Assessing the Career Awareness of early Adolescent Learners

Wendy S. Grimshaw

Dissertation submitted to the faculty of Virginia Polytechnic Institute and
State University in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

In

Curriculum and Instruction

John G. Wells, Chair

Donna F. Fogelsong

Joseph S. Mukuni

Thomas O. Williams Jr.

May 10, 2021

Blacksburg, Virginia

Keywords: Career Awareness, Measurement Inventory

Assessing the Career Awareness of Early Adolescent Learners

Wendy S. Grimshaw

ABSTRACT

In the next five years, millions of jobs in STEM-related occupations will be available, but with only twenty percent of college graduates earning bachelor's degrees in STEM fields, the pipeline problem persists. Research has demonstrated that students' career awareness significantly influences consideration of STEM careers. According to cognitive and career development theory, career awareness (knowledge of the requisites, routines, and rewards of jobs) develops primarily during the elementary school years. Because early detection of low-level career awareness can facilitate programming changes that will minimize premature circumscription of STEM career choices, an instrument that measures a student's level of career awareness at the early adolescent stage of development is warranted. Building on the conceptual framework of the Career Awareness Inventory developed in 1973, the new Early Adolescent Career Awareness Inventory (EA-CAI) was developed to reflect the contemporary context and constructs for measuring the career awareness of early adolescent learners. The viability of the EA-CAI instrument for use in contemporary educational settings was examined in this research. Results from the research showed that the EA-CAI instrument demonstrated correct terminology, content and construct validity, readability, and reliability. Moreover, the research results showed that early adolescent learners could demonstrate aspects of career awareness in response to EA-CAI items, and that the EA-CAI instrument could measure the career awareness of early adolescent learners on a continuum.

Assessing the Career Awareness of Early Adolescent Learners

Wendy S. Grimshaw

GENERAL AUDIENCE ABSTRACT

Millions of jobs in STEM-related occupations are available, but comparatively few college graduates are earning bachelor's degrees in STEM fields. Research has demonstrated that students' awareness of these career options significantly influences consideration of STEM careers. Career awareness (knowledge about the requirements, routines, and rewards of jobs) develops primarily during the elementary school years. Because early detection of low-level career awareness can lead to educational programming changes that will minimize students' elimination of STEM career choices, an instrument that measures a student's level of career awareness at the early adolescent stage of development is warranted. Building on the conceptual framework of the Career Awareness Inventory developed in 1973, the new Early Adolescent Career Awareness Inventory (EA-CAI) was developed to reflect the contemporary context and constructs for measuring the career awareness of early adolescent learners. This research examined the viability of the EA-CAI and showed that the instrument consistently measured what it was designed to measure--the career awareness of early adolescent learners.

ACKNOWLEDGEMENTS

TABLE OF CONTENTS

CHAPTER ONE: INTRODUCTION

Near the end of the twentieth century, the publication of *A Nation at Risk* issued an alarming message about America's declining rank in commerce, industry, science, and technological innovation (National Commission on Excellence in Education, 1983). Two decades later, *Rising Above the Gathering Storm* echoed the alarm, calling for a strengthening of the U.S. science, technology, engineering, and mathematics (STEM) pipeline by increasing the number of students pursuing degrees and careers in STEM fields (National Academy of Science, 2005). As a U.S. Department of Labor report explains, "Competitiveness in STEM fields requires a focus on the skills and the supply of those involved in STEM fields from the most complex research and development and leadership positions to production, repair, marketing, sales, and other jobs that require competencies built upon math, science, engineering, and technology knowledge" (Jobs for the Future, 2007).

By 2022, the U.S. economy is projected to increase employment by 10.8 percent (Richards & Terkanian, 2013). The 184 occupations related to STEM have a projected growth of nine million jobs between 2012 and 2022 (Vilorio, 2014). Yet less than twenty percent of college students earning a bachelor's degree do so in a STEM field (NSF 2009 in Kier et al, 2013). The discrepancy is partly attributed to students not knowing about the wide range of careers accessible with a science background (Cohen, Patterson, Kovarik, & Chowning, 2013, p. 13). Sanders suggests discovering new means of developing young students' sustained interest in STEM as a remedy for the STEM pipeline shortage (2009, p. 22). With the resurgence of attention to preparing students for the twenty-first century workplace, have come new understandings about how educators can best address the expanding need for a STEM-skilled workforce.

Theories about the factors inherent to career decision making find their roots in Frank Parson's *Choosing a Vocation* (1909). These theories have played a determining role in the career development efforts in public schools for decades. For example, within the Developmental Curriculum Model for Career Education (Bailey & Stadt, 1973) are tenets of Parson's three key factors in making career decisions, often articulated as domains: self knowledge, occupational knowledge, and career decision making (Peterson, Sampson, Lenz, & Reardon, 2002, pp. 313-314). This model, which organizes six domains of behavior in a matrix composed of four stages of career development, supports the theoretical initiation of preparation for students' career decision making at lower grade bands.

Couched in behavioral science, and aligned with Super's early theories of career development (1957, 1963), Gottfredson's Theory of Circumscription, Compromise, and Self-Creation explains four stages that are loosely associated with certain ages and grade bands (2002, p. 96). While stages one and two address the creation of a student's public self in ages three-to-five and six-to-eight, respectively, Gottfredson explains that it is during the growth in stage three (ages nine to thirteen), that most students have "developed firm conceptions of their place in the broad social order and narrowed their vocational options accordingly" (2002, p. 99). In fact, by stage four (ages 14 and above), "occupational exploration is confined to the zone of acceptable alternatives circumscribed at earlier stages" (Gottfredson, p. 100), so it is logical that contemporary early career development programming has more recently been situated in elementary and middle school grade bands.

Nature of the Problem

The focus of career development instruction on self- and career- awareness at the elementary level is a response to research that suggests that waiting until middle school to kindle student interest in STEM may be too late (Pannoni, 2014) because the persistence in achieving STEM career goals is determined by student expectations prior to the end of middle school (Tai et al, 2006, in Miller & Lauterbach, 2014, p. 21). However, most middle school students lack insights about the world that would serve as a foundation for developing realistic career plans (Finch & Mooney, 1997, in Hanover Research, 2012). Over one-third of young adults (ages 16-25) surveyed in a Lemselson-MIT Invention Index study reported that a factor for not entering a STEM career field is, simply put, not knowing about the field (Engler, 2012). In sum, this suggests that in order for students to even consider a STEM career path, they must first develop awareness in elementary school.

Career awareness "is an understanding of the existence of and the requirements for a wide array of professions in science, technology, engineering, and mathematics" (Cole, 2011). Research indicates that students who explore and develop deep understandings of career awareness characteristics by the beginning of middle school, will experience a more enhanced career planning process (Totura, p. 4). However, students in elementary schools typically have few opportunities to develop career awareness in a meaningful and intentional way, and the resulting deficiency of career knowledge and awareness leaves students ill prepared to navigate the ever-changing employment arena (ACTE, 2008, p. 2). Moreover, if early adolescent students' levels of career awareness were assessed, the results may identify a deficiency in this foundational aspect of career development.

Conceptual Underpinnings

Although much research has been conducted on the career development outcomes for secondary students, there is little attention being given to similar outcomes in the early adolescent grade bands (Gottfredson & Lappan, 1997; Schultheiss, 2005; Porfeli,, 2008). Most career development programming in K-12 education is situated at the late middle and high school levels. Yet Gottfredson's Theory of Circumscription, Compromise, and Self-Creation, which is largely based on cognitive science, does suggest that early adolescence is an appropriate starting point for career development efforts. The work of many cognitive theorists likewise shows that career development can justifiably begin in early adolescence.

According to Piaget (1952), during the Concrete Operational Stage (ages 7 to 11), students can reason logically about concrete events and classify ideas into different categories. Vygotsky (1962) emphasized that cognitive skills are naturally influenced by socialization and culture, both of which relate significantly to career development. And "Erikson's (1963) psycho-sociological theory of life stages approximates the socialization development basic to career awareness and the elementary school child, roughly ages 7 -11" (Fadale, 1974). In essence, theorists agree that during early adolescence, students are developmentally ready to begin constructing knowledge about career development by participating in career awareness, exploration, and preparation activities. Unfortunately, in terms of career development programming, theory and practice are not complimentary in U.S. schools. However, with the more recent focus on STEM Education initiatives, there is an opportunity for revisiting the placement of career development on the K-12 timeline.

STEM is an acronym that has been used to refer to the grouping of the four distinct disciplines of science, technology, engineering, and mathematics (Sanders, 2009). The intent of

STEM education is to develop self-reliant students who are able to utilize technologies, reason logically, practice inquiry, investigate, problem-solve, innovate, invent, and collaborate within each of these related fields. As noted by Honey et al. (2014), there is an essential connection that links STEM education to productive employment, which is crucial to the potential for extensive innovation in the United States. Furthermore, a career development programming, implemented in conjunction with STEM Education approaches, can provide consideration of theoretical foundations that intentionally situate the career development foci within the theoretically appropriate K-12 grade bands.

Rationale

Ultimately, career choice is based on how "the individual's skills, interests, values, beliefs, and purposes fit, align with, inform, and contribute to work, and work contributes to the individual's well-being and life goals" (Gillie & Isenhour, 2003). While evidence of preliminary alignments often begins to surface in the elementary years, students should establish a more definitive career goal, and outline a clear plan for career development, by the end of middle school. The student's career choice process is supported when schools assist in determining a program of study, setting degree and/or certificate objectives, and facilitating work-linked learning experiences (Harvard *Pathways*, 2011, p. 28).

The K-12 educational system is the largest influencer on students' career choice outside of parental influence (Lee, 2012), primarily because teachers promote occupational awareness (Harkins, 2001). The role of the K-12 educational system as an influencer of career awareness development in children motivates this research study. Research to determine early adolescents' understanding of career awareness constructs will impact efforts to intentionally develop students' career awareness in K-12 education. By linking students with career awareness,

5

exploration, and preparation earlier in their academic programming, students can begin

scaffolding their construction of career goals and aspirations, even before they reach middle

school. Moreover, examining the potential for more intentional career development

programming in the developmentally appropriate grade bands prior to early adolescence is a

theoretically grounded solution to addressing the STEM pipeline shortages.

According to cognitive and career development theory, career awareness develops primarily

during the elementary school years. Moreover, research has demonstrated that students' career

awareness significantly influences consideration of STEM careers. In the next five years,

millions of jobs in STEM-related occupations will be available, but with only twenty percent of

college graduates earning bachelor's degrees in STEM fields, the pipeline problem persists. The

results of the NACCEE's National Assessment of Educational Progress Project on Career and

Occupational Development (1977) indicated that most high school students fail to see the

relevance of school learning for work (Johnson, 2000). Because early detection of low-level

career awareness can facilitate programming changes that will minimize premature

circumscription of STEM career choices, knowledge about a student's level of career awareness

at the early adolescent stage of development is warranted.

Research Problem

Research situates the initial stages of career development "much earlier in the life span

than generally assumed, and what children learn about work and occupations has a profound

affect on the choices they make as adolescents and young adults, and ultimately on their

occupational careers" (Hartung, et al., 2005, p. 412). While theory-based literature on childhood

career development is limited (Schultheiss, 2008, p. 12), the antecedents of occupational choice

are identifiable. Moreover, those constructs pertaining to career awareness, and specifically

those applicable during the theoretical operational stages of the elementary years, are measurable.

In 1973, Fadale developed a Career Awareness Inventory (CAI) instrument to measure student career awareness at the early adolescent stage of development. Since that time, career development theory has deepened our understandings of the stages, domains and progressions of career development in children. Simultaneously, the context and constructs relative to the dimensions of work (requisites, routines and rewards of jobs) have evolved in the decades since Fadale's instrument was developed. Although still used in practical applications today, the CAI instrument's alignment with contemporary career clusters, workplace demographics, student readability levels, and technological advancements in assessment instrumentation, is uncertain. An instrument that can reflect the current landscape of both career development and the world of work, to effectively measure early adolescent career awareness, is needed.

Purpose

The purpose of this study was to develop an instrument that aligns with contemporary contexts and constructs for measuring career awareness in early adolescent children. This study was focused on examining the categories and test items that will ensure a reliable and valid assessment of student career awareness in contemporary educational settings. Evaluation of the empirically based instrument modifications and assessment of validity for the Early Adolescent Career Awareness Inventory (EA-CAI) were guided by the following research questions:

7

Research Questions

RQ1: To what extent is the EA-CAI instrument a valid tool to assess early adolescent students' career awareness?

RQ1-SQ1: What level of content validity can be established in measuring career awareness in early adolescent learners?

RQ1-SQ2: What level of construct validity can be established in measuring career awareness in early adolescent learners?

RQ1-SQ3: How suitable is the readability level of the EA-CAI instrument for early adolescent learners at the sixth grade level?

RQ1-SQ4: What level of reliability can be established in measuring early adolescent learners' career awareness?

RQ2: Given the EA-CAI instrument is deemed valid, what is the career awareness of early adolescent learners?

Limitations and Assumptions

The study results were confined to the willingness of students/sites to participate. Additionally, differences in school programming and student demographics may have impacted the results. The participating school may have in place academic programming that addresses career development at various degrees of effectiveness. Such programming might include career fairs, guest speaker presentations, place-based in-field exposure to community careers, career modules, or mandated state curriculum. Similarly, other influences that might have contributed to students' background knowledge and experience could include gender, socio-economic status, access to community role models, and parental education or occupational level.

Definition of Terms

Career Readiness

- a process of connecting 'education and employment to achieve a fulfilling, financially secure, and successful career' (Career Readiness Partner Council, 2012, p.2).

Career Development

- the implementation of a series of career decisions that constitute an integrated career path throughout the lifespan (Brown, D., 2002, p. 316)

Career Awareness

- an awareness of the inter-relationships of self and education, as positive work attitudes, as role identification, as exploration of career clusters, and as decision-making skills (Keller, 1972, in Fadale, 1973)

- an individual's awareness of the career opportunities available and their career needs (Eliason and Patrick, 2008, in Nasir and Lin, 2013)

STEM Career Awareness

- an understanding of the existence of and the requirements for a wide   array of professions in science, technology, engineering, and mathematics" (Cole, 2011,   p. 18)

Occupation

- the principal business of one's life; vocation (the work in which a person is employed)

Job

- a regular remunerative position

Career

- a profession for which one trains and which is undertaken as a permanent calling; a field for or pursuit of consecutive progressive achievement especially in public, professional, or business life

Career Cluster

- a broad group of careers and industries created by the U.S. Department of Education for the purpose of organizing and developing career and technical education programs

CHAPTER TWO: LITERATURE REVIEW

Overview

STEM Careers Pipeline

In 1983, President Ronald Reagan presented *A Nation at Risk* report, written by members of the National Commission on Excellence in Education, outlining the quality of education in the United States. The report signaled an alarm about America's slipping academic positioning in the world. However, the report failed to generate much change. Two decades later, another report, *Rising Above the Gathering Storm*, echoed the call for improvements in the United States schools' educational efforts, suggesting that insufficient numbers of students were prepared to pursue careers in STEM fields. The ill preparation for career placement, particularly in the STEM pipeline, is a dilemma that plagues the American education system still today. "News headlines routinely underscore our nation's pressing need for new entrants to STEM careers while decrying the lack of interest in, and preparedness for, these jobs (Cohen, et al., 2013, p. 12).

Projections for future STEM pipeline careers demonstrate "that the rates at which students currently enter STEM professions will be inadequate to keep up with the demands of our economy" (Cohen et al., 2013, p. 12). Perhaps even more alarming is that student interest in STEM careers is also waning. "According to the President's Council of Advisors on Science and Technology (PCAST), 'the problem is not just a lack of proficiency among American students; there is also a lack of interest in STEM fields among many students' (PCAST, 2010, p. vi)" (Cohen et al, 2013, p. 13). A lack of career awareness about the range of career options available to students in STEM fields is largely responsible for the decline in interest (Cohen et al., 2013). Consequently, the federal investment in STEM education initiatives, which promote an

awareness of career options and opportunities available in STEM fields, has increased

substantially in recent years (National Science and Technology Council, 2012). Because career

awareness is thought to be a necessary precursor to subsequent phases of career development, the

move to promote the filling of STEM pipeline vacancies has brought new attentions to the career

development practices employed by our schools.

Career Development

The career development for school-aged students can span the entire K-12 learning window.

As Magnuson and Starr emphasize, during successful career development students acquire a

series of sub-skills, and career awareness and career exploration form the foundation for the

acquisition process (2000). Gillie and Isenhour outline the developmental process in the

following chronology:

- Creating awareness of options,
- Exploring possible career paths,
- Reviewing available information,
- Clarifying interests, values, and skills through assessment,
- Reflecting upon experiences,
- Relating education and training options to occupational goals,
- Experimenting through work sampling, volunteering, or employment,
- Consulting with knowledgeable people in the field of interest,
- Formulating plans for education, training, career entry, and retraining,
- Making decisions and refining plans,
- Implementing and adapting plans, and
- Applying the career development process throughout the lifespan (2003).

Careful consideration of the scope and sequence of this chronology can have a direct impact on

the STEM pipeline.

<div align="center">

Underlying Theories of Cognitive and Career Development

</div>

The recursive interplay between student cognitive development and student career

development (Magnuson & Starr, 2000) has been a foundation for research in career education

since the early 1900's when Parsons (1909) first outlined goals for student vocational education.

<div align="center">

12

</div>

Since that time, the theoretical underpinnings of student career development (Ginzberg, 1952; Super, 1957, 1963, 1990; & Gottfredson, 1981, 1997, 2002) have been closely aligned with theoretical understandings of student cognition (Erikson, 1963; Piaget, 1952; Vygotsky, 1962).

Erikson's Eight Stages of Psychosocial Development

Erikson (1963) outlined eight stages of psychosocial development. School-age students enter Erikson's fourth stage of development (industry vs. inferiority) at about age six, and will remain in this stage until adolescence, or puberty. Students who have followed the expected progression through stages one through three, will eagerly begin to try new experiences with the belief that "adults will provide care for them and that they have the ability to master life tasks" and an enthusiasm for learning new things (Magnuson & Starr, 2000, pp. 94-95). Students will begin to make decisions in this stage, "about who they are in relation to the world around them," (Magnuson & Starr, 2000, p. 95) based on success or failure in their explorations. These decisions about social identity will significantly impact their simultaneously developing ideas about their place within the world of work as they enter adolescence and Erikson's fifth stage of development (identity vs. role confusion).

