confidentiality. Student names will be removed from all paper and electronic copies of the data. Signed consent and assent forms will be stored in a separate location from the survey responses. The confidentiality of your child's individual information will be maintained in any publications or presentations regarding this study.

Questions about the Study: If you have any questions about the study, you may contact Lynne Cox at telephone number (940) 565-2299, or the faculty advisor, Dr. Jerry Wircenski, UNT Department of Learning Technologies, at telephone number (940) 565-2714.

Review for the Protection of Participants: This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). The UNT IRB can be contacted at (940) 565-3940 with any questions regarding the rights of research subjects.

Research Participants' Rights: Your signature below indicates that you have read or have had read to you all of the above and that you confirm all of the following:

- If requested, Lynne Cox has explained the study to you and has answered all of your questions. You have been told the possible benefits and the potential risks and/or discomforts of the study.
- You understand that you do not have to allow your child to take part in this study, and your refusal to allow your child to participate or your decision to withdraw him/her from the study will involve no penalty or loss of rights or benefits. The study personnel may choose to stop your child's participation at any time.
- You understand why the study is being conducted and how it will be performed.
- You understand your rights as the parent/guardian of a research participant and you voluntarily consent to your child's participation in this study.
- You have been told you will receive a copy of this form.

_____
Printed Name of Parent or Guardian

_____   _____
Signature of Parent or Guardian   Date

For the Principal Investigator: I certify that I have reviewed as necessary and reviewed the contents of this form with the parent or guardian signing above. I have explained the possible benefits and the potential risks and/or discomforts of the study. It is my opinion that the parent or guardian understood the explanation.

_____   _____
Signature of Principal Investigator   Date

APPROVED BY THE UNT IRB

FROM _____ 4/7/09 _____ TO _____ 4/6/10 _____

Forma de Consentimiento Informado de la Mesa de Revisión de la Universidad del Norte de Texas

Antes de concordar con la participación de su hijo/hija con este estudio de investigación, es importante de usted lea y comprenda la siguiente explicación del propósito y de los beneficios del estudio y como se llevará acabo.

Título del Estudio: El Efecto de la Participación en la Educación Técnica y de Carreras en el Concepto de Sí Mismo de los Estudiantes de Escuelas Secundarias en el Estado de Texas.

Investigadora Principal: Lynne Cox, estudiante doctoral en la Universidad del Norte de Texas (UNT) del Departamento de Tecnologías para el Aprendizaje.

El Propósito del Estudio: Se le pide permiso a usted para que su hijo/hija participe en un estudio de investigación para determinar si la participación en la Educación Técnica y de Carreras (CTE) impacta el concepto de sí mismo del estudiante. Estos programas son clases que sus hijos están cursando actualmente en la escuela (Medios de Tecnología, Animación, Diseño de Publicidad). Ésta es una oportunidad para que su hijo/hija considere qué piensa él o ella mismo(a) de sus clases académicas/CTE.

Procedimiento del Estudio: Se le pedirá a su hijo/hija que complete una encuesta de 50 preguntas que le llevará unos 15 minutos de su clase de CTE.

Riesgos Anticipados: No hay riesgos anticipados ni incomodidades a los estudiantes por los procedimientos de este estudio. No hay respuestas correctas ni incorrectas en la encuesta. Los estudiantes pueden dejar de contestar las preguntas en cualquier momento y todas las respuestas se mantendrán en confianza.

Los Beneficios a los Sujetos o a Otros: Este estudio hará al estudiante y al maestro más consciente del área del concepto de sí mismo. Los maestros o maestras recibirán información en estrategias que pueden usar en sus lecciones diarias que les ayudarán a sus estudiantes a mejorar el concepto de sí mismo. El estudio representa una contribución única a las investigaciones que existen en el concepto de sí mismo por el énfasis en CTE.

Compensación para los Participantes: Los estudiantes no recibirán compensación individual por su participación en el estudio. El maestro/maestra de su hijo/hija participará en un sorteo para una tarjeta de regalo de $50.00 como compensación por la participación de su clase en el estudio. La elegibilidad en el sorteo depende en que 90% de los estudiantes regresen su Forma de Consentimiento Informado firmado por los padres.

Procedimiento para Mantener en Confianza los Documentos del Estudio: El investigador(a) tomará todas las precauciones razonables para proteger la confidencia de los estudiantes. Se quitarán los nombres de todos los estudiantes de todas las copias de los documentos de papel o electrónicos. Todas las formas de consentimiento y aprobación serán guardadas en un lugar separado de las respuestas de la encuesta.

La información individual de su hijo/hija se mantendrá en confianza y no se publicará en ninguna revista o presentación relacionada con este estudio.

Preguntas sobre el Estudio: Si tiene preguntas acerca del estudio, se puede comunicar con Lynne Cox al teléfono (940) 565-2299 o con el consejero de la facultad, Dr. Jerry Wircenski, UNT Department of Learning Technologies al número (903) 565-2714.