Piaget's Operational Stages

Like Erikson, Piaget (1952) believed that children pass through developmental stages. His four-stage cognitive theory underscored the importance of understanding the progression of student thinking, and established the schematic organizations and interpretations of developing knowledge. As a child's cognitive development unfolds, their way of thinking becomes increasingly advanced. Around age seven, children enter the *concrete operational stage* of cognitive development, "where they make a dramatic shift in their ability to process information (Magnuson & Starr, 2000, p. 95). Based on experiential learning of earlier levels, students at this

stage of cognitive development will be able to reason logically about concrete events, and

categorize or classify object into groups or sets. As suggested by Leung (2008), "cognitive

growth and development is instrumental to the development of a cognitive map of occupation

and conceptions of self that are used to evaluate the appropriateness of various occupational

alternatives" (p. 123). Thus, the cognitive development that transpires within the concrete

operational stage will, in turn, facilitate the assimilation or accommodation of new experiences

(Magnuson & Starr, 2000, p. 95) when children begin to reason more abstractly, idealistically,

and logically in Piaget's *formal operational stage* of adolescence.

Vygotsky's Zone of Proximal Development

Vygotsky's (1962) contribution to the knowledge of student development centered

largely on the inherent social context for students' understandings. "Vygotsky viewed children

as apprentices in learning to think" (Magnuson & Starr, 2000, p.96), dependent upon the social

setting that ultimately guides and advances their learning. He suggested that students must be

within a *zone of proximal development*, or readiness zone, which bridges prior learning to new

opportunities to learn (1962). He theorized that "scaffolds" such as mentors, language, and

verbal interactions serve as supports to the bridge (Magnuson & Starr, 2000, p. 96). His theory

supports the ideas inherent to career development, in that students must first become aware of

occupations in order to develop knowledge about them, and that student understandings are

largely dependent upon their *social space* contexts.

<center>**Career Development Theories**</center>

According to Gottfredson (1981), *social space* "refers to the set or range of occupations

that the person considers as acceptable alternatives" (p. 548). Because this range of occupations

reflects the child's view of their placement in the larger social setting, it is indicative of "the sort

<center>14</center>

of person he or she would like to be or is willing to be in the eyes of family, peers, and wider society" (Gottfredson, 1981, p. 548) at any given time during the lifespan. Basing their ideas largely on cognitive development, theorists have developed frameworks for understanding students' life span processes of career choice and development. These theories have been supported and refuted by research in recent years.

Ginzberg's Theoretical Interpretations of Childhood Role in Career Development

Ginzberg (1952) was the first theorist to include childhood in theoretical interpretations of career development. His theory regarding occupational choice divided childhood into two developmental periods. The first, *fantasy choice*, begins in preschool and continues until about age eleven. Ginzberg (1952) suggested that children's career aspirations are inconsistent in the first period, and that even in the second period, *tentative choice*, career aspirations are interest-based, with little reliance on the realities of ability or availability. "In contrast, Trice (1991) and Trice and King (1991) reported that elementary school children's occupational aspirations are relatively stable over the span of an academic year during the period that Ginzberg described as fantasy choice, challenging the suggestion that children aspire impulsively" (Trice, Hughes, Odom, Woods, &McClellan, 1995, p. 308). However, Ginzberg's supposition regarding the basis of student choice has been substantiated by the research of Trice et al. (1995), who found that interest was the primary reason given for student career choice (p. 320).

Super's Theory of Self-Concept and the Five-Stage Framework

Super's (1957) first theory of career development also addressed the childhood years, and introduced the notion of self-concept, "the constellation of self attributes considered by the individual to be vocationally relevant" (Super, 1963, p. 20). As noted by Giannantonio and Hurley-Hanson (2006), "this picture includes one's abilities, personality traits, values, self-

esteem, and self-efficacy" (p. 320). Super (1963) further developed his theory on the role of

children's developing self-concept on occupational choice, by explaining three fundamental

elements: formation, translation, and implementation, which occur in successive stages

(Schultheiss, 2008, p. 8).

As interpreted by Schultheiss (2008), self-concept *formation* begins in early childhood,

and centers on students' exploration, identification with key figures, role playing, and reality

testing," (p. 8). Stage two, the *translation* of self-concept into occupational terms, occurs as

students identify, experience, and generally become aware of their interests and abilities

(Schultheiss, 2008, p. 8). The final stage of Super's (1963) theoretical self-concept development

process, *implementation* of self-concept, occurs at the end of adolescence and beginning of

adulthood, as the student enters the workforce (Schultheiss, 2008, p. 8). According to Porfeli et

al. (2008), children in late childhood and early adolescence explore, learn about, and reflect

minimally on their emerging sense of self. This results in a "developing awareness of work in

relationship to an emerging sense of self, which includes a sense of educational and vocational

interests, aptitudes, values, emotions, and aspirations" (Portfeli et al., 2008, p. 27).

Super (1990) later proposed a five-stage framework for students' career development.

These five stages (growth, exploration, establishment, maintenance/management, and

disengagement/decline) embed nine dimensions (i.e., curiosity, exploration, information, key

figures, interests, locus of control, time perspective, self-concept, and planfulness) he believed

led to effective problem solving and decision making (Schultheiss, 2008, p. 8). Through

interaction with the learning environment, the goal within each stage is to "successfully manage

the vocational development tasks that are socially expected of persons in the given age range"

(Leung, 2008, pp. 120-121). During the growth stage, ages birth to about fourteen,

developmental tasks focus on self-concept formation, attitudes, interests, needs, and general understanding of the occupational world.

As noted by Schultheiss (2008), "although Super (1990) provided the most comprehensive treatment of childhood career development, little systematic research has been conducted to confirm or refute his theoretical assumptions" (p. 8). Nevertheless, Super's formalization of stages and respective tasks was a major contribution to theoretical frameworks developed by other theorists, especially those including the career development that takes place in childhood.

Gottfredson's Theory of Circumscription and Compromise

One such theorist, Gottfredson (1981), proposed a four-stage development theory which is rooted in early childhood. Gottfredson (1981) noted that because self-concept develops prior to high school, "theory might be usefully extended back into childhood" (p. 546).

Gottfredson (1981) proposed a theory of *circumscription* and *compromise*. Based largely on Van Daele's (1968, in Gottfredson, 1981) analysis and description of children's cognitive development and ego-ideal formation (p. 554), Gottfredson embraced the areas of occupation, community, social, material, and body goals in her proposed stages of (1) orientation to size and power, (2) orientation to sex roles, (3) orientation to social valuation, and (4) orientation to the internal, unique self (2008, p. 554). However, "in contrast to the established notion that choice is a process of selection, Gottfredson (1981, 1996, 2002) theorized that career choice and development could instead be viewed as a process of elimination or circumscription in which a person progressively eliminates certain occupational alternatives from further consideration" (Leung, 2008, p. 123).

Gottfredson's theoretical framework is based on the child's expected cognitive and social development relative to the chronological age progression. Rather than experiencing ever-widening opportunities for career exploration, she has proposed that self-concept and occupational preference develop in a four-stage process from age 3 on, so that, as children have better understanding of themselves and the world of work, they restrict occupational preferences and choices" (Trice et al., 1995, p. 310). According to Gottfredson (1981), most children abandon ideas of power associated with magic, in favor of intuitive power associations with adulthood, by age five, the estimated endpoint of Stage 1 (p. 558). "In Stage 1, orientation to size and power, preschoolers begin to classify people in the most obvious ways—as big (and powerful) versus little—and to realize that jobs are adult roles" (Gottfredson & Lapan, 1997, p. 421).

Stage 2 of Gottfredson's theoretical framework focuses on students' less formal, concrete distinctions among people and jobs based on gender and sex roles (1997, p. 421). Cues such as clothing and job-related activities are used by children ages six to eight, to classify jobs as either male- or female-oriented, and there is little tolerance for divergence within this dichotomous classification system (Gottfredson & Lapan, 1997, p. 421). "Children's occupational preferences in Stage 2 clearly reflect a concern with doing what is appropriate for one's sex" (Gottfredson, 1981, p. 560).

Between the ages of nine to thirteen, children in Stage 3 exhibit less concrete comprehension of the world of work. Recognition of socioeconomic and academic ability differences among peers contributes to understanding of status and prestige associated with different occupations (Gottfredson & Lapan, 1997, p. 423). As Gottfredson and Lapan (1997) suggests, "having now become more cognizant of the key distinctions among occupations,

including their requirements and rewards, these youngsters will also score higher in vocational maturity" (p. 423).

In the final stage of Gottfredson's theory, children ages fourteen and older begin to divert their attention from the external stimuli, to their own interests, personality, values and talents (1997, p. 423). "By adolescence, then, youngsters have developed not only the same cognitive map of the occupational world that adults share, but also a sense of where they fit into that world by virtue of their own social and psychological characteristics" (Gottfredson & Lapan, 1997, p. 425). Children's elimination of career choices based on interests, values, and competencies, during this final stage of career development has been supported by several research studies, although there is some indication that circumscription occurs earlier than Gottfredson's theory suggests (Trice et al., 1995, p. 310).

As a final step in the selection of occupation, Gottfredson introduced the idea of compromise, the process whereby individuals relinquish preferred career aspirations for less preferred options due to perceived accessibility (Gottfredson & Lapan, 1997, pp. 426-427). As Leung (2008) points out, "in response to external realities and constraints such as changes in the structure of the labour market, economic depression, unfair hiring practices, and family obligations, individuals have to accommodate their occupational preferences so that their eventual choices are achievable in the real world" (p. 124). In fact, research has indicated that by fourth grade students refer to specific abilities and interests to substantiate their first occupational choice (Trice et al., 1995, pp. 319-320).

Career Development Frameworks

Parsons (1909) is noted for being the first to outline goals for career education, and throughout the century that has followed there has been considerable development of

frameworks for student learning deemed essential to success in the world of work. As noted by Porfeli, Hartung, & Vondracek (2008), "the exploratory process of learning about work (Jordaan, 1963) in relationship to an emerging sense of self (Harter, 1999) shapes the development of a vocational identity and self-concept (Schmitt-Rodermund & Vondracek, 1999), values (Porfeli, 2004, 2007), and interests (Holland, 1997), and this exploratory process may begin as early as the grade school years (Patton & Pofeli, 2007) (p. 27). Many of the frameworks for learning during this exploratory process parallel theoretical student growth expectations attributed to grade band or age. The frameworks also demonstrate consideration of the dimensions of work (routines, requisites, and returns) (Wise, Charner, & Randour, 1976). Four existing career development frameworks designed for structuring this exploratory process are outlined below.

Bailey & Stadt's Stages and Subprocesses of Career Development Curriculum

Bailey and Stadt (1973) presented an early framework of stages of career development curriculum corresponding to four educational levels: Awareness Stage (primary elementary; K-3), Accommodation Stage (intermediate elementary; 4-6), Orientation Stage (junior high; 7-8), and Exploration and Preparation Stage (high school; 9-12) (p. 349). The stages provided developmentally appropriate context for sequencing curricular experiences and activities, while simultaneously giving consideration to six domains of behavior. Called "subprocesses" by the authors, these domains included (1) concepts of self, (2) occupational, educational and economic concepts and skills, (3) sense of agency, (4) information processing skills, (5) interpersonal relationships, and (6) work attitudes and values (p. 350). The progressive relationships between the domains and the developmental stages were illustrated in a six-by-four matrix framework, and elaborations on the goals and rationales for each of the representative elements within the matrix were provided. For example, within the domain of *concepts of self*, the goal of *awareness*

20

of self at the K-3 level of the Awareness Stage transitions to *development of concepts related to self* at the 4-6 level of the Accommodation Stage. Additionally, the authors provided an informal, but highly detailed, sample of illustrative objectives for each of their four stages of career development.

The National Career Development Guidelines

The National Career Development Guidelines (NCDG) framework (2003) was revised by the U.S. Department of Education's Office of Vocational and Adult Education (OVAE) after its original publication by the National Occupational Information Coordinating Committee (NOICC) in 1989. With an emphasis on life-long learning, and in coordination with the goals of No Child Left Behind (NCLB), the revised framework has been designed to serve the needs of an expanded audience. This audience is no longer limited to K-12 students and educators, but now includes post-secondary students as well as adults already in the workforce. The framework organizes eleven competency goals into three domains (Personal Social Development, Educational Achievement and Learning, and Career Management). For each goal, the framework provides indicators of mastery for three stages (Knowledge Acquisition, Application, and Reflection) not tied to age or level of schooling, but rather to learning levels derived from Bloom's Taxonomy (Hanover Research, 2012). A coding system for tracking the indicators for each of the stages related to a goal within one of the domains underscores the progressive nature of career development as depicted in this framework.

Olguin & Maple's Competencies for Career Development Learning

Authors Olguin and Maple (2008) offer a more linear organization of career development learning, also organized by periods contingent upon school level. The authors outlined ten competencies in three grade bands: elementary school, middle/junior high school, and high

school. According to the authors, at the elementary level students are expected to (1) understand the continuing changes in male/female roles, (2) develop skills to use and understand career information, and (3) understand the importance of self-concept (p. 80). Middle school students are expected to (4) know in-depth information about careers, (5) explore self-concept, (6) understand career requirements, (7) know about lifestyle characteristics that result from career choices, and (8) possess skills to make career transitions (p. 81). At the high school level, students are expected to develop (9) skills to locate evaluate, and interpret career information, and (10) skills to prepare to seek, obtain, maintain, and change jobs (p. 82). Within each grade band, the authors cited research-based activities that might address the expected outcomes.

New York's Career Development and Occupational Studies Framework

The Career Development & Occupational Studies (CDOS) framework, drafted jointly by representatives from The University of the State of New York and the New York State Education Department (NYSED), outlines learning standards for career development and occupational studies at three levels: elementary, intermediate, and commencement (NYSED). All three grade bands are correlated independently with the three highlighted standards for learning, with the caveat that the third standard is divided into two parts, and the second part is only addressed at the high school level. The three standards represent the domains of (1) career development, (2) integrated learning, (3a) universal foundation skills, and (3b) career majors. Within the Career Development domain, students are expected to "be knowledgeable about the world of work, explore career options, and relate personal skills aptitudes and abilities to future career decisions" (NYSED). With respect to integrated learning, students must "demonstrate how academic knowledge and skills are applied in the workplace and other settings" (NYSED). Universal Foundation Skills rely on student demonstration of "master of the foundation skills

and competencies essential for success in the workplace: (NYSED). With regard to Career Majors, students who choose a career major must "acquire the career-specific technical knowledge/skills necessary to progress toward gainful employment, career advancement, and success in post-secondary programs" (NYSED).

Definitions of Career Awareness

Career awareness has been subject to variations of definition, dependent upon conceptualizations. Some early definitions were based on economic, psychological, and sociological conceptualizations (Arterbury, Collie, Jones, & Morrell, 1972, p. 5). Others, both then and now, have derived definitions based on four elements of conceptual dimensions: occupational knowledge, occupational preferences, occupational values, and occupational self-concept (Arterbury et al., 1972, p. 7). Most definitions focus on "the world of work, attitudes toward work and knowledge of one's own capabilities, values and interests" (Arterbury et al., 1972, p. 8). A widely accepted contemporary definition states that career awareness is "the inventory of knowledge, values, preferences, and self-concepts that an individual draws on in the course of making career-related choices" (Herr et al., 2004, p. 44).

Wise, Charner & Randour's Conceptual Framework for Career Awareness

Because career awareness is considered foundational to further career development, the emphasis on career awareness has historically been situated at the elementary level in U.S. schools (Arterbury et al., 1972, p. 9). "The function of career education during the awareness stage thus becomes that of helping the child to perceive the ingredients which are the forerunners of more effective career development concepts and behaviors and to develop skills for differentiating and internalizing new phenomena" (Bailey & Stadt, 1973, p. 351). In an effort to identify those ingredients, Wise, Charner & Randour (1976) proposed a three-by-four matrix

23

comprised of the four aspects of career awareness (knowledge, values, preferences, and self-concepts) and the three dimensions of work (routines, requisites, and returns) (p. 51).

Summary

STEM "career awareness for primary and secondary students is an understanding of the existence of and the requirements for a wide array of professions in science, technology, engineering, and mathematics" (Cole, 2011, p. 18). Career awareness involves knowing distinct characteristics about potential career options, including information such as

- The day-to-day activities and tasks of a potential career,
- The qualifications required for entry into a career,
- The work environment, conditions and values of a career,
- The lifestyle impacts typically associated with a specific career
- The financial realities and potential within a career path,
- Where the jobs are located—geography and industries, and
- Future trends and outlook relevant to the career (Laurier, 2014).

"Exploring is exposure to a variety of activities and opportunities that can extend student knowledge bases of career choices and enhance their planning process" (Totura, p. 4).

In the early 1970's, school systems employed a variety of models and frameworks for elementary students (Deiulio & Young, 1973). Since that time, frameworks have continued to be developed at state, national, and international levels to link learning with intended outcomes. The aforementioned frameworks are comparable in their reflection of the content and process learning criteria for career development, and they reflect Super's (1957) life span perspective on career development. Evidenced in some manner in all four frameworks is the development of students' self-concept, an ongoing precursor to further career development. Although considered fundamental to career development, the establishment of a fully-developed self-concept is notably incomplete within all of the frameworks during early adolescence, suggesting that assessment of that aspect of career awareness would be premature at this age band. Additionally,

the frameworks overlap in domains and competencies representative of the requisite skills and knowledge for the construction and management of future careers (Skorikov & Patton, 2007, p. 40). Finally, three of the four frameworks delineate benchmarks for career development expectations relevant to grade bands. "Within such contexts, career learning or career guidance has the potential to provide children with accurate and relevant information, to challenge restrictive, negative, and stereotypical notions about themselves, and to keep their options open" (Herr, Cramer, & Niles, 2004, p. 334). The framework least aligned with a study of children's career awareness, therefore, would be the NCGD which situates youth and adult learning at developmental levels based on Bloom's taxonomy, rather than on age.

Of the four frameworks discussed, the framework most closely aligned with a study of, and development of an instrument to measure, children's career awareness is that of Bailey and Stadt (1973). Based on the matrix of career awareness proposed by Wise, Charner, & Randour (1976), the four central aspects of career awareness (knowledge, values, preferences, and self-concepts) and the three dimensions of work (routines, requisites, and returns) must be recognizable in a framework that would serve the needs of such a study (p. 51). Moreover, by clearly and specifically situating the ingredients necessary for the development of career awareness in the lower grade-bands (K-3), their framework offers the most substance for a study of the measurement of children's career awareness prior to adolescence. The state (CDOS) and national (NCGD) frameworks have the recognition of educational institutions, however, upon close examination, much of their emphasis on the measureable "inventory of knowledge, values, preferences, and self-concepts that an individual draws on in the course of making career-related choices" (Herr et al., 2004, p. 44) is geared toward older students.

Research on Career Development

Driven largely by public sentiment and government funding (Career Education Incentive Act, 1977), the research on how students aspire to, and choose, careers experienced a robust period of growth from the late 1970's to the early 1980's. During this time, research demonstrating that theoretically anticipated changes in occupational knowledge occur throughout the lifespan emerged (Watson & McMahon, 2005, p. 122). Moreover, by emphasizing the development of self-concept over the life span, Super (1963, 1990) inferred the reliance of occupational choice on "complex interactions among a number of factors, including physical and mental growth, personal experiences, and environmental characteristics and stimulation" (Leung, 2008, p. 120). According to SCCT, "career choice is an unfolding process in which the person and his/her environment mutually influence each other" (Leung, 2008, p. 126). In focusing on the modification of learning through interaction with environmental influences, these theories emphasize the role of recursiveness on children's' career development learning (Watson & McMahon in Skorikov & Patton, 2007, p. 38).

Social and Environmental Influences

While the theoretical basis for knowing how children acquire knowledge necessary to career development is fairly robust, the research to substantiate these theories has been "fragmented and sparse" (Schultheiss, 2008, p. 9), and skewed toward adolescence and adulthood (Watson, 2008, p. 76). As noted by Watson & McMahon (2005), "while there is general acceptance that career development learning occurs throughout childhood, previous research has failed to sufficiently examine the nature of such learning" (p. 121). Nevertheless, the empirical research of the past four decades establishes that student career choice develops in a series of stages, beginning in early childhood, and extending through adolescence into

adulthood (Deiulio & Young, 1973, 378). Moreover, career development of school-aged children is largely dependent upon their total development (Magnuson & Starr, 2000, p. 93). As expressed by Erikson (1963), Piaget (1952), and Vygotsky (1962), the major tenets of child development theories contribute to our understanding of student processing of information from a variety of social and environmental influences. For students, these influences largely shape the development of career choice.

Career development learning according to Super's (1990) model relies on several sources "such as family, school, society, peer group, community, and the labor market, sources which are also available in other career theories (e.g., Lent, Brown, & Hackett, 1994, 1996; Mitchell & Krumboltz, 1996; Patton & McMahon, 1999; Roe, 1956; Roe & Lunnenborg, 1990; Vondracek, Lerner, & Schulenberg, 1986; Young et al., 1996)" (Watson & McMahon, 2005, p. 120). Similarly, in a revision of her theory, Gottfredson (2002) emphasized the relationship between genetic influences and the environment, maintaining that the more public aspects of self-concept (e.g., gender, social class) have a stronger influence on choice than the private aspects (e.g., skills, interests) (Leung, 2008, p. 123). As described by Lent, Brown, & Hackett's Social-Cognitive Career Theory (SCCT) (1994), this influential interplay between people and environment is thought to be central to how children gain knowledge of career choices that interest them. "It involves the specification of primary career choice or goal, actions aiming to achieve one's goal, and performance experience providing feedback to the individual on suitability of goal" (SCCT in Leung, 2008, p. 126).

According to Gottfredson (1981), the first influences on youngsters' career choice will be parents, friends, and colleagues within their immediate social setting (p. 571). Within the child's home environment, parents, especially, will be active agents in the career development process

27

(Watson & McMahon, 2005, p. 125). Research suggests that parents act as role models (Lee, 2012, p. 124), and voice their expectations and consultations through five influential channels: "open communication between parents and children, the development of responsibility of young people, the active involvement of parents in the lives of children, the encouragement of autonomy, and providing specific direction and guidance to children" (Hou & Leung, 2011, p. 350). Despite this significant contribution to career aspirations, "fewer than 10% of children reported parental suggestions, and even when these suggestions were reported, children especially girls, had not reported these suggestions as either their first or second choices" (Trice et al., 1995, p. 308).

After parents, teachers, by virtue of their increased interaction time with students, also influence career choice (Lee, 2012, p. 123). However, "the school as an influential source of learning in the career development of children is broadly recognized but narrowly researched" (Watson & McMahon, 2005, p. 124). Harkins (2001) suggests that appropriate films, books, internet searches, classroom visitors, field trips and related materials are all potential school influences on student career choice (p. 171). Furthermore, "teachers can promote occupational awareness as part of pretend play by providing appropriate props, such as tools or clothing articles that suggest certain jobs" (Harkins, 2001, p. 173).

Other significant sources of influence on children's career choice have been substantiated by research. According to Giannantonio & Hurley-Hanson (2006), "an image norm is the belief that individuals must represent or possess a certain image, consistent with occupational, organizational, or industry standards, in order to achieve career success" (p. 318). Occupational image norms formed in the Growth and Exploration stages (Super, 1990) can be created by contact with workers, by messages from family and friends in the youngster's social network, or

28

by messages conveyed by the media (Giannantonio & Hurley-Hanson, 2006, pp. 321-323), as well as by childhood play (Herr et al., 2004, p. 339). In research on television as an influence, "O'Bryant and Corder-Bolz (1978) established that children as young as five years of age learn to gender stereotype occupations based on the gender of a television role model, that children learn about occupations from the television content that they view, and that girls will modify their occupational aspirations as a result of viewing particular occupational roles portraying women" (Watson & McMahon, 2005, p. 124).

Gottfredson maintained that, while the interplay between cognitive and environmental sources plays a significant role in shaping the selection process, ultimately the child "is still an active agent who could influence or mould their own environment" (Leung, 2008, p. 123). Young children seek out information about jobs, working conditions, employment qualifications, job expectations, physical and mental requirements, and they "recognize situations in which specific subject knowledge would be useful" (Harkins, 2001, p. 171). As Trice et al. (1995) found, "children will eliminate more occupations with age, and their reasons for rejection will follow a developmental sequence" (p. 318).

Even without formal instruction in the stages outlined by Bailey & Stadt (1973), children's cognitive and social development is likely to support learning about the world of work. For instance, as Bandura (1977, in Stewart & Koch, 1983) posited, "children learn social behavior through their eyes and ears merely by observing other persons and events, which they subsequently imitate" (p. 12). Herr et al. (2004), concur, stating that elementary school children are generalists in "that they are typically open to and they interact with a broad range of stimuli and modes of behavior" (p. 338). Students' physical and psychological explorations of their world in early to middle childhood contribute to their increasingly complex understandings,

classifications, and associations (Patton & Porfeli, 2007, p. 62). Moreover, research has demonstrated that childhood is "an active period of realistic career exploration" during which children employ appropriate cognitive structures of self to engage in exploration (Patton & Porfeli, 2007, pp. 52-53).

Children's career development activity can also be enhanced by the implementation of career education lessons. Ten studies conducted in the 1970's demonstrated that programming focused on career awareness with elementary school children had positive impacts on student outcomes (Arterbury et al., 1972, p. 14). However, little research has contributed to educator's understanding of the developmental nature of students' reasoning or the processes inherent to career development (Watson & McMahon, 2005, p. 122). "To help educators gain a better understanding of current status of a particular age group regarding specific career and occupational development objectives, the career-development needs of 9-year-olds were assessed as part of a project initiated by the National Assessment of Educational Progress (Miller, 1978)" (Miller, 1989, p. 171). The results indicated that most of the children had access to places of interest in the community that would provide exposure to a variety of occupational options, some ability to identify occupations was subjective to gender, and most of the nine-year-olds had strong understanding of the duties of familiar occupations (Miller, 1989, p.172).

With similar purpose, Howard and Walsh (2010) conducted a study to determine the grade bands at which certain career choice and career attainment behaviors were most apparent. Comparing student responses at six proposed levels of their Conceptions of Career Choice and Attainment (CCCA) model: Level 1-Pure Association, Level 2-Magical Connection, Level 3-External Activities, Level4-Internal Processes & Capabilities, Level 5-Interaction, and Level6-Sytemic Interaction. Based on the results, the researchers "identified distinct levels of children's

reasoning about career choices and career attainment and found that these levels vary by age with older children engaging in more sophisticated reasoning processes than younger children" (Howard & Walsh, 2010, p. 151). Students in kindergarten were able to describe career choice and attainment using simplistic lists about a job or career (Level 1). Third grader students demonstrated ability to describe observable, learnable skills or activities that might lead to job attainment (Level 3). Students in the sixth grade were able to match themselves to jobs or careers based on job activities, workplace characteristics, and personal abilities and interests. They also recognized that attaining a job requires learning skills and physical or mental abilities (Level 4). Less than 25% of sixth graders were able to consider the influences of personal attributes and environment involved in career attainment (Level 5), and the students were unable to reach CCCA model Level 6 (Howard & Walsh, 2010). Results of Howard and Walsh (2010) further suggested that "as children mature cognitively, they are better able to explain the processes of career choice and attainment" (2010, p. 151). Additionally, Howard and Walsh (2010) found "that as children are better able to understand cause and effect relationships, they will be increasingly able to identify specific educational and training experiences required for various jobs" (p. 151). "A related study found that most children were able to identify school learning that related to occupations that interest them as well as occupations nominated by the researchers (McMahon, Gillies, & Carroll, 2000)" (Watson & McMahon, 2005, p. 124).

Career Development Practice

Despite the extensive theoretical suggestion that self and career awareness development should begin as soon as a child enters school, actual practice in the United States falls short of this goal. In practice, educating the 'whole child' has seldom included attention to career aspects of education (Gibson, 1972, p. 4). Rather, career development initiatives are not explicitly

targeted at the elementary level, and instead focus on students in the middle or high school grade bands.

Typically, as Gottfredson & Lapan (1997) recognized, vocational counseling often concentrates on students in Stage 4 of her career development model, ages 14 and older (p. 423). State standards express this delay in career education quite clearly. As Porfeli et al. note (2008), comprehensive career curriculum, like that offered in Florida, is geared toward learning about the world of work at the middle school level (Luscombe, 2006, in Porfeli et al., p. 31). Similarly, the Georgia Middle School Performance Standards for Career Technical and Agricultural Education (CTAE) and the Texas Essential Knowledge and Skills Development Standards both use the federally defined Career Clusters model, and both situate career awareness learning within sixth grade (Hanover, 2012). Although the Pennsylvania Career Education and Work (CEW) standards group curriculum by grade level strands (K-3, 4-5, 6-8, and 9-12), career awareness is a thematic strand taught at all levels (Hanover, 2012, p. 31). According to Porfeli et al. (2008), other states, including Mississippi, Oklahoma, and the Carolinas, have also developed optional and less structured curriculum, but for post-elementary aged students (p. 31), while legislation in Louisiana and New Mexico mandated career education programming for eighth through twelfth graders. And in a more recent review of career literature, Schultheiss (2005) summarized that, "although the school-to-work movement was intended to impact all students K-12, recent research and practice have focused almost exclusively on enriching the learning and work experiences of high school students (e.g., Fouad, 1997; Solberg, Howard, Blustein, & Close, 2002)." (p. 186). Furthermore, efforts to develop career awareness in lower grade bands have been met with programmatic challenges.

Traditionally in the United States, elementary students have been introduced to work-related topics by teachers or guidance counselors. For example, the Round Rock Independent School District in Texas situates career awareness at the elementary school level, and "includes helping students understand the role of work, one's own uniqueness, and basic knowledge about different occupations" (Hanover, 2012, p. 37). However, new research demonstrates that such content is often incompatible with students' needs because teachers opt to force work readiness into thematic units on family or community workers (Harkins, 2001, p. 172). As Harkins (2001) explains, "many such units focus on superficial coverage of topics rather than promoting critical understandings (Kostelnik et al., 1999), and the attention to careers is limited" (p. 172).

Guidance counselors have also traditionally been facilitators of career awareness activities with children at the elementary level in the United States. The elementary years are opportunities for curiosity, inquiry, exploration, and trial in a relatively prejudice-free environment, and it's the guidance program's role to capitalize on these natural tendencies in terms of career awareness connections (Gibson, 1972, p. 1). However, systems-level comprehensive career guidance programs often neglect to focus on the elementary level (Schultheiss, 2008, p. 19; Gibson, 1972, p. 4), because limited resources are stretched to address state and federal testing mandates (Porfeli et al., 2008, p. 31). The limited conditions and resources inherent to comprehensive career programming perpetuate the disconnect between school and work, and between developmental science and counseling practice (Porfeli et al., 2008, p. 31).

Clearly, occupational preparation is a complex endeavor. As Gibson (1972) notes, "while few would dispute the desirability of earlier career decision making and entry into the appropriate training programs, our understandings of human growth and development, coupled

33

with our recognition of the rapidly changing requirements and nature of the world of work, indicate the impracticality of such a possibility" (p. 3). However, educators can begin to prepare students for the complexities of career choice during elementary school (Gibson, 1972, p. 3). Gottfredson's (1981) theory of circumscription and compromise illustrates the continuous process of elimination that students employ in their career selection. Rather than forcing or encouraging students to make premature choices, preventing premature foreclosure of viable options is the goal of career-related learning in elementary school (Herr et al., 2004, p. 334). Elementary activities accomplish this through exposure and growth (Olguin & Maple, 2008, p. 80). As Wernick (1973) explains, early and frequent decision making activities provide the opportunity to relate to events and enhance valuing abilities (p. 16).   Thus, as Deliulio & Young (1973) suggest, "It is essential that career education begin in the elementary school because it enhances a child's self-concept and lays the groundwork for directly identifying with occupations later in high school" (p. 380).

Most career education researchers agree that the elementary years are vital to the life-span developmental process. In developing self-awareness, students begin to make connections to themselves and the world of work, gaining knowledge about possibilities that relate to their own self-images (Wernick, 1973, p. 17). Some believe that the consolidation and activation of interest depend on the variety of environments and experiences that students at the elementary level are exposed to--not merely because the students are enthusiastic learners, but because they are also at a developmental level that is amenable to intervention and changing perspectives (Gottfredson, 2002, p. 136). "Gillies, McMahon and Carroll (1998) found that compared with their peers upper primary school children who participated in a program of intentional career development learning developed a better understanding of sources of career information and

actively sought out such information such that they also were more able to relate their school learning to occupations such as lawyer, nurse and fashion designer than children who did not participate in the program" (Watson & McMahon, 2007, p. 39). It is this intentional career development programming at the elementary level that needs to be employed in the United States.

Between the ages of seven and eleven, students are in a life stage (Erikson, 1963) whereby their sense of industry encourages involvement in productive situations (Fadale, 1973, p. 2). Moreover, this is the developmental level when students organize observations from explorations of their inner and outer worlds into complex associations and categories (Patton & Porfeli, 2007, p. 47). A stable pattern of interest evolves, based on activities that make the student feel efficacious and on which the student associates desirable outcomes (Leung, 2008, 126). Such activities would be considered developmentally appropriate if they focused on experiences that have personal meaning for students. Career exploration should expand on understandings of, and interest in, the work of significant adults in their lives (Harkins, 2001, p. 170). As Harkins (2001) explains, "when teachers use children's personal knowledge as the foundation for further exploration, they set the stage for solid concept development" (p. 170). Furthermore, by drawing on meaningful active experiences about the world, students will be better prepared to succeed as adults in the world of work (Harkins, 2001, p. 170).

As students reach the end of adolescence they are faced with decisions about coursework and occupational goals. These decisions require conceptual understandings that have been strengthened over time (Harkins, 2001, p. 173). According to Bailey and Stadt (1973), between the Awareness Stage and the Accommodation stage, the manifestations of students' cognitive and psycho-social growth contribute to increased conceptual understandings

(p. 356). Although the authors' assumption is that the domains of the career development continuum do not change, the cumulative understandings from previous stages contribute to differentiation in terms of identifiable elements within each domain (Bailey & Stadt, 1973, p. 357). As the authors explain, "the function of career education during the awareness stage thus becomes that of helping the child to perceive the ingredients which are the forerunners of more effective career development concepts and behaviors and to develop skills for differentiating and internalizing new phenomena" (Bailey & Stadt, 1973, p. 351).

Career guidance that is focused on the early and middle childhood integrates career goals and provides students with a conceptual foundation that will be essential throughout the remainder of their lives (Harkins, 2001, p. 173). As Herr et al. (2004) explain, "the concepts children acquire during this life stage directly influence later school success, career identity, adult interests, and general perspectives on life as their attitudes about success and failure develop early" (p. 343). Thus, it is the continuous and integrated approach to career development, throughout a student's education, that builds the requisite career choice skills (Gibson, 1972, p. 6). The success of students' career development rests firmly on a foundation of career awareness originating in the years prior to the elimination and compromise of viable options, those years of early and middle childhood. Moreover, the formative elementary school years should provide career guidance and career development activity that supports students' life-span career success because "any program which assists the individual in realizing his potential is, in a very direct manner, contributing to the human resource development and manpower utilization of the society" (Gibson, 1972, pp. 4-5).

Fadale's Career Awareness Inventory

An examination of the literature in career education and STEM education shows that while several instruments have been developed to measure the construct of student interest in careers, few have been developed to measure students' career awareness. One instrument that is relied upon, decades after its development, is Fadale's Career Awareness Inventory (CAI) (1973). This instrument was developed based on the theoretical framework outlined by the Comprehensive Career Education Model of the early 1970's, and was intended to be a tool for educators interested in assessing the career awareness demonstrated by students (Fadale, 1973).

The inventory is a multiple-choice instrument that examines seven factors of students' career awareness including knowledge of related occupations, degree of contact with the occupation, knowledge of job characteristics, awareness of the functions of the occupation, knowledge of the work locations, and knowledge of career decision making. The instrument is based on Taylor's Occupational Clustering System (1972), and utilizes eleven career clusters, segmenting the careers into service- or product-based categories.

<center>**Implications for an Assessment of Career Awareness**</center>

As noted previously, understanding of children's career development is primarily theoretical, and there is only limited research to substantiate the implications and hypotheses. However, "elementary children through their experiences in the school, the family, and the community acquire impressions of the work people do, the kinds of people employed in different jobs, the overt impressions of the compensation they receive or the lifestyles people in various jobs experience, and the types of abilities required to do these jobs" (Herr et al., 2004, p. 333).

Clearly there is a positive correlation between level of intellect and occupational knowledge (Hartung et al., 2005, p. 394). Based on the theories of Super (1990), Gottfredson

(1997), and Lent et al. (1994), and the findings of Miller (1978) and Howard and Walsh (2010), it is apparent that the assessment or measurement of children's career development must be meaningful to them, and must be situated within developmentally appropriate levels. Students nearing the end of the Growth Stage "have easily carried out such tasks as ranking occupations, rating large numbers of them according to their similarity to each other, or mimicking the responses of various types of workers on interest inventories" (Gottfredson, 1981, p. 551). Given that students begin their career development journey before entering school, it is presumable that students at the end of the Awareness Stage would be knowledgeable enough to complete an associated instrument. As Gottfredson (1981) points out, "the ability to title and describe occupations increases steadily with age through the school years, with some occupations becoming familiar earlier than others and some groups of youngsters (e.g., more intelligent ones) being more knowledgeable than their peers (e.g., Nelson, 1963)" (p. 551).

An assessment measure would also need to take into consideration that the nature of children's descriptions of occupations will undoubtedly change over time, with children in the Growth Stage basing their descriptions on their activities and behaviors, while students in the Exploration Stage base their descriptions on interests, abilities, and aptitudes (Borgen & Young, 1982, in Watson & McMahon, 2005, 122). As Gottfredson (1981) explains, children's cognitive occupational mapping "is simpler and less detailed than that of an adult, but what he or she is aware of is consistent with the images of adults" (p. 557). As students aspire to some occupations, and eliminate others from their selection pool, it is entirely reasonable to measure their career awareness at the developmentally appropriate level of middle childhood.

CHAPTER THREE: METHOD

The method for conducting an investigation into the development of an instrument for measurement of career awareness of early adolescent learners is described in this chapter. The research design, procedures for data collection, and data analysis are included in the corresponding chapter sections. The study is guided by the following research questions and sub-questions:

RQ1: To what extent is the EA-CAI instrument a valid tool to assess early adolescent students' career awareness?

RQ1-SQ1: What level of content validity can be established in measuring career awareness in early adolescent learners?

RQ1-SQ2: What level of construct validity can be established in measuring career awareness in early adolescent learners?

RQ1-SQ3: How suitable is the readability level of the EA-CAI instrument for early adolescent learners at the sixth grade level?

RQ1-SQ4: What level of reliability can be established in measuring early adolescent learners' career awareness?

RQ2: Given the EA-CAI instrument is deemed valid, what is the career awareness of early adolescent learners?

Research Design

Descriptive cross-sectional research design entails analyzing data collected at one particular point in time, without change in the environment, manipulation of variables, or comparison of groups. This non-experimental design was selected for the investigation due to its

congruity to the objectives of this study—evaluating instrument modifications, establishing readability, and assessing validity and reliability of the EA-CAI instrument. By providing snapshot information about prevalence and distribution of data collected, this design validates the use of the EA-CAI as a tool for measurement of career awareness of early adolescent students.

Method

Participants

Characteristics of the study population are dictated by the research questions and design. Participants for this study were students from one middle school in an urban area of southwest Virginia. The selection of sixth grade early adolescent participants was based on the following: (a) after year four of primary school (or at 9.5 years of age), students are generally considered to be functional readers, capable of reading competency, (b) they are acquainted with digital technologies and computer-generated assessments and can navigate an electronic model, (c) they are considered visually literate in that they can make meaning from information presented in an image, (d) the mechanisms of career development stages typically span the ages of 5-14, so early adolescent students are theoretically able to comprehend the majority of the content of the instrument, and (e) research shows that interventions for career awareness improvement should be implemented prior to students' eighth grade year.

The total population of the target school was 930, of which 330 were sixth grade students. The gender distribution of the population was 53% males and 47% females, and the ethnicity of the population was represented by 70% White, 20% Black/African American, 6% Hispanic, 4% Asian, and less than 1% American Indian. Institutional Review Board (IRB) approval from the Board of Human Subjects at Virginia Tech for conducting research with sixth

grade students was awarded prior to data collection (see Appendix H). All sixth-grade students

enrolled in the middle school were invited to participate in the study, and students and parents

were provided an IRB approved research recruitment documents. Parent consent and student

assent forms were returned, appropriately signed, for each selected participant.

Instrumentation

Instrument development is simultaneously a creative and technical endeavor designed to

provide data that will inform subsequent activities. As explained by Colton and Covert, "An

instrument is a mechanism for measuring phenomena, which is used to gather and record

information for assessment, decision making, and ultimately understanding" (2007). The Career

Awareness Inventory (CAI) instrument was developed by Fadale in 1973 at the Cornell Institute

for Research and Development in Occupational Education, to provide data relative to students'

career development. Designed to measure career awareness, the CAI instrument has 130 multiple

choice test items divided among seven test sections (Table 1).

Table 1.

Fadale's CAI Instrument Sections

Instrument Section	Section Heading	Section Purpose	Number of Items
Test I	Identity	identify worker occupations based on an image	63
Test II	Training	identify occupations requiring college education	6
Test III	Role Models	identify workers known in real life	32
Test IV	Function	differentiate between service and product work	4
Test V	Prestige	identify pay of workers	5
Test VI	Clusters	identify related occupational clusters	10
Test VII	Characteristics	identify what workers like to do in jobs	7

According to Fadale, "*The Dictionary of Occupational Titles and Manpower*

Requirements served as validating sources for item writing" for the CAI (1973, p. 21).

Readability was geared toward the upper elementary levels in consideration of the use of

41

appropriate occupational titles. Content validity was established by a three-person expert panel

representing elementary education, counseling and career education. The panel identified

interrelationships of agreement for the content and domain of the instrument with a high

correlation for Questions and Activities (.98) and Visual Graphics (.88). While basic external

construct validity was established, it was found to be less efficient when the instrument was used

as a group test rather than in interview format. Internal construct validity was demonstrated by

subtest inter-correlations within the group instrument during instrument formulation, with low

correlations among subtests indicating subtest independence. Reliability for the Fadale CAI

instrument (.795) was estimated using internal consistency procedures outlined by the Spearman-

Brown formula. The standard error of measurement for the total test was 2.7. Established

stanines for the CAI Total Awareness Test range from 1 (raw score of 0-44) to 9 (raw score of

90-125). Although these data analysis statistics indicated the CAI was suitable to applications at

the time of its development, more recent theoretical and instrumentation developments provided

reason to review the features of the inventory.

Typical of the era in which it was developed, the CAI instrument is paper-pencil and the

images are black-and-white sketches. Similarly, the inventory content reflects jobs that either no

longer exist or have evolved to mirror contemporary technologies and workforce trends. While

Fadale's CAI served the purpose of assessing career awareness for many years, and the

instrument's conceptual framework remains relevant to contemporary career development

assessment, all of the key instrument features required modification to develop a new inventory

that would accurately assess careers in today's workforce. The following section presents the

procedures followed for conducting initial instrument revisions and establishing the viability of

the instrument as revised.

<div align="center">**Procedures**</div>

Initial CAI Revision

The initial step in developing a viable, more contemporary career assessment inventory was revision of the terminology, content, images, structure, organization, and presentation format. Given the established purpose and focus of this study, the type of instrument and reporting mode most appropriate for data collection and measurement was identified through review of prior research. As seen in Figure 1, Colton and Covert describe six common Categories of Social Science Instruments that utilize self- or independent rater reporting.

Figure 1.

Categories of social science instruments.

Behavioral
rating
scales

Tests
(teacher-made
and standardized)

Checklists
and
inventories

Modes
• Self-report
• Independent
rater

Survey
questionnaires

Psychometric
instruments

Rating
scales
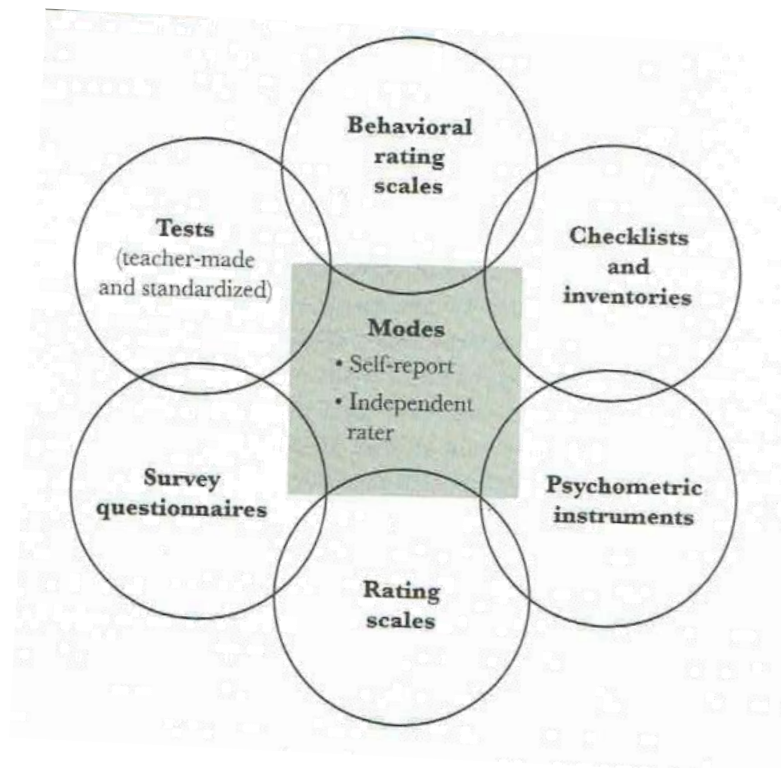
Note. Adapted from "Designing and Constructing Instruments for Social Research and Evaluation," by David Colton and Robert W. Covert, 2007, p. 18.

"In the social sciences the term inventory describes an instrument used to assess a person's interests, characteristics, or skills" (Colton & Covert, 2007, p. 9). Specific to the goal of this study, the purpose, research design, object of measurement, data collection method, and available time, technology, and personnel resources were considerations that resulted in selecting a hybrid instrument that while predominately an inventory similar to the original CAI, would be a new Early Adolescent Career Assessment Inventory (EA-CAI) administered in a self-reporting survey format. To accommodate the large sample size needed for data analysis, the self-reporting survey mode was appropriate, despite the tendency of such a format to limit the information obtained due to a small number of response choices (Colton & Covert, 2007, p. 11). The electronically administered inventory survey would provide the quantitative data necessary to measure learners' career awareness and would be conducive to administration in an on-line school setting.

With a hybrid format selected, the instrument sections were next re-organized to reflect the sequential presentation of requisites, routines, and rewards of jobs associated with the respective occupational fields. Sections of the new EA-CAI were labeled and organized as indicated in Table 2.

Table 2.

New EA-CAI Instrument Sections

Instrument Section	Section Heading	Number of Items
1	Categorize Occupation by Career Clusters	16
2	Identify Occupations That Require a College Degree	10
3	Identify Occupations from a Picture	50
4	Categorize Occupations as Service- or Product- Oriented	8
5	Identify Related Job Activities and Work Conditions	14
6	Identify Related Pay and Prestige	12
7	Familiarity with Workers Who Hold a Variety of Jobs	14

Once the sections were re-organized, the next step in the instrument revision process was to re-format and re-formulate the items.

Item revision for each section took into consideration elements related to the literacy of the intended audience. "Literacy assumes comprehension: the individual can not only say the word but also has an internal definition of it and can combine it with other words into meaningful sentences" (Colton & Colvert, 2007, p. 177). Sentence length was deliberately short, item questions intentionally addressed only one or two concepts within a section, and overly technical, abstract, or confusing vocabulary terms were either defined within the context of the item stem, explained in background information provided in the section introduction, or replaced with more common substitutes.

Necessary revisions also required consideration item formatting and the sufficiency of response choices. To easily quantify participant responses, and to maintain format consistency, a multiple choice format was maintained for all inventory items. Multiple choice items consisted of a stem and alternatives, including one answer and the rest distractors. Following guidelines for multiple choice item generation (Brame, 2013) the revised item stems were designed to be meaningful, contain only relevant material, and be written as a question or partial statement. To avoid constructions that might reduce validity and reliability, a revised bank of potential response alternatives was developed for each section of the instrument. These alternatives were selected to be reflective of the contemporary occupational landscape outlined by the US Bureau of Labor Statistics, clearly and concisely stated, mutually exclusive, and free from clues or bias. All correct and distractor alternatives were pooled from the respective response banks. While five sections of the instrument were re-formatted to have four response alternatives for each item

(including the correct response), two sections were dichotomous, requiring only two response alternatives.

Some inventory sections also required consideration of visual literacy and digital technology during the item revision process. An image bank of jobs was created based proportionally on jobs listed by the United States Bureau of Labor Statistics for each of the sixteen career clusters. Images in the bank were procured by the researcher, obtained for use with permission by the researcher, or were sourced from public domains. Criteria for the new images included accurate representation of the work environment and the type of work conducted by the job holder, as well as equitable representation of age, gender, and ethnicity. Prerequisite components of the inventory (title, introduction, and directions) were subsequently revised to correspond to the item revisions and electronic survey administration. Mindful of the digital presentation format, item spacing and text font (size, color and style) were selected for ease of viewing on the computer screen. The number of items in each section was also updated to meet minimum requirements for data analysis.

New EA-CAI: Establishing Viability

Completion of initial revisions resulted in the development of the new Early Adolescent Career Awareness Inventory (EA-CAI) and procedures now focused on establishing relevancy, reliability, and validity. The process initiated with an iterative review by a panel of experts to provide correction of terminology, guidance on imagery, and instrument validation. The panel selection was guided by academic and experiential qualifications in the fields of both early adolescent and career and technical education to ensure instrument relevancy and reliability. As described in subsequent sections, review iterations facilitated content and construct validity and

established grounds for determining appropriateness of data derived from the modified Early

Adolescent Career Awareness Inventory, the EA-CAI.

Expert Panel Selection. An expert panel, as recommended by Fraenkel and Wallen

(2003), should be comprised of individuals who can logically and intelligently render judgement

on the adequacy of the instrument. The panel participants should have both content and context

knowledge relevant to judgement of the usage of the instrument by the intended participants (p.

91). Based on these guidelines, the researcher invited three participants to serve on a

content/construct panel.

The criteria for selection to the expert panel for this study included (1) holding a

doctorate in workforce development, a related STEM education field, or career and technical

education (CTE), (2) having a minimum of five years practical experience in education, and (3)

having outreach, engagement, or research experience with upper elementary school student

populations. The goal of the panel participation was consensus on instrument content and

format, which is demonstrated by inter-rater reliability. The panel was asked to provide feedback

on two trajectories: (1) correction of terminology and (2) content and construct validity. Each

panel participant was supplied with a cover letter, a copy of the modified instrument, and

guidelines for response format. On two separate occasions, panel members were asked to review

the electronic version of the EA-CAI instrument and provide responses within a two-week

window. Each stage of this process was followed by a period of iterative revisions to ensure

consensus on modifications.

Interrater Reliability. Interrater reliability is the measurement of consistency or

agreement between two or more observers or raters. These measurements can be calculated

using Cohen's or Fleiss' kappa. Cohen's kappa is used in situations where there are only two

raters, rendering it inappropriate for this study. To determine the strength of the reliability

coefficient among the expert panel raters, an analysis of interrater reliability was conducted using

Fleiss' kappa (Fleiss, 1971). This statistical analysis measures reliability of agreement for

categorical ratings on a fixed number of items by two or more raters, so it was well-suited to

responses from a three-member panel. In the Fleiss kappa formula, κ, is defined as:

$$\kappa = \frac{\bar{P} - \bar{P}_e}{1 - \bar{P}_e}$$

when $\bar{P} - \bar{P}_e$ represents the degree of agreement and $1 - \bar{P}_e$ represents the degree of agreement

above chance.

The formula provides a measurement indicating the consistency of ratings when a fixed

number of respondents assign numerical values to a set number of items. When κ = 1, the

measurement indicates the raters are in complete agreement. When κ ≤ 0, the measurement

indicates there is no agreement among the raters (beyond what would be normally be expected

by chance). The Fleiss kappa formula for determining inter-rater reliability was applied in the

first stages of this study (Phase 1: Correction of Terminology).

Phase 1: Correction of Terminology

Due to changes in career clusters, job titles, and work-related requisites, routines and

rewards occurring in the decades since the original instrument's development, the first phase of

the study focused on a correction of terminology. Terminology used on the original instrument

was either obsolete or had been adjusted to reflect contemporary trends and technologies. The

discrepancies in terminology would have been confusing to sixth graders. As a result, the

original instrument may not accurately measure career awareness of students. To remedy this

potential pitfall, the EA-CAI instrument reflected the career clusters, job titles, and work-related

terminology outlined by contemporary sources prior to administration with student participants.

Expert reviews were conducted to verify adherence of terminology to the contemporary parlance. Potentially problematic terms were identified during a preliminary review by select experts, and the expert panelists reviewed and corrected only those terms deemed problematic during Phase 1.

Expert Panel Review

The three members of the expert panel were provided with an electronic version of the modified EA-CAI instrument (Appendix A), guidelines for rubric response (Appendix B), and a scoring rubric with the potentially problematic terms highlighted for evaluation (Appendix C). The panel participants adhered to the following procedure: (a) review highlighted terms that were selected to replace obsolete or outdated terminology, (b) indicate whether the highlighted terms need or do not need modification, based on contemporary parlance, (c) provide suggestions of alternative terms on the rubric if necessary, and (d) return the rubric to the researcher within a two-week period of time. Phase 1 iterations were conducted to establish panel consensus, following which the researcher revised the EA-CAI instrument with the recommended retention, elimination, and modification of potentially problematic terms. The researcher then submitted the revised terminology rubric to the panel of experts for a final rating (Appendices E and F).

Establishing Instrument Validity

Instrument validity is a description of the degree to which the instrument measures what it is intended to measure. Therefore, assessing validity is a judgement based on the continuum of evidence that the instrument is producing valid results. Colton & Covert define validity as "the degree to which an instrument is representative of the topic and process being investigated" (2007, p. 68). The complete range of the topic, as identified by research literature and experts, should be addressed by the instrument. The goal of modifications to the EA-CAI was to establish

49

content and construct validity of the revised instrument as a tool for measuring the career awareness of early adolescent students.

Phase 2: Content and Construct Analysis Procedures

The EA-CAI instrument sought to modify the Career Awareness Inventory (CAI) instrument to be more reflective of contemporary career awareness features. Although the modifications to the seven test categories and respective items were believed to be appropriate, expert panel validation was necessary. A common process was used by the panel to evaluate the test items for content and construct validity. The expert panel received written instructions on performing content and construct analysis on the electronic version of the EA-CAI instrument (Appendix G). Instructions for completing the related rubric were prefaced by an operational definition of the EA-CAI instrument. Steps for completing the content and construct validation were completed concurrently, and consensus by the panel demonstrated that the EA-CAI instrument attained pre-administration content validity. Details of this process are described in the following sections.

Content and Construct Validity. According to Polit, Beck & Owen, "Content validity concerns the degree to which a scale has an appropriate sample of items to represent the construct of interest—that is, whether the domain of content for the construct is adequately represented by the items" (2007). Johnson and Christensen (2008, p. 152) outline a three-step process for content validation: (1) understand the construct being defined and measured, including how the items represent the content domain, (2) examine the content on the test instrument, and (3) use a deductive approach to determine whether or not the test represents the content domain. In this study, the panel was to identify the test items that operationalized the construct based on relevancy to the study focus.

50

The panel members were each provided with an operational definition of the EA-CAI instrument and a Content and Construct Validation Rubric (Appendix H). The rubric consisted of two questions about the test items, one to establish relevance to the intended participants and another to determine appropriateness to the operational definition. For each test item, the rater was asked to select a response of either "relevant" or "not relevant." For question responses of "not relevant," experts were asked to suggest removal or a replacement option.

To verify consensus of panel experts regarding interpretation of the construct "career awareness in early adolescents", a Content Validity Index (CVI) was employed. The CVI is considered a consensus estimate and is a widely used approach for calculating proportion of raters in agreement. It is similar to the kappa used for Interrater Reliability, although it lacks information about degree of agreement beyond chance. Unlike the kappa, the CVI captures only agreement about the high relevance of an item. The CVI provides item (I-CVI) and scale (S-CVI) level information and requires a dichotomous "relevant /non-relevant" response, rather than a scaled response. For the purpose of this study, guidelines suggest an I-CVI value of 1.00 when the number of panel experts is five or fewer (Lynn, 1986 in Polit et al., 2007).

Phase 3: Establishing Instrument Readability

Student respondents are required to read the EA-CAI instrument, even though it is presented electronically, so it was important to address the readability level of the test items. The Flesh-Kincaid assessment is designed to indicate the difficulty level of passage text. The Flesh-Kincaid grade level assessment is used extensively in education because it presents a score directly correlated to a grade level. The following formula is used to calculate this reading level:

$$0.39 \left(\frac{\text{total words}}{\text{total sentences}} \right) + 11.8 \left(\frac{\text{total syllables}}{\text{total words}} \right) - 15.59$$

Because the grade level score emphasizes sentence length over word length, it was appropriate for the test item application when career or job titles may have otherwise been deemed a higher readability level. This formula is automatically calculated by the Microsoft Word processor, so it was used to assess test items generated or modified prior to the Reliability and Content Validity evaluations and modifications set forth by the expert panel. The maximum reading grade-level of the EA-CAI indicated by the Flesh-Kincaid Grade-Level assessment was originally 5.1, equivalent to a fifth grade reading level. Subsequently, changes to the instrument required a review of degree of compatibility to readability at the grade six level. Any passages of text that reflected a higher grade level necessitated a revision to meet the grade six standard.

Data Collection Procedures

Once it was determined that the EA-CAI contained appropriate terminology, was content and construct valid, and was assessed to be at an appropriate reading level for grade six students, the instrument was prepared for administration. To ease the transfer of data to SPSS data analysis software, the inventory instrument was converted to a digital format using Survey Monkey online software. This software accommodated both the images and the multiple-choice format of the inventory items. It also provided log-in capability for individual student participants in remote learning settings.

Colton and Colvert recommend pretesting at multiple stages of instrument development (2007, p. 129). To mimic the conditions and environment of a full-scale administration, a small-scale field test was deemed the most appropriate method of pretest. Field testing allowed the researcher to make observations and obtain feedback from a small group of raters to test item revisions (syntax, technology mechanisms) and estimate completion time. Guidelines for the raters, a random sample of two early adolescent students, were consistent with those developed

for the full-scale administration of the EA-CAI instrument. Sections were completed

independently and in sequential order. Following completion of the instrument, section

completion times were recorded for each rater (Table 3), and a total completion time of under

sixty minutes was estimated.

Table 3.

EA-CAI Field Test Completion Times

Section	Field Test Completion Time (minutes)	
	Rater 1	Rater 2
1	5	6
2	3	4
3	4	11
4	2	2
5	5	4
6	3	2
7	1	2
TOTAL	23	31

EA-CAI Administration

Research procedures were conducted using the participating school's secure Learning

Management System (LMS). As shown in Figure 2, the researcher presented all video and

written media within an LMS module. The module was divided into two parts: Recruitment

(Invitation to Participate) and Administration (EA-CAI Survey Instructions). Participants used

their school-issued Chromebook device to access the Recruitment part of the module.

Figure 2.

LMS Research Module
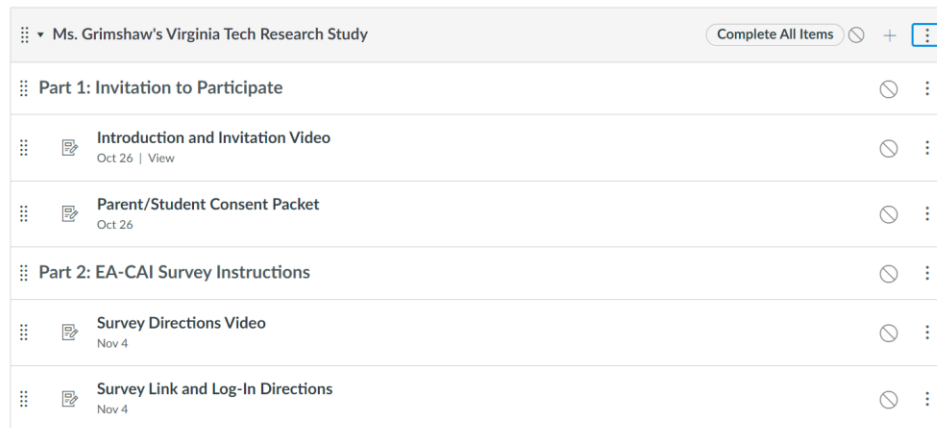
Fidelity to sequential viewing of the related media publications within Parts 1 and 2 of the module was maintained using a module setting. All documents were digitally distributed, signed, or submitted using the secure LMS on the student's school-issued Chromebook device. Access to Part 2 of the module was limited by the researcher. Only those participants who submitted prerequisite Consent/Assent documents were able to view and access Part 2 of the module. The study procedures were as follows:

1. Recruitment: The researcher presented scripted information about the research study, and an invitation to participate, in a pre-recorded video message which was distributed to grade six students using the secure LMS (Appendix K).

2. Consent: Digital Parent Consent and Student Assent packets were distributed electronically to each grade six student using the school's LMS (Appendices L, M, and N).

   a. Parents and students reviewed the packet documents in the privacy of their homes and made their decisions about participation in the study.

b. Those wishing to participate returned the signed Consent and Assent forms to the researcher electronically.

3. Survey Administration: The researcher scheduled the survey administration window to be conducted following the due date for Consent and Assent form returns. The researcher administered a one-time, 1-hour survey through the secure online (web-based) survey development site.

    a. The researcher presented scripted administration directions, in a pre-recorded video message, which was distributed to participants using the secure LMS (Appendix O).

    b. The researcher presented written directions for accessing the EA-CAI survey using a link and password (Appendix P).

    c. Student participants completed the online EA-CAI survey in the privacy of their homes.

4. Data Collection: The researcher collected data (multiple choice responses) via download from the secure online survey.

The data collection process was initiated in late October, however early participation was limited due to the impacts of the Covid-19 pandemic on the school community. Since prizes have been shown to improve low survey response rates, the researcher obtained IRB approval to include an incentive for participation in the research study. As a means of increasing student participation, all participating students were entered into a random drawing. Eleven participants were randomly selected to receive a $20 Walmart gift card, an appropriate incentive for sixth grade students. Participants had at least a 1 in 30 chance of being selected. By including this gift card incentive, an increase in student participation was anticipated.

Because no identifiable information was collected on the EA-CAI survey, all students who completed and submitted the parent Consent and student Assent forms were automatically entered in the drawing. The list of password-protected student names was sent to the principal. A separate email with the password to unlock the Excel document was also sent to the principal. The school principal was the only other person to know the names of the selected drawing participants, along with their mailing addresses. Procedures for the incentive drawing were as follows:

1. The researcher informed the parents and students of the incentive in the recruitment announcements (packet cover letter), and both the parent consent and student assent documents.

2. The researcher entered eligible participant names into the ABCYA Random Name Picker (https://www.abcya.com/games/random_name_picker) and clicked "spin." The researcher clicked the spin button eleven times to randomly select the eleven incentive recipients and recorded those names on a password protected Excel document.

3. The researcher sent the school principal the "Incentive Drawing Distribution Procedures" via email, explaining how to distribute the selection notification letter and eleven gift cards. The email also contained the password protected Excel document of the listed eleven randomly selected participant names and the template for the selection notification letters (Appendix Q).

4. The researcher sent the eleven $20 Walmart gift cards to the principal through the inter-office mail.

5. The researcher sent an email to the principal containing the password to unlock the Excel document listing the names of the eleven participants randomly selected in the incentive drawing (Appendix R).

6. The principal sent each selected drawing recipient one gift card and one drawing selection letter to their home mailing address (Appendix S).

7. The principal sent a confirmation email to the researcher when the incentives were mailed to each of the eleven recipients and the list of incentive recipient names was deleted.

Following IRB approval of the incentive drawing (Appendix J), the data collection process resumed in January, and the web-based Early Adolescent Career Awareness Inventory (EA-CAI) survey was administered online using the Survey Monkey platform until the first week of March. Survey responses were recorded, kept confidential, and saved directly to the researcher's password protected account. Data was transferred electronically, using the researcher's password protected computer, for data download and analysis using SPSS software.

<div align="center">**Data Analysis**</div>

Item and factor analysis was conducted using the data downloaded as a single composite SPSS file. "The main purpose of item analysis is to improve tests by revising or eliminating ineffective items" (Boopathiraj & Chellamani, 2013). One index that can influence the selection of items for the final draft of an instrument is Item Difficulty.

Item Difficulty is the proportion of participants that answered an item correctly, a value that ranges from 0 to 1.0. This mean statistic identifies the difficulty level of items, with optimum values being closest to 0.50. "Generally, items of moderate difficulty are to be preferred to those which are much easier or much harder" (Boopathiraj & Chellamani, 2013).

Items with p-values above .90 are considered too easy and those with p-values below 0.20 are considered too difficult. Item Difficulty for inventory items on the EA-CAI was determined using the mean statistic values.

Item analysis can also estimate the reliability of responses within the instrument, otherwise known as internal consistency reliability. This can be measured using Cronbach's alpha, a statistical quantification that establishes the degree to which items on an instrument are assessing a common underlying construct. A reliability value between 0.7 and 0.8 is considered acceptable, between 0.8 and 0.9 is considered good, and between 0.9 and 1.0 is considered excellent. As noted by Colton and Colvert, an alpha below 0.70 indicates that item may not be "tapping into the construct" (2007, p. 265), justifying further revision to the instrument.

As noted by Colton & Covert (2007, p. 72), a primary approach for demonstrating validity is item analysis. This involves demonstrating relationships between all possible pairings of individual test items, as well as comparing correlations between individual items with the correlation for all of the items. When data shows that the correlations are strong, the researcher knows that the test items are measuring the underlying construct(s).

Another approach for demonstrating validity is conducting exploratory factor analysis. This approach also "uses correlations to identify common factors that influence a set of measures and individual factors that are unique to each item" (Colton & Colvert, 2007, p. 72). Common factors are reflected by underlying constructs, so strong correlations demonstrate that items are suitable measures for the intended constructs. The factor analysis further determines whether a test is unidimensional (measures a single construct) or multidimensional (measures several constructs).

Phase 4: Reliability and Exploratory Factor Analysis Procedures

The reliability and exploratory factor analysis for the collected data in this study was run on an SPSS statistical software program to determine the measure of internal consistency, the nature of the constructs underlying the data, and to inform the data reduction process. Item analysis was conducted by evaluating the number correct for each test item. SPSS data analysis software was used to conduct the frequency analysis to identify central tendencies. Reliability was established using Cronbach's alpha formula:

$$\alpha = \frac{N \cdot \bar{c}}{\bar{v} + (N-1) \cdot \bar{c}}$$

Where:

N = the number of items.
$\bar{c}$ = average covariance between item-pairs.
$\bar{v}$ = average variance.

Exploratory factor analysis is a statistical technique used to explore the underlying structure of the construct. A parallel analysis determines the number of factors to retain. In this study, a principal axis factor analysis with a pro-max rotation determined the least number of factors that accounted for the variance of the data set variables. A factor loading of 0.50 or greater is considered statistically significant. During factor analysis, a scree test was performed to determine how many factors should be retained. The method for determining the number of smaller factors to exclude was based on Kaiser's criterion, which selects out factors having an eigen value less than one. An eigen value greater than one determined factors for retention for the EA-CAI instrument.

Determining Career Awareness

The EA-CAI was designed to measure several components or dimensions of the construct "career awareness." Following administration, statistical analysis was used to identify the career awareness indicators for sixth grade students, and for examining the internal structure of the instrument to make sure that each respective set of items measured the separate dimensions. Based on the results, instrument refinements were made. Some items were retained, while others were modified or extracted. The result was an EA-CAI instrument that demonstrated reasonable content and construct validity and reliability.

In general, once test categories and test items are retained or removed following factor analysis, data results for the wholly modified instrument can be analyzed to determine a range of career awareness for the study participants. Taking into consideration both frequency and percentage figures, the researcher can establish a test score scale for the instrument. Using a stanine method for examining raw scores in terms of correct answers for the subtests, the mean and standard deviation for a scale can be determined. Total test characteristics for the original Fadale CAI instrument are presented in Table 4. Stanines for the Fadale CAI Instrument are illustrated in Table 5.

Table 4.

Total Test Characteristics

	Fadale's (1973) Career Awareness Inventory
MEAN	69.63
MEDIAN	71.5
STANDARD ERROR OF MEASUREMENT	2.7
TOTAL POSSIBLE SCORE	125

Table 5

Stanines for the Total Awareness Test

STANINES	Fadale's (1973) Career Awareness Inventory: Raw Score Range
9	90-125
8	85-89
7	80-84
6	75-79
5	67-74
4	60-66
3	55-59
2	45-54
1	0-44

CHAPTER FOUR: DATA ANALYSIS AND FINDINGS

The purpose of this research study was to modify and validate an instrument to assess the career awareness of early adolescent learners. Building on the conceptual framework of the Fadale Career Awareness Inventory (CAI) instrument, a new Early Adolescent – Career Awareness Inventory (EA-CAI) instrument was developed that mirrored today's contemporary career landscape utilizing contemporary instrument development processes and technologies. The resulting instrument was subsequently reviewed and analyzed to establish viability. Findings generated based on the analysis of data collected are presented in the following sections sequentially in response to each of the research questions/sub-questions guiding this study.

Findings

RQ1: To what extent is the EA-CAI instrument a valid tool to assess early adolescent students' career awareness?

Four phases of data collection and analysis were conducted to address Research Question 1 (RQ1). During Phase 1 (Correction of Terminology) a panel of experts reviewed and modified problematic terms and phrases used in the new EA-CAI instrument. The same panel of experts was also used in establishing the preliminary validity of the EA-CAI in Phase 2 (Establishing Content and Construct Validity). For both Phase 1 and Phase 2, panelists served as instrument raters engaged in several reviews and arbitration sessions to establish interrater reliability based on achieving and acceptable level of consensus. Phase 3 (Establishing Instrument Readability) established an overall readability level for the instrument. Data collected during preliminary instrument administration were used to determine the level of reliability of the instrument in Phase 4 (Establishing Instrument Reliability). Item and Factor Analysis results further addressed

Research Question 2 (RQ2) by assessing the career awareness of early adolescent learners. The findings from each phase are presented in the following four sections.

Phase 1: Correction of Terminology

The EA-CAI was reviewed by a panel of qualified experts, who found 16 instances of potentially problematic terminology. One term used in the directions portion of the instrument was questionable primarily due to its nuanced definition, ten were terms that described specific job titles, and five were phrases used in item alternates. Three interraters reviewed these highlighted terms using the same rubric provided by the researcher (Appendix C), whereby they indicated whether the terms were appropriate and therefore could be maintained, or if they needed modification. When a rater indicated modification was needed, they were subsequently asked to provide a suitable replacement for the term(s). Table 6 shows a portion of the rubric presented to the expert panel, as well as a sample of their responses and suggested modifications.

Table 6

Rubric Sample: Summary of Initial Expert Panel Correction of Terminology Reponses

Part #	Item #	Question Word or Concept	Reviewer #	Modifications Needed Y / N	Suggested Modifications of Terminology
1	Directions	Directions: Jobs can be organized into "clusters" based on what they have in common. For each test item, four jobs are listed. Only one job matches the career cluster named. Choose the letter of the job that belongs in the career cluster named. SAMPLE: 1A. Cluster: Education & Training A. nurse B. teacher C. truck driver D. lawyer If you selected letter B, teacher, you are correct. Point the cursor to the letter B for item 1A and click to select. For these 16 survey items, select the job that matches the career cluster named.	Rater 1 Rater 2 Rater 3	N N Y	2: Jobs-Career-Occupation!! Your inventory name is including the "Career". But in your inventory, "job" and "career" were included. I think it's okay but just consider making them consistent. Just opinion. Your current version is understandable. 3: Career, career
1	1	1. Cluster: Agriculture, Food & Natural Resources A. pharmacist B. bank teller C. college professor D. park ranger	Rater 1 Rater 2 Rater 3	N N N	

In the first review of the instrument panelists did not reach full agreement on which terminology

needed corrections (Appendix D). As displayed in Table 7, 100% agreement was reached on five

items (#1 Section1, #4, #9 and #34 Section 3, and #13 Section 7) needing no further

modification, and eleven items needing modification having only achieved 66% agreement.

Table 7

Consensus for Initial Expert Panel Correction of Terminology Review

Section #	Item #	Rater 1	Rater 2	Rater 3	#/3	% Agreement
1	Directions	1	1	0	2/3	66
1	1	1	1	1	3/3	100
1	3	1	1	0	2/3	66
1	7	1	1	0	2/3	66
1	8	1	1	0	2/3	66
1	10	1	1	0	2/3	66
1	13	1	1	0	2/3	66
3	4	1	1	1	3/3	100
3	9	1	1	1	3/3	100
3	34	1	1	1	3/3	100
3	49	1	1	0	2/3	66
5	1	1	1	0	2/3	66
5	4	1	1	0	2/3	66
5	10	1	1	0	2/3	66
5	14	1	1	0	2/3	66
7	13	1	1	1	3/3	100

Note: A 1 indicates no modifications recommended, and a 0 indicates modifications recommended

For all items not having reached full consensus, the responses and suggested modifications

provided by the experts were analyzed and synthesized to generate modified terms. Modified

terms were compiled and re-presented to panelists for review using the rubric provided

(Appendix F). Panelists were required to give their rationale for the modification(s), or the

decision(s) to maintain the original terminology in the fifth column of the rubric. Table 8 shows

a sample of the final rubric used by raters in the second iteration of Correction of Terminology.

Table 8

Correction of Terminology Final Review Rubric for Interraters

Directions: Review the modifications and rationale for changing or retaining terms below. Additional information about the modification process has also been included on the subsequent pages of this document for reference purposes. Indicate your degree of acceptance of the modifications to terms in each item, in Column 1 of the table, with a Y for "yes" or N for "no."

Table: Phase 1-Correction of Terminology

Modifications Acceptable? Y / N	Part #/ Item #	Question Word or Concept	Suggested Modifications of Terminology	Modified or Maintained Item
	1/Directions	Directions: Jobs can be organized into "clusters" based on what they have in common. For each test item, four jobs are listed. Only one job matches the career cluster named. Choose the letter of the job that belongs in the career cluster named. SAMPLE: 1A. Cluster: Education & Training A. nurse B. teacher C. truck driver D. lawyer If you selected letter B, teacher, you are correct. Point the cursor to the letter B for item 1A and click to select. For these 16 survey items, select the job that matches the career cluster named.	2: Jobs-Career-Occupation!! Your inventory name is including the "Career". But in your inventory, "job" and "career" were included. I think it's okay but just consider making them consistent. Just opinion. Your current version is understandable. 3: Career, career	Directions: Jobs can be organized into "career clusters" based on what they have in common. For each test item, four jobs are listed. Only one job matches the career cluster named. Choose the letter of the job that belongs in the career cluster named. SAMPLE: 1A. Cluster: Careers in Education E. nurse F. teacher G. truck driver H. lawyer If you selected letter B, teacher, you are correct. Point the cursor to the letter B for item 1A and click to select. For these 16 survey items, select the job that matches the career cluster named. Rationale:

Table 8 (cont'd)

Correction of Terminology Final Review Rubric for Interraters

				Career Clusters (www.careertech.org/Career-Clusters) are used as the organizing framework for the grouping of related jobs in the EA-CAI directions and items because they are commonly used by CTE, Guidance, and other department practitioners within school settings. The term "career" will be added to "cluster" in Part 1 of the instrument, to clarify this foundational meaning. While the terms "job," "occupation," and "career," are often used interchangeably, their definitions are, in fact, nuanced (see definitions provided). The term "career" has a broad definition, respective of a field of employment opportunity (Example: Agriculture). "Occupation" refers to the line of work a person does within a career field (Example: Farming). "Job" describes a position of employment specific to the work being done within an occupation (Example: farmer). Use of the term "job" will be maintained in this instrument, rather than modified, when referencing the remunerative position of the worker.

Interrater Reliability. The Fleiss kappa is an acceptable and established method of determining interrater reliability when three or more raters provide categorical ratings for a set number of items. Fleiss' kappa ranges from 0 to 1, where 0 indicates no agreement and 1 indicates perfect agreement. Interrater reliability was established using Fleiss' kappa for the 16 potentially problematic terms to be included in the EA-CAI instrument. At the conclusion of the second interrater iteration (Table 9), the Fleiss' kappa analysis results (Table 10) indicated that all three raters were in 100% agreement ($\kappa = 1$) on the corrected terminology for these sections of the EA-CAI instrument.

Table 9

EA-CAI Correction of Terminology Interrater Reliability Agreement

Section #	Item #	Rater 1	Rater 2	Rater 3	k	% Agreement
1	Directions	1	1	1	1	100
1	1	1	1	1	1	100
1	3	1	1	1	1	100
1	7	1	1	1	1	100
1	8	1	1	1	1	100
1	10	1	1	1	1	100
1	13	1	1	1	1	100
3	4	1	1	1	1	100
3	9	1	1	1	1	100
3	34	1	1	1	1	100
3	49	1	1	1	1	100
5	1	1	1	1	1	100
5	4	1	1	1	1	100
5	10	1	1	1	1	100
5	14	1	1	1	1	100
7	13	1	1	1	1	100

Note: 1 indicates acceptance, 0 indicates rejection

Table 10

Interrater Reliability Kappa

Items	Acceptance	Rejection	Agreement *Pi*
1	3	0	1.0
2	3	0	1.0
3	3	0	1.0
4	3	0	1.0
5	3	0	1.0
6	3	0	1.0
7	3	0	1.0
8	3	0	1.0
9	3	0	1.0
10	3	0	1.0
11	3	0	1.0
12	3	0	1.0
13	3	0	1.0
14	3	0	1.0
15	3	0	1.0
16	3	0	1.0
Total	48	0	1.0
Pj	1	0	16.0

Note: Minimum score = 0 (Not Accepted), Maximum score = 1 (Accepted)

The Fleiss' kappa formula was used for calculations, as follows:

$$\kappa = \frac{P - Pe}{1 - \bar{P}e}$$

$$P_1 = \frac{3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3 + 3}{48} = 1$$

$$\bar{P} = \frac{1}{(16)}(16) = 1$$

$$\bar{P}_e = (1^2 + 1^2 + 1^2 + 1^2 + 1^2 + 1^2 + 1^2 + 1^2 + 1^2 + 1^2 + 1^2 + 1^2 + 1^2 + 1^2 + 1^2 + 1^2)/16$$

$$\bar{P}_e = 1$$

If raters are in complete agreement, as they were for Phase 1: Correction of Terminology, then κ = 1.

Phase 2: Establishing Content and Construct Validity

Research Question 1. Research Question 1 (RQ1), "To what extent is the EA-CAI instrument a valid tool to assess early adolescent students' career awareness?" was characterized by four sub-questions (SQ1, SQ2, SQ3, and SQ4). Phase 2 addressed both SQ1, "What level of content validity can be established in measuring career awareness in early adolescent learners?" and SQ2, "What level of construct validity can be established in measuring career awareness in early adolescent learners?" The same panel of experts who participated in Phase 1 were similarly tasked with rating the instrument to establish content and construct validity.

Content Validity. The three raters were provided with an operational definition of career awareness, including the targeted variables of careers and career awareness, before analyzing the 124 EA-CAI survey items to establish content validity (Appendix G). Each interrater reviewed and evaluated the wording of each instrument item and provided a rating based on its relevancy to the career content in the operational definition. Ratings were recorded with check marks on a rubric indicating whether the item wording was either a "Valid" or "Not Valid" representation of

career awareness content (Appendix H). Following completion of independent instrument

reviews, the mean was calculated for rater responses on each item of the instrument to determine

the item's content validity index (I-CVI).

Table 11

Summary of Ratings on the Content Validity of the EA-CAI Instrument

Section	Items	Rater 1	Rater 2	Rater 3	Number in Agreement	I-CVI
1	1-16	1	1	1	3	1.0
2	17-26	1	1	1	3	1.0
3	27-76	1	1	1	3	1.0
4	77-84	1	1	1	3	1.0
5	85-98	1	1	1	3	1.0
6	99-110	1	1	1	3	1.0
7	111-124	1	1	1	3	1.0

Note: 1 = items congruent and 0 = items not congruent with operational definition

Results (Table 11) showed the mean I-CVI was 1.0, indicating 100% agreement among raters

that the items were congruent with the operational definition of career awareness and valid in

addressing career content.

Construct Validity. Construct validity indicates the extent to which the construct is

measured by an assessment. The same process and rubric document used to determine content

validity was used to assess construct validity. Based on the same operational definition for career

awareness provided, panel experts reviewed the EA-CAI instrument to rate how well each item

aligned with the defined construct being measured. Ratings were recorded with check marks on a

rubric (Appendix H) indicating whether the item was a "Valid" or "Not Valid" measurement of

the career awareness construct. Initially one rater indicated that an item in the third section of the instrument required a modified image to be considered valid. Following this modification, the mean rater response was calculated for each item of the instrument to determine the item's content validity index (I-CVI).

Table 12

Summary of Ratings on the Construct Validity of the EA-CAI Instrument

Section	Items	Rater 1	Rater 2	Rater 3	Number in Agreement	I-CVI
1	1-16	1	1	1	3	1.0
2	17-26	1	1	1	3	1.0
3	27-76	1	1	1	3	1.0
4	77-84	1	1	1	3	1.0
5	85-98	1	1	1	3	1.0
6	99-110	1	1	1	3	1.0
7	111-124	1	1	1	3	1.0

Note: 1 = items congruent and 0 = items not congruent with operational definition

Results (Table 12) showed the mean I-CVI was 1.0, indicating 100% agreement among raters that the items were congruent with the operational definition of career awareness and were valid items in measuring career awareness.

Phase 3: Establishing Readability

Readability. Phase 3 addressed SQ3 of the research study, "How suitable is the readability level of the EA-CAI instrument for early adolescent learners at the sixth grade level?" Following the correction of terminology and having established content and construct validity, a Flesch-Kincaid Readability analysis was used to assess the readability levels for the EA-CAI

instrument. The Flesch-Kincaid Grade Level analysis was performed as an accepted measure of readability for the text contained in the instrument based on a United States school grade level. For example, a score of 6.0 means that a sixth grader can understand the document.

The readability level of the EA-CAI was assessed using the grade level calculator feature of Microsoft Word which uses the formula (.39 x ASL) + (11.8 x ASW) – 15.59 where ASL = average sentence length (number of words divided by number of sentences), and ASW = average number of syllables per word (number of syllables divided by number of words). Once the Reading Grade Level was established, the Flesch-Kincaid Reading Ease test was also performed. The Reading Ease score was calculated using the formula 206.835 – (1.015 x ASL) – (84.6 x ASW) where ASL = average sentence length (number of words divided by number of sentences), and ASW = average number of syllables per word (number of syllables divided by number of words). As shown in Table 13, the Flesch-Kincaid Reading Ease test, which rates on a 100-point scale, indicates the ease of understanding for the text at the established grade level. Readability statistics were calculated for each section of the entire instrument (Appendix T).

Table 13

Flesch-Kincaid Reading Ease Test Score Ratings

Flesch-Kincaid Reading Ease Test Score	Level of Reading Ease for Grade Level
0-30	very difficult
30-50	difficult
50-60	fairly difficult
60-70	plain English
70-80	fairly easy
80-90	easy
90-100	very easy

Based on the results, the EA-CAI instrument as a whole was determined to be at a reading grade level of 5.8 and had a reading ease score of 74.2, which is considered fairly easy for readers in the fifth and sixth grades. Section one had a higher reading level at 8.2, with a reading ease of only 54.6. These levels resulted from the career cluster and job names inherent to the section being at a higher level of reading difficulty. All other sections were between a 3.7 and 6.1 grade level and demonstrated a reading ease at or above 73, indicating that the instrument was generally at or below the reading level of the intended sixth grade audience.

Phase 4: Establishing Reliability

Reliability. Phase 4 of the research study addressed SQ4, "What level of reliability can be established in measuring early adolescent learners' career awareness?" Instrument reliability is demonstrated when responses consistently produce the same information over time. For this study, reliability measures were conducted following data collection.

Data collection was initiated with the invitation to 330 sixth grade students to participate in the study. Twenty-one percent (69 students) completed the consent process and 16% (51 students) completed the EA-CAI survey. The instrument was administered in an asynchronous online format. The Survey Monkey statistical analysis feature showed the average time spent completing the survey to be 23 minutes and 13 seconds. Survey responses from participating students who completed the EA-CAI were analyzed using the Statistical Program for the Social Sciences (SPSS) software. Data from section seven of the instrument was not analyzed because student responses were assumed to be correct for all questions. Reliability was determined using Chronbach's alpha for analysis of the total test instrument, and for each of the first six instrument sections. The Chronbach alpha reliability coefficient ranges between 0 and 1. George and Mallery (2003) provide the following rules of thumb for interpreting the reliability coefficient:

73

"_> .9 - Excellent, _> .8 - Good, _> .7 - Acceptable, _> .6 - Questionable, _> .5 - Poor, and _< .5

– Unacceptable" (p. 231).

Table 14

Reliability Statistics for the EA-CAI Instrument

	Chronbach's Alpha	Number of Items
Total Test	.948	110
Section 1	.780	16
Section 2	.872	10
Section 3	.859	50
Section 4	.782	8
Section 5	.774	14
Section 6	.410	12

Results of reliability analysis for the EA-CAI instrument (Table 14) indicate an excellent degree

of internal reliability for the total test, acceptable or good degrees of reliability for each of the

first five sections of the instrument, and poor reliability for the sixth section of the instrument.

Item analysis (Table 15) revealed that five questions in section six were too easy and two

questions were too difficult. The small number of items in this section resulted in a low

reliability coefficient.

Table 15

Item Statistics for EA-CAI Section 6

Item Statistics

	Mean	Std. Deviation	N
q0099	.00	.000	51
q0100	.20	.401	51
q0101	.98	.140	51
q0102	.94	.238	51
q0103	.92	.272	51
q0104	.75	.440	51
q0105	.63	.488	51
q0106	.92	.272	51
q0107	.98	.140	51
q0108	1.00	.000	51
q0109	1.00	.000	51
q0110	1.00	.000	51

Item analysis conducted during this phase revealed additional trends within the data. Mean statistics for items in sections one through six of the instrument were calculated using SPSS software (Appendix U). The level of item difficulty, or the proportion of the participants that answered an item correctly, was indicated by the mean statistic. Table 16 shows the number of items for each range of difficulty analyzed in this process.

Table 16

Level of Difficulty of EA-CAI Instrument Items

Item Difficulty	Mean Statistic Range	Number of Items
Easy	0 - .2	52
Moderately Difficult (Desired Range)	.2 - .9	56
Difficult	.9 – 1.0	2

Based on the results, 47% of the items were considered easy, 51% were considered moderately difficult, and 2% were considered difficult. As discussed with the reliability results for section six, items that are too difficult or too easy have limited contribution to instrument reliability. Eighteen items within the easy range were answered correctly by 100 % of the respondents. These items were maintained at this stage because they addressed content and/or constructs deemed critical for an accurate assessment of learners' career awareness.

Section seven of the instrument contained questions that solicited responses relating to individual participant life experiences which necessitated a different method of item analysis. Given section seven solicited responses unique to each participant, all responses were assumed to be 100% correct. As a result, reliability and correlation statistics could not be analyzed for these data. Alternatively, a frequency analysis was conducted (Table 17) to determine which jobs learners had more personal exposure to in their everyday lives.

Table 17

Section 7 Rank Order Responses for Job Familiarity

Item #	Career Cluster	Job Title	Percent of Participants Who Knew Job Holder
113	Transportation, Distribution & Logistics	bus driver	74.51%
117	Health Science	dentist	68.63%
120	Government & Public Administration	military officer	52.94%
121	Health Science	physician	50.98%
122	Architecture & Construction	plumber	33.33%
115	Education & Training	college professor	31.37%
111	Finance	accountant	23.53%
116	Marketing	customer service representative	21.57%
119	Arts, A/V Technology & Communications	graphic designer	21.57%
123	Business Management & Administration	purchasing agent	21.57%
124	Information Technology	web developer	15.69%
114	Human Services	claims adjuster	13.73%
112	Science, Technology, Engineering & Mathematics	aerospace engineer	9.80%
118	Agriculture, Food & Natural Resources	environmental scientist	7.84%

Based on the frequency analyses results, learners indicated they were most familiar with workers who held jobs in government and health care, and least familiar with workers who held jobs in Agriculture, Food & Naturals Resources and STEM related career fields. Learners

indicated they were equally familiar with people who performed three jobs: graphic designer, purchasing agent, and customer service representative. The Health Science career cluster was dually represented in this instrument section, ranking second overall when averaged together. Three career clusters lacked representation in this section: Hospitality & Tourism; Law, Public Safety, Correction & Security; and Manufacturing.

Item analysis, including mean statistics and frequency analysis, are part of a group of statistical measures that help determine the role of each item with respect to the whole instrument. Item analysis can help identify items that are inconsistent in measuring the underlying construct. These items can then be revised and retained, or they can be eliminated. Results of the reliability and item analysis statistical measures for the EA-CAI instrument survey data supported the assumption that the items retained were consistent and content/construct valid measures of the underlying construct, career awareness.

Establishing Validity

Validity. Validity of an instrument is said to be established when the instrument items are deemed good measures of the construct the instrument intends to assess. While the approach to item analysis conducted for this study is widely considered "a primary quantitative approach for demonstrating validity" (Colton & Covert, p. 72), factor analysis is another approach that enhances the demonstrated validity of the instrument. Factor analysis is based on the correlation matrix and correlations usually need a large sample size before they stabilize.

Analysis of the instrument by the panel of experts during Phase 2 demonstrated the EA-CAI to be a content and construct valid instrument. To strengthen the level of instrument validity, a factor analysis of the data was attempted. The data were submitted to the principal axis factor analysis with the oblique promax rotation in SPSS. Eigen values greater than one

were the criteria for retaining a factor and individual items with loadings greater than .6 were deemed to be salient based on the sample size of 51. When the items were submitted to SPSS, an error message was generated: "There are fewer than two cases, at least one of the variables has zero variance, there is only one variable in the analysis, or correlation coefficients could not be computed for all pairs of variables. No further statistics will be computed." This error message indicated that the correlations matrix was not suitable for the factor analysis given the relatively small sample size. The data were not stable enough or in the amount needed to conduct the factor analysis. Variance from all variables in a set of factors could not be determined and variance that might have occurred could not be explained. Moreover, because factor analysis could not be conducted, factors that might be influencing results were not fully established. Specifically, without factor loading results, instrument items could not be further analyzed for retention or extraction. Assessing the career awareness of early adolescent learners relied on examining the internal structure of the instrument to ensure that each respective set of items measured the separate dimensions. Based on the results of the attempted factor analysis, final instrument refinement could not be made.