Revisión para la Protección de los Participantes: Este estudio de investigación ha sido revisado y aprobado por La Mesa de Revisión Institucional (IRB) de la Universidad del Norte de Texas (UNT). Se puede comunicar con la IRB de UNT al número (940) 565-3940 si tiene preguntas sobre los derechos de los sujetos del estudio.

Derechos de los Participantes del Estudio: Su firma abajo indica que usted ha leído o se le ha leído todo lo antes mencionado y que confirma lo siguiente:

- Si se le pide, Lynne Cox le ha explicado el estudio a usted y le ha contestado todas sus preguntas. Se le ha informado de todos los posibles beneficios y probables riesgos y/o incomodidades del estudio.
- Usted comprende que no tiene que permitir a su hijo/hija a que participe en este estudio, y si se niega a permitir que su hijo/hija participe o si decide retirarlo/retirarla del estudio no habrá ningún castigo o pérdida de derechos o beneficios. El personal del estudio puede decidir a suspender la participación de su hijo/hija en cualquier momento.
- Usted comprende por qué se está haciendo el estudio y cómo se llevará acabo.
- Usted comprende sus derechos como padre/tutor del participante del estudio y usted voluntariamente da su consentimiento para que su hijo/hija participe en este estudio.
- Se le ha informado que usted recibirá una copia de esta forma.

_____

Nombre del Padre/ Madre/Tutor en Letra de Imprenta

_____   _____

Firma del Padre/Madre/Tutor   Fecha

Para la Investigadora Principal: Yo afirmo que he revisado según ha sido necesario los contenidos de esta forma con el padre/madre/tutor y he solicitado su firma arriba. Les he explicado los posibles beneficios y probables riesgos y/o incomodidades del estudio. En mi opinión, el padre/la madre/el tutor comprendió la explicación.

_____   _____

Firma de la Investigador Principal   Fecha

Student Assent Form

You are being asked to be part of a research project being done by the University of North Texas Department of Learning Technologies.

This project involves studying the impact of participation (in years) in Career and Technical Education (CTE) programs on your self-concept. These CTE programs are courses you are already taking in school such as Media Technology, Animation, and Advertising Design.

You will be asked to complete a 50-item survey that will take about 15 minutes of your CTE class time. This survey gives you a chance to consider how you think and feel about yourself in academic and CTE experiences at school.

In return for returning the **Student Assent Form**, your class will be entered in a drawing for a $50 gift card. Eligibility for the drawing is contingent upon returning this form. If you agree to participate in this project, please remember you can change your mind at any time.

If you would like to be part of this project, please sign your name below.

_____
Printed Name of Student

_____   _____
Signature of Student   Date

_____   _____
Signature of Principal Investigator   Date

Waiver of Assent

The assent of (_____) was waived due to:
                        insert child's name

_____ Age

_____ Maturity

_____ Psychological State

APPROVED BY THE UNT IRB
4/7/09 TO 4/6/10

_____
Printed Name of Parent/Guardian

_____   _____
Signature of Parent/Guardian   Date

APPENDIX B

SELF-DESCRIPTION QUESTIONNAIRE II - MODIFIED/CTE (SDQII-M/CTE)

Both the SDQII and SDQIII are in the public domain, and available from
http://www.self.ox.ac.uk/Instruments.htm

SDQII-M/CTE

Self-Description Questionnaire II-Modified/CTE

All information supplied will be kept strictly confidential.

Name: _____

Birth Date:

		/			/		

Mnth *Day* *Year*

Did you take a Career and Technical Education (CTE) course(s) in middle school?   ○ Yes   ○ No

Gender: ○ Male   ○ Female

Name of Course: _____

Which Career and Technical Education (CTE) courses have you taken in high school?

Ethnicity:
○ African-American
○ Caucasian/White
○ Hispanic
○ Asian or Pacific Islander
○ American Indian
○ Alaskan Native
○ Other

Name of Course: _____

Name of Course: _____

Name of Course: _____

Name of Course: _____

Name of Course: _____

Name of Course: _____

PLEASE READ THESE INSTRUCTIONS FIRST:
This is not a test - there are no right or wrong answers.

Shade Circles Like This--> ●
Not Like This--> ⊗ ✓

This is a chance for you to consider how you think and feel about yourself. It is important that you:

* are honest
* give your own views about yourself, without talking to others
* report how you feel NOW (not how you felt at another time in your life, or how you might feel tomorrow)

Your answers are confidential and will only be used for research or program development. Your answers will not be used in any way to refer to you as an individual.

Use the six-point scale to indicate how true (like you) or how false (unlike you) each statement over the page is as a description of you. Please do not leave any statements blank.