RQ2: Given the EA-CAI instrument is deemed valid, what is the career awareness of early adolescent learners?

To the extent the expert panel engaged in content and construct validity assessment of the instrument items, the data revealed an acceptable level of instrument validity was established through this study.

Instrument Scoring and Reporting

Having established a level of validity for the instrument, descriptive statistics were used to determine the mean statistic for the total test and each respective section (Appendix V). The

minimum items answered correctly by a participant on the EA-CAI was 70 and the maximum

was 120. The descriptive statistics mean score for the total instrument highlighted in Table 18

indicated that participants correctly answered an average of 108 of 124 items (87%) correctly.

The EA-CAI total test mean (108.31) and median (115) were significantly higher than the mean

(69.63) and median (71.5) for the original CAI instrument, which was administered to students in

grades four to six.

Table 18

Descriptive Statistics for the Total EA-CAI Instrument

		S1	S2	S3	S4	S5	S6	S7	Total
N	Valid	51	51	51	51	51	51	51	51
	Missing	0	0	0	0	0	0	0	0
Mean		13.2157	8.3333	44.2745	7.0196	12.1569	9.3137	14.0000	108.3137
Std. Error of Mean		.39039	.33801	.69962	.23007	.30980	.16207	.00000	1.82756
Median		14.0000	9.0000	46.0000	8.0000	13.0000	10.0000	14.0000	115.0000
Mode		14.00	10.00	46.00	8.00	13.00	10.00	14.00	117.00
Std. Deviation		2.78793	2.41385	4.99631	1.64305	2.21244	1.15741	.00000	13.05142
Variance		7.773	5.827	24.963	2.700	4.895	1.340	.000	170.340
Range		12.00	9.00	19.00	5.00	9.00	4.00	.00	50.00
Minimum		4.00	1.00	30.00	3.00	5.00	7.00	14.00	70.00
Maximum		16.00	10.00	49.00	8.00	14.00	11.00	14.00	120.00
Percentiles	25	13.0000	7.0000	41.0000	6.0000	12.0000	8.0000	14.0000	103.0000
	50	14.0000	9.0000	46.0000	8.0000	13.0000	10.0000	14.0000	115.0000
	75	15.0000	10.0000	48.0000	8.0000	13.0000	10.0000	14.0000	117.0000

The standard errors for the EA-CAI instrument were small, indicating the data was representative

of the means. In comparison, the total instrument standard error for the EA-CAI (1.8) was less

than the standard error for the CAI (2.7).

Summary of Findings

Findings from the analyses of data collected in preparation of, and from, the online

version of the EA-CAI survey, as administered to sixth grade students, were presented in Chapter

4 to address RQ1 and RQ2. The analyses performed demonstrated there was an acceptable level

of instrument validation reached as a result of expert panelists' interrater reviews and through

additional item analysis. Conclusions, implications, and recommendations for further study are

presented and discussed in Chapter Five.

CHAPTER FIVE: CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

This chapter present the conclusions, implications, and recommendations derived from the research. The conclusions discussed in this chapter are based on the findings and analyses from the previous chapter and focus on answering the two research questions guiding this study. Implications resulting from these findings and the conclusions drawn are presented for future research and practice, followed by recommendations to apply these findings to research and practice.

Conclusions

From the findings presented in Chapter Four, it can be concluded that the newly developed EA-CAI instrument provides a valid assessment of the career awareness of early adolescent learners. While not generalizable to a larger population, the demographics from this study show that the EA-CAI instrument is a viable tool for measuring career awareness of early adolescent learners. Further detailed conclusions regarding the viability of the new EA-CAI instrument are explained in greater detail according to the two main research questions.

Research Question 1: Instrument Modification Conclusions

The first overarching research question directing this study was "To what extent is the EA-CAI instrument a valid tool to assess early adolescent students' career awareness?" and was answered through analysis of data collected through four research study phases. What follows are detailed explanations of the conclusions drawn from these analyses.

Phase 1 Conclusions

This study used the conceptual framework of Fadale's CAI instrument as a starting point for developing the new EA-CAI instrument. Given that nearly half a century had elapsed since the creation of the CAI, updates to the language of the instrument were necessary. Phase 1

yielded analysis of the terminology by an expert panel. Correction of Terminology data showed an interrater reliability kappa statistic of 1, indicating perfect agreement on the modifications to terminology and consensus that the resulting terminology used in the EA-CAI instrument was correct and current.

Phase 2 Conclusions

The updated terminology from Phase 1 was used during further analysis in Phase 2. The same panel of experts used a common process to evaluate the instrument items for content and construct validity. The I-CVI value of 1 showed that interraters were in 100% agreement that the newly developed EA-CAI items were aligned with the operational definitions for careers and career awareness. The instrument was found to be both content and construct valid.

Phase 3 Conclusions

Readability of the new EA-CAI instrument was assessed in Phase 3 using the Flesch-Kincaid Reading Grade Level and Reading Ease scoring formulas. Scores indicated that the total instrument was at a 5.8 reading level, which was slightly lower than the expected reading level of a sixth grader in the United States. Additionally, the reading ease score of 74.2 for the total instrument demonstrated that the text would be fairly easy for a fifth or sixth grader. Scores for both assessments combined to show that the instrument as a whole is suitable for early adolescent learners at the fifth and sixth grade reading levels.

Phase 4 Conclusions

Establishing reliability of the newly developed EA-CAI to assess the career awareness of early adolescent learners required administration of the instrument to participating grade six students. The instrument survey was completed online, and the administration was not proctored due to Covid-19 restrictions. Of the 69 participating sixth grade students, 51 survey responses

83

were completed. The typical time spent on the survey by individual participants was 23 minutes and 13 seconds, which was consistent with the field test conducted prior to administration. The data provided by the completed surveys was used in determining the internal consistency of the 110 items contained in the first six sections of the instrument. When data were analyzed, the alpha coefficient of .948 for the total test indicated that the new EA-CAI instrument had an excellent overall reliability.

Item and Frequency Analysis Conclusions

Item analysis based on mean statistics was used to determine Item Difficulty for the first six sections of the instrument. Results indicated that all but two items were either moderately difficult or easy for survey participants. Section seven responses were analyzed using a frequency analysis. Overall results indicated a high degree of familiarity with jobs that are typically more visible or accessible to the early adolescent learner (bus driver, dentist, military officer, and physician), and a significantly limited familiarity with those jobs less visible or accessible to these learners (aerospace engineer and environmental scientist).

Validity Conclusions

Factor analysis results showed that a correlations matrix could not be generated for the data based on the small sample size. The ability to make final refinements to the instrument were limited because factor analysis did not yield the factor loadings necessary for decisions on item retention or extraction. Validity demonstrated by the expert panel analysis in Phase 2 could not be enhanced by results of factor analysis.

Research Question 2: Career Awareness Conclusions

The second overarching research question guiding this study was "Given the EA-CAI instrument is deemed valid, what is the career awareness of early adolescent learners? Research Question 2 (RQ2) was answered through the synthesis of participant responses on the EA-CAI survey, and what follows are detailed descriptions about the conclusions drawn from these analyses.

Instrument Section Conclusions

Survey results showed that participants were able to demonstrate all assessed aspects of career awareness at some level. Based on descriptive statistical analysis, participants could, at minimal or greater levels, categorize occupations by career clusters, identify occupations that required a college education, identify occupations from a picture, categorize occupations as service- or product- oriented, identify related job activities and work conditions, and identify pay and prestige. Participants also demonstrated having familiarity with workers who hold a variety of jobs. Based on results it can be concluded that the new EA-CAI could accurately assess the career awareness of early adolescent learners.

Instrument Scoring and Reporting Conclusions

The total instrument descriptive statistical analysis revealed a mean score of 108. Calculating scaling scores using the ranking and splitting algorithm for developing stanines begins with knowing the mean statistic for the total instrument. The total test mean value in this study was based on results prior to item retention and extractions that typically follows factor analysis. Consequently, stanines for scoring and reporting the instrument results were not generated in this study.

Summary of Conclusions

Conclusions drawn from the processes of developing and administering the EA-CAI instrument are as follows:

Results from the research showed the EA-CAI instrument demonstrated correct terminology, content/construct validity, readability, and reliability when administered to the target audience. Therefore, the research concludes that the EA-CAI instrument, as administered asynchronously online, is deemed a viable tool for measuring career awareness of early adolescent learners. Research results also showed students could demonstrate aspects of career awareness in response to instrument sections and items, and therefore concluded that early adolescent learners' career awareness can be measured by the new EA-CAI. Furthermore, study results indicated that different levels of career awareness exist, and a composite stanine score for this instrument can be reflective of learners' career awareness on a continuum. These conclusions provide the basis for implications regarding EA-CAI refinements and future use, as presented in the following section.

Implications

The conclusions reached in this study have specific implications for the newly developed EA-CAI instrument's readability, reliability, validity, administration and scoring, and classroom utility. Implications that build upon these variables are explained in this section:

Instrument Readability

Like its predecessor, the new EA-CAI instrument was designed for the early adolescent learner. The conclusions drawn in this study support the use of the instrument in the upper elementary grade bands based on the established readability level and ease for grades five and six. Future refinements and modifications to the instrument to reflect contemporary career cluster

and workforce trends would necessitate a re-evaluation of reading level and reading ease. If the reading level is of concern for specific student demographics, or if the instrument is to be used to assess the developing career awareness levels of a younger audience, additional supports and modifications would be necessary.

Reliability

While the results of the EA-CAI instrument as a whole demonstrated excellent reliability, these results were influenced by a variety of factors. As Colten and Covert explain, "if the instrument is reliable, *an observer or respondent should interpret the meaning of items the same way each time it is administered*" (2007, p. 74). The findings of this study were based on data gathered through asynchronous online administration of the instrument to a rather small sample of the population. "When a test is administered, aspects related to the test construction itself, the student, graders, and various circumstances surrounding its administration could cause the results to be inconsistent" (Slavin, 2012 in Arnold, 2012, p. 190). Given the administration protocols for this study were impacted by the Covid-19 pandemic, it is difficult to gauge the influences that may have played a role in the results. Online administration of the new EA-CAI with a larger sample size, in a proctored setting, could increase the reliability of the results.

Validity

An important consideration in instrument development is validity. To support the meaningful and appropriate inferences that might be drawn from results of an instrument, ample evidence must be gathered to establish the instrument's validity. Factor analysis should be conducted using data collected by the newly developed EA-CAI survey instrument, to increase the instrument's validity. By identifying items that are representative of relevant factors, and by extracting those that are not representative, the level of validity of the instrument would be

enhanced. Based on the large number of items on the EA-CAI instrument, a larger sample size of 200-1000 participants would be necessary to perform a factor analysis.

EA-CAI Instrument Utility in Educational Settings

The purpose of this study was to develop an instrument that aligns with contemporary contexts and constructs for measuring the career awareness of early adolescent learners. The EA-CAI instrument reflects the current landscape of career development education and the career clusters and pathways apparent in today's workplace. The new EA-CAI has also demonstrated it can effectively measure early adolescents learners' career awareness. Implications are that the new EA-CAI instrument could, if used to assess student levels of career awareness prior to eighth grade, identify weaknesses that could be remedied by tailored career development programming for early adolescent learners prior to circumscription of potential career choices.

Although this study established the viability of the newly developed EA-CAI instrument, without a means for scoring and reporting results, the instrument lacks a level of utility in educational settings. The statistical mean for the total test can be used to develop a stanine scale for reporting results. Stanine is a method of scaling assessment results by placing student performance on a standard nine-unit scale. The stanine scale, which has a mean of five and a standard deviation of two, is developed using an algorithm involving ranking and splitting the scores. This method was used in developing a stanine reporting scale for the original CAI instrument and could be similarly used to develop stanines for the EA-CAI once all final refinements have been made to the instrument following factor analysis.

Recommendations are given in the next section to guide researchers and practitioners in addressing these implications.

Recommendations for Further Research

Based on the implications of this study, the following actions are recommended for researchers, elementary educators, school administrators, and guidance and career counselors, to improve the career development continuum of early adolescent learners.

A proctor manual should be developed to provide guidance on administering the new EA-CAI online instrument in synchronous and asynchronous virtual and in-person educational settings. Additional research should be conducted by administering the new EA-CAI instrument to a minimum of 200 fifth and/or sixth grade participants. Data collected in the research should be used to conduct a factor analysis. Factor loadings should be used to determine items to maintain or extract from the instrument. Following instrument refinements, readability and reliability should be re-established for the instrument.

Once the instrument is finalized, descriptive statistics should be used to generate a total instrument statistical mean. This mean should be used to develop stanines and related reporting documents for the instrument, to allow educators to obtain a sense of an early adolescent learner's level of career awareness in comparison with other groups of students. Guidance on scoring and reporting results should be developed for dissemination to administering practitioners. The scoring and reporting document should include suggestions for addressing identified early adolescent learners' weaknesses in demonstrated career awareness within the elementary education setting.

Educators should regularly assess early adolescent learners' levels of career awareness during the fifth or sixth grade years of elementary school using the newly developed EA-CAI instrument survey. Results of the assessment should illuminate and guide practitioners on how best to address the career development needs of any students who demonstrate low levels of

career awareness prior to the end of elementary school. Composite results should also guide administrators and career development specialists within the school district on aspects of career awareness that should be addressed and reinforced. This is necessary in order to minimize learners' premature conscription of potential careers and to simultaneously support students' preparation for career aspirations within the framework of the career development continuum.

REFERENCES

American School Counselor Association (2014). *Mindsets and behaviors for student success: K-12 college- and career-readiness standards for every student*. Alexandria, VA: Author.

Arnold, S. D. (2012). Assessing student learning online: Overcoming reliability issues. IADIS International Conference on Cognition and Exploratory Learning in Digital Age (CELDA 2012). Retrieved from files.eric.ed.gov/fulltext/ED542719.pdf

Arterbury, E., Collie, J., Jones, D., & Morrell, J. (1976). *The efficacy of career counselor education: Career awareness*. National Advisory Council for Career Education.

Arulmani, G, Bakshi, A. J., Leong, F. T. L., & Watts, A. G. (2014). The manifestation of career: Introduction and overview. In G. Arulmani et al. (Eds.) *Handbook of career development*, International and Cultural Psychology, DOI 10.1007/978-1-4614-9460-7_1, Springer Science + Business Media, LLC 2014.

Bailey, L. J., & Stadt, R. W. (1973). *Career education: New approaches to human development*. Bloomington, IL: McKnight Publishing Company.

Boopathiraj, C., & Chellamani, K. (2013). Analysis of test items on difficulty level and discrimination index in the test for research in education. *International Journal of Social Science & Interdisciplinary Research, 2*(2), pp. 189-193.

Brown, D. (2007). *Career information, career counseling, and career development*. Boston: Pearson.

Brown, D. (Ed.). (2002). *Career choice and development*. San Francisco, CA: Jossey-Bass.

Career Education Incentive Act. (1977). Public Law 95-207. 95th Congress. Retrieved from https://www.congress.gov/bill/95th-congress/senate-bill/1627

Career Readiness Partner Council. (2012). Building blocks for change: What it means to be career ready. https://cte.careertech.org/sites/default/files/CRPC_4pager.pdf

Christensen, L. B., Johnson, B., & Turner, L. A. (2011). *Research methods, design, and analysis*. Allyn & Bacon.

Clark-Stewart, A., & Koch, J. B., (1983). *Children: Development through adolescence*. New York: John Wiley & Sons.

Cohen, C., Patterson, D. G.,Kovarik, D. N., Chowning, J. T. (Spring/Summer 2013). Fostering STEM career awareness: Emerging opportunities for teachers. *Washington State Kappan*.

Cole, C. (2011). *Connecting students to STEM careers: Social networking strategies*. (Chapter 2). International Society for Technology in Education (ISTE).

Colton, D., & Colvert, R. W. (2007). *Designing and constructing instruments for social research and evaluation*. San Francisco, CA: Jossey Bass.

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches*. Los Angeles: Sage Publications.

Deiulio, A. M., & Young, J. M. (1973). Career education in the elementary school. *The Phi Delta Kappan, 54*(6), 378-380.

Employment Projections staff. (2013). Overview of projections to 2022. *Monthly Labor Review*. Retrieved from http://www.jstor.org/stable/monthlylaborrev.2013.12.006

Engler, J. (2012, June 15). STEM education is the key to the U.S.'s economic future. *U. S. News and World Report Online.* Retrieved from http://www.usnews.com/opinion/articles/2012/06/15/stem-education-is-the-key-to-the-uss-economic-future

Erikson, E. H. (1963). *Childhood and society*. (2nd ed.). New York: Norton.

Fadale, L. M. (1973). *An instrument to determine career awareness*. New York State Education Department, Office of Occupational Education.

Fadale, L. M. (1973). *DEVELOPMENT OF AN INSTRUMENT TO DETERMINE CAREER AWARENESS* (Order No. 7406306). Available from ProQuest Dissertations & Theses Global. (302666426). Retrieved from http://ezproxy.lib.vt.edu:8080/login?url=http://search.proquest.com/docview/302666426 accountid=14826

Finch, C. R., & Mooney, M. (1997). *School-to-work opportunities in middle school: Concepts and issues.* Berkeley: National Center for Research in Vocational Education, University of California.

Furlong, A., Kasurinen, H., Biggart, A., & Sinisalo, P. (1998). The educational and occupational aspirations of young people in Scotland and Finland. *Young, 6*(4), pp. 2- 21.

George, D., & Mallery, P. (2003). SPSS for Windows step by step: A simple guide and reference. 11.0 update (4th ed.). Boston: Allyn & Bacon.

Giannantonio, C. M., & Hurley-Hanson, A. E. (2006). Applying image norms across Super's career development stages. *The Career Development Quarterly, 54*(4), 318-330.

Gibson, R. L. (1972). *Career development in the elementary school*. Columbus, OH: Charles E. Merrill Publishing Company.

Gillie, S., & Isenhour, M. G. (2003). *The educational, social, and economic value of Informed and Considered Career Decisions.* America's Career Resource Network Association (ACRNA). U. S. Department of Education.

Ginzberg, E. (1952). Toward a theory of occupational choice. *Occupations, 30*, 491-494.

Gottfredson, L. S. (1981). Circumscription and compromise: A developmental theory of occupational aspirations. *Journal of Counseling Psychology Monograph, 28*(6), 545-579.

Gottfredson, L. S. (2002). Gottfredson's theory of circumscription, compromise, and self-creation. In D. Brown (Ed.), *Career choice and development* (85-103). San Francisco: Jossey-Bass.

Gottfredson, L. S., & Lapan, R. T. (1997). Assessing gender-based circumscription of occupation aspirations. *Journal of Career Assessment, 5*(4), 419-441.

Hanover Research (2012). *Effective career awareness and development programs for K-8 students.* Retrieved from https://isminc.com/

Harkins, M. A. (2000). Career education in the primary grades: Building work-readiness through an experiential curriculum. *Childhood Education, 76*(4), 219-224. doi: 10.1080/00094056.2000.10521166

Harkins, M. A. (2001). Developmentally appropriate career guidance: Building concepts to last a lifetime. *Early Childhood Education, 2*(3), 169-174.

Hartung, P. J., Porfeli, E. J., & Vondracek, F. W. (2005). Child vocational development: A review and reconsideration. *Journal of Vocational Behavior, 66*, 385-419.

Herr, E. L., Cramer, S. H., & Niles, S. G. (2004*). Career guidance and counseling through the lifespan*. Boston: Pearson.

Hou, Z., & Leung, S. A. (2011). Vocational aspirations of Chinese high school students and their parents' expectations. *Journal of Vocational Behavior, 79*, 349-360.

Howard, K. A. S., & Walsh, M. E. (2010). Conceptions of career choice and attainment: Developmental levels in how children think about careers. *Journal of Vocational Behavior, 76*, 143-152. doi: 10.1016/j.jvb.2009.10.010

Howell, D. C. (2013). *Statistical methods for psychology*. Belmont, CA: Wadsworth.

Irvine, S. H., & Kyllonen, P. C. (2002). *Item generation for test development*. Mahwah, NJ: Lawrence Erlbaum Associates, Publishers.

Jobs for the Future. (2007). *The STEM workforce challenge: The role of the public workforce system in a national solution for a competitive science, technology, engineering, and mathematics (STEM) workforce.* U.S. Department of Labor, Employment and Training Administration.

Johnson, B., & Christensen, L. (2008). *Educational research: Quantitative, qualitative, and mixed approaches*. (3rd ed.). Los Angeles, CA: Sage.

Johnson, L. S. (2000). The relevance of school to career: A study in student awareness. *Journal of Career Development, 26*(4), 263-276.

Kimura, S. (2006). Recent movements in Japan concerning career guidance and future tasks. *Japan Labor Review, 3*(2), Special Edition: Occupational Awareness and Career Guidance for Youths.

Kier, M. W., Blanchard, M. R., & Albert, J. L. (2014). Connecting students to STEM careers. *Science Scope, 37*(6), 72-76.

Kier, M. W., Blanchard, M. R., Osborne, J. W., & Albert, J. L. (2014). The development of the STEM Career Interest Survey (STEM-CIS). *Research in Science Education*, 44: 461-481.

Kline, P. (1994). *An easy guide to factor analysis*. New York: Routledge.

Kroger, J. (2007). *Identity development: Adolescence through adulthood*. Thousand Oaks, CA: Sage.

Laurier. (2014). *Career awareness*. Career Development Center.

Lee, H. C. (2012). "What do you want to do when you grow up?" Occupational aspirations of Taiwanese preschool children. *Social Behavior and Personality, 40*(1), 115-128.

Lent, R. W., Brown, S. D., & Hackett, G. (1994). Toward a unifying social cognitive theory of career and academic interest, choice, and performance. *Journal of Vocational Behavior, 45*, 79-122.

Leung, S. A. (2008). The big five career theories. In J. A. Athanasou & R. Van Esbroeck (Eds.), *International handbook of career guidance* (115-132). New York: Springer.

Lin, L. S., & Nasir, R. (2013). The effectiveness of psycho-educational group counseling for normal students and students with special needs in terms of career awareness and self-concept. *The Social Science, 8*(3). 231-235.

Magnuson, C. S., & Starr, M. F. (2000). How early is too early to begin life career planning? The importance of the elementary school years. *Journal of Career Development, 27*(2), 89 101.

Maltese, A. V., & Tai, R. H. (2010). Eyeballs in the fridge: Sources of early interest in science. *International Journal of Science Education 32*(5), pp. 669-685.

Maltese, A. V., & Tai, R. H. (2011). Pipeline persistence: Examining the association of educational experiences with earned degrees in STEM among U.S. students. Wiley Online Library.

McMahon, M. (2005). Career counseling: Applying the systems theory framework of career development. *Journal of Employment Counseling, 42*, 29-38.

Miller, M. J. (1989). Career counseling for the elementary school child: Grades K-5. *Journal of employment counseling, 26*(4), 169-177.

Miller, L., & Lauterbach, L. (2014). Career simulations: Technology tools that support STEM content and motivation. *Science Scope, 37*(6), 16-21.

Nasir, R., & Lin, L. S. (2012). The relationship between self-concept and career awareness amongst students. *Asian Social Science, 9*(1). 193-197.

National Academy of Science, Committee on Science, Engineering, and Public Policy (COSEPUP). (2005). *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future.* Washington, DC: National Academies Press.

National Commission on Excellence in Education [NCEE]. (1983). *A nation at risk: The imperative for educational reform: A report to the nation and the Secretary of Education, United States Department of Education.* Washington, DC: Author. http://www2.ed.gov/pubs/NatAtRisk/risk.html

National Science and Technology Council. (2012). Coordinating federal science, technology, engineering, and mathematics (STEM) education investments: Progress report, office of science and technology policy. Retrieved from http://www.whitehouse.gov/administration/eop/ostp/nstc/docsreports.

National Science Board (NSB). (2007). *A National Action Plan for Addressing the Critical Needs of the U.S. Science, Technology, Engineering, and Mathematics Education System.* Arlington, VA: National Science Foundation. http://www.nsf.gov/nsb/documents/2007/stem_action.pdf

National Science Board (NSB). (2008). *Science and engineering indicators 2008.* Arlington, VA: National Science Foundation.

Nazli, S., (2007). Career development in primary school children. *Career Development International, 12*(5), 446-462. doi: 10.1108/13620430710773763

Neville, D. D., Neimeyer, G. J., Probert, B., Fukyama, M. (1986). Cognitive structures in vocational information processing and decision making. *Journal of Vocational Behavior, 28*, 110-122.

New York State Education Department. *Learning standards for career development and occupational studies at three levels.* Retrieved from http://www.p12.nysed.gov/cte/cdlearn/documents/cdoslea.pdf

Olguin, D. L., & Maple, C. (2008). Legislative impact: A holistic paradigm for professional school counselors and teachers in K-12 career development. In G. T. Eliason and J. Patrick (Eds.). *Career development in the schools*. Charlotte, NC: Information Age Publishing, Inc.

Osipow, S. H. (1983). *Theories of career development*. Englewood Cliffs, NJ: Prentice-Hall, Inc.

Panchak, P. (2015). Are America's advanced industries ceding global leadership? *Industry Week*. Retrieved from http://www.industryweek.com/competitiveness/are-americas advancedindustries-ceding-global-leadership#slide-0-field_images-159371

Pannoni, A. (2014). Making STEM stick in the middle school: Educators discuss techniques and challenges when engaging middle schoolers in STEM topics. U.S. News STEM Solutions.

Parsons, F. (1909). *Choosing a vocation*. Boston: Houghton Mifflin Co.

Patton, W., & Porfeli, E. J. (2007). Career exploration for children and adolescents. In V. B. Skorikov and W. Patton (Eds.) *Career development in childhood and adolescence*. Rotterdam: Sense Publishers.

Patton, W., & Skorikov, V. B. (2007). *Career development in childhood and adolescence*. Rotterdam: Sense Publishers.

Piaget, J., (1952). *The origins of intelligence in children*. New York: International Universities Press.

Pedhazur, E. J., & Schmelkin, L. P. (1991). *Measurement, design, and analysis: An integrated approach*. New York: Psychology Press.

Porfeli, E. J., Hartung, P. J., & Vondracek, F. W. (2008). Children's vocational development: A research rationale. *The Career Development Quarterly, 57*(1), 25-37.

Polit, D. F., Beck, C. T., & Owen, S. V. (2007). Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. *Research in nursing & health*. 30: 459-67.

Richards, E., & Terkanian, D. (2013). Occupational employment projections to 2022. *Monthly Labor Review, ???*(??), 1-44.

Sanders, M. (2009). Integrative STEM education primer. *The Technology Teacher*. (December/January).

Schultheiss, D. E. P. (2005). Elementary career intervention programs: Social action initiatives. *Journal of Career Development, 31*(3), 185-193.

Schultheiss, D. E. P. (2008). Current status and future agenda for the theory, research, and practice of childhood career development. *The Career Development Quarterly, 57*(1), 7-24.

Schultheiss, D. E. P., Palma, T. V., & Manzi, A. J. (2005). Career development in the middle childhood: A qualitative inquiry. *The Career Development Quarterly, 53*(3), 246-262.

Seligman, L. (1994). *Developmental career and counseling assessment*. Thousand Oaks, CA: Sage.

Skorikov, V. B., & Patton, W. (Eds.). (2007). *Career development in childhood and adolescence*. Rotterdam, The Netherlands: Sense Publishers.

Sodano, S. M., & Tracey, T. J. G. (2007). Development of career interests and perceived competence. In V. B. Skorikov and W. Patton (Eds.). *Career development in childhood and adolescence*. Rotterdam: Sense Publishers.

Stevens, H., & Wilkerson, K. (2010). The developmental assets and ASCA's national standards: A crosswalk review. *Professional School Counseling, 13*(4), 227-233. Retrieved from http://www.jstor.org/stable/42732952

Super, D. E. (1957). *The psychology of careers*. New York: Harper & Row.

Super, D. E. (1963). Self concepts in vocational development. In D. E. Super (ed.), *Career development: Self-concept theory* (pp. 1-26). New York: College Entrance Examination Board.

Super, D. E. (1990). A life-span, life-space approach to career development. In D. Brown, L. Brooks, & Associated (Eds.), *Career choice development* (2nd ed., pp. 197-261), San Francisco: Jossey Bass.

Taylor, J. E., Montague, E. K., & Michaels, E. R. (1972). *An occupational clustering system and curriculum implications for the Comprehensive Career Education Model.* Alexandria, VA: human Resources Research Organization.

Torpey, E. (2015). Clusters, pathways, and BLS: Connecting career information. Retrieved from https://www.bls.gov/careeroutlook/2015/article/career-clusters.htm

Totura, C. (2014). Creating a college and career-ready school culture. https://nau.edu/uploadedFiles/Academic/COE/Gear_Up/_Forms/Research%20In%20Practice%20Brief%20-%20%20Series%20I%20Paper%202.pdf

Trice, A.D., Hughes, M. A., Odom, C., Woods, K., & McClellan, N. C. (1995). The origins of children's career aspirations: IV. Testing hypotheses from four theories. *The Career Development Quarterly, 43*(4), 307-322.

Vilorio, D. (2014). STEM 101: Intro to tomorrow's jobs. *Occupational Outlook Quarterly.* www.bls.gov/ooq

Vygotsky, L. S. (1962). *Thought and language*. Cambridge, MA: MIT Press.

Wallen, N. E., & Fraenkel, J. R. (2013). *Educational research: A guide to the process*. New York, NY: Routledge.

Walls, R. T. (2000). Vocational cognition: Accuracy of 3rd-, 6th-, 9th-, and 12th-grade students. *Journal of Vocational Behavior, 56*, 137-144.

Walls, R. T., Fullmer, S. L., & Dowler, D. L. (1996). Functional vocational cognition: Dimensions of real-world accuracy. *The Career Development Quarterly, 44*(3), 224-233.

Watson, M., & McMahon, M. (2005). Children's career development: A research review from a learning perspective. *Journal of Vocational Behavior, 67*, 119-132.

Watson, M., & McMahon, M. (2007). Children's career development learning: A foundation for lifelong career development. In V. B. Korsikov and W. Patton (Eds.) *Career development in childhood and adolescence*. Rotterdam: Sense Publishers.

Watson, M., & McMahon, M. (2008). Children's career development: Metaphorical images of theory, research, and practice. *The Career Development Quarterly, 57*(1), 75-83.

Wernick, W. (1973). *Teaching for career development in the elementary school: A life-centered approach*. Worthington, OH: Charles A. Jones Publishing Company.

Wise, R., Charner, I., & Randour, M. L. (1976). A conceptual framework for career awareness in career decision-making. *The Counseling Psychologist, 6*(3), 47-53.

APPENDICES

Appendix A

EA-CAI Instrument

EA-CAI
INSTRUCTIONS

You should carefully answer each question on this survey before you move on to the next question. You may change an answer before you move to another section of the survey, but you cannot go back to a previous section once it is completed.

After you have answered the last question in a Section, you will click on the box labeled *Go to Next Section* to move to the next Section of the survey.

Go <u>To</u> Next Section

EA-CAI

Section 1: Career Clusters

Directions: Jobs can be organized into "career clusters" based on what they have in common. For each question in this section, four jobs are listed. Only one job matches the career cluster named. Choose the job that belongs in the career cluster named.

SAMPLE: *Which job matches the Cluster: Careers in Education?*

- *nurse*
- *teacher*
- *truck driver*
- *lawyer*

If you selected *teacher*, you are correct.

This section includes the following 16 questions. For each question, select the job that matches the career cluster named by moving your cursor over the

circle in front of the job and clicking on it. A check mark will appear in the circle you selected.

Continue this process until you have answered all 16 questions. When you have finished answering questions, at the bottom of the screen click *Go to Next Section*. This will take you to Section 2 of the survey.

1. Which job matches the Cluster: Careers in Agriculture, Food & Natural Resources?
○ pharmacist
○ bank teller
○ college professor
○ park ranger

2. Which job matches the Cluster: Careers in Architecture & Construction?
○ surveyor
○ ticket agent
○ software developer
○ fashion designer

3. Which job matches the Cluster: Careers in Arts, Audio/Visual Technology & Communications?
○ personal fitness trainer
○ plumber
○ photographer
○ housekeeper

4. Which job matches the Cluster: Careers in Business Management & Administration?
○ chief executive officer
○ radiologist
○ welder
○ aerospace engineer

5. Which job matches the Cluster: Careers in Education?

○ claims adjuster
○ librarian
○ chef
○ dentist

6. Which job matches the Cluster: Careers in Finance?

○ farmer
○ archeologist
○ electrician
○ accountant

7. Which job matches the Cluster: Careers in Government & Public Administration?

○ mining engineer
○ restaurant server
○ military officer
○ physical therapist

8. Which job matches the Cluster: Careers in Health Services?

○ cashier
○ carpenter
○ secretary
○ physician

9. Which job matches the Cluster: Careers in Hospitality & Tourism?

○ police officer
○ architect
○ welder
○ travel agent

9. Which job matches the Cluster: Careers in Human Services?

○ animator
○ miner
○ machine operator
○ hair stylist

103

11. Which job matches the Cluster: Careers in Information Technology?

○ graphic designer
○ geographer
○ housekeeper
○ environmental scientist

12. Which job matches the Cluster: Careers in Law, Public Safety, Corrections & Security?

○ police officer
○ musician
○ bus driver
○ auto mechanic

13. Which job matches the Cluster: Careers in Manufacturing?

○ veterinarian
○ assembler
○ surgeon
○ coach

14. Which job matches the Cluster: Careers in Marketing?

○ dietician
○ forensic scientist
○ real estate agent
○ pilot

15. Which job matches the Cluster: Careers in Transportation, Distribution & Logistics?

○ dental hygienist
○ delivery driver
○ broadcast technician
○ geologist

16. Which job matches the Cluster: Careers in Science, Technology, Engineering & Mathematics?

○ hotel clerk
○ chemist
○ school principal
○ judge

Go To Next Section

EA-CAI

Section 2: Jobs Needing a College Degree

Directions: Some workers have to go to college to be able to do a job. In this section, one worker on each list needs a college degree. In the SAMPLE below, select the worker that has to earn a college degree.

SAMPLE: *Which worker needs a college degree?*

- *musician*
- *cashier*
- *assembler*
- *teacher*

If you selected *teacher*, you are correct.

This Section includes 10 questions. For each question, select the worker in each list that needs a college degree by moving your cursor over the circle in front of your answer and clicking on it. A check mark will appear in the circle you selected.

Continue this process until you have answered all 10 questions. When you have finished answering the questions, at the bottom of the screen click *Go To Next Section*. This will take you to Section 3 of the survey.

7. Which worker needs a college degree?
- ○ baker
- ○ dental hygienist
- ○ hotel clerk
- ○ carpenter

18. Which worker needs a college degree?
- ○ delivery driver
- ○ chef
- ○ bank teller
- ○ aerospace engineer

19. Which worker needs a college degree?

○ surgeon
○ plumber
○ farmer
○ auto mechanic

20. Which worker needs a college degree?

○ secretary
○ sculptor
○ physician
○ travel agent

21. Which worker needs a college degree?

○ personal fitness trainer
○ ticket agent
○ restaurant server
○ pharmacist

22. Which worker needs a college degree?

○ hair stylist
○ fire fighter
○ architect
○ machine operator

23. Which worker needs a college degree?

○ real estate agent
○ housekeeper
○ web developer
○ school principal

24. Which worker needs a college degree?

○ welder
○ construction manager
○ broadcast technician
○ dentist

25. Which worker needs a college degree?

○ purchasing agent

○ lawyer

○ customer service representative

○ bus driver

26. Which worker needs a college degree?

○ claims adjuster

○ photographer

○ veterinarian

○ truck driver

Section 3: Job Pictures and Related Jobs

Directions: People can do many different jobs. Some types of jobs are pictured in this section. For the SAMPLE below, there are two questions that go with the picture. The first question asks you to look at the picture and identify the worker by selecting the name from the list that matches the job being done in the picture.

SAMPLE:

Which of the following best names the worker in the sample picture?

- *hair stylist*
- *nurse*
- *bank teller*
- *teacher*

If you selected *teacher*, you are correct. Next, look at the SAMPLE picture again. The next question asks you to select a worker from the list that is **closely related** to the job of a teacher.

Which worker is most related to the job shown in the sample picture?

- *truck driver*
- *farmer*
- *librarian*
- *veterinarian*

If you selected *librarian*, you are correct.

In this Section there are two questions for each picture.

The first question for each picture asks you to look at the picture and then select the name of the worker shown (move your cursor over the circle in front of the name of the job and click on it).

The second question asks you to select a worker that is *closely related* to the worker in the picture (move your cursor over the circle in front of the name of the related job and click on it).

Continue this process until you have answered