1	2	3	4	5	6
FALSE	MOSTLY FALSE	MORE FALSE than true	MORE TRUE than false	MOSTLY TRUE	TRUE
Not like me at all; it isn't like me at all					This statement describes me well; it is very much like me

1	2	3	4	5	6
FALSE	**MOSTLY FALSE**	**MORE FALSE** than true	**MORE TRUE** than false	**MOSTLY TRUE**	**TRUE**
Not like me at all; it isn't like me at all					This statement describes me well; it is very much like me

	Statement	False					True
01.	**MATHEMATICS** is one of my best subjects	①	②	③	④	⑤	⑥
02.	Overall, I have a lot to be proud of	①	②	③	④	⑤	⑥
03.	I am hopeless in **ENGLISH** classes	①	②	③	④	⑤	⑥
04.	People come to me for help in most **SCHOOL SUBJECTS**	①	②	③	④	⑤	⑥
05.	I am never able to think up answers to problems that haven't already been figured out	①	②	③	④	⑤	⑥

		False					True
06.	I often need help in **MATHEMATICS**	①	②	③	④	⑤	⑥
07.	Overall, I am no good	①	②	③	④	⑤	⑥
08.	I look forward to **ENGLISH** classes	①	②	③	④	⑤	⑥
09.	I am too stupid at school to get into a good university	①	②	③	④	⑤	⑥
10.	I am good at combining ideas in ways that others have not tried	①	②	③	④	⑤	⑥

		False					True
11.	I look forward to **MATHEMATICS** classes	①	②	③	④	⑤	⑥
12.	Most things I do, I do well	①	②	③	④	⑤	⑥
13.	I do badly on tests that need a lot of **READING** ability	①	②	③	④	⑤	⑥
14.	If I work really hard I could be one of the best students in my school year (grade level)	①	②	③	④	⑤	⑥
15.	I wish I had more imagination and originality	①	②	③	④	⑤	⑥

		False					True
16.	I have trouble understanding anything with **MATHEMATICS** in it	①	②	③	④	⑤	⑥
17.	Nothing I do ever seems to turn out right	①	②	③	④	⑤	⑥
18.	Work in **ENGLISH** classes is easy for me	①	②	③	④	⑤	⑥
19.	I get bad marks (grades) in most **SCHOOL SUBJECTS**	①	②	③	④	⑤	⑥
20.	I enjoy working out new ways of solving problems	①	②	③	④	⑤	⑥

		False					True
21.	I enjoy studying for **MATHEMATICS**	①	②	③	④	⑤	⑥
22.	Overall, most things I do turn out well	①	②	③	④	⑤	⑥
23.	I am not very good at **READING**	①	②	③	④	⑤	⑥
24.	I learn things quickly in most **SCHOOL SUBJECTS**	①	②	③	④	⑤	⑥
25.	I am not much good at problem solving	①	②	③	④	⑤	⑥

		False					True
26.	I do badly in tests of **MATHEMATICS**	①	②	③	④	⑤	⑥
27.	I don't have much to be proud of	①	②	③	④	⑤	⑥
28.	**ENGLISH** is one of my best subjects	①	②	③	④	⑤	⑥
29.	I am stupid at most **SCHOOL SUBJECTS**	①	②	③	④	⑤	⑥
30.	I have a lot of intellectual curiosity	①	②	③	④	⑤	⑥

		False					True
31.	I get good marks (grades)in **MATHEMATICS**	①	②	③	④	⑤	⑥
32.	I can do things as well as most people	①	②	③	④	⑤	⑥
33.	I hate **READING**	①	②	③	④	⑤	⑥
34.	I do well on tests in most **SCHOOL SUBJECTS**	①	②	③	④	⑤	⑥
35.	I am not very original in my ideas, thoughts, and actions	①	②	③	④	⑤	⑥

		False					True
36.	I never want to take another **MATHEMATICS** course	①	②	③	④	⑤	⑥
37.	I feel that my life is not very useful	①	②	③	④	⑤	⑥
38.	I get good marks (grades) in **ENGLISH**	①	②	③	④	⑤	⑥
39.	I have trouble with most **SCHOOL SUBJECTS**	①	②	③	④	⑤	⑥
40.	I am an imaginative person	①	②	③	④	⑤	⑥

		False					True
41.	I have always done well in **MATHEMATICS**	①	②	③	④	⑤	⑥
42.	If I really try I can do almost anything I want to do	①	②	③	④	⑤	⑥
43.	I have trouble expressing myself when I try to write something	①	②	③	④	⑤	⑥
44.	I am good at most **SCHOOL SUBJECTS**	①	②	③	④	⑤	⑥
45.	I would have no interest in being an inventor	①	②	③	④	⑤	⑥

		False					True
46.	I hate **MATHEMATICS**	①	②	③	④	⑤	⑥
47.	Overall, I am a failure	①	②	③	④	⑤	⑥
48.	I learn things quickly in **ENGLISH** classes	①	②	③	④	⑤	⑥
49.	Most **SCHOOL SUBJECTS** are just too hard for me	①	②	③	④	⑤	⑥
50.	I can often see better ways of doing routine tasks	①	②	③	④	⑤	⑥

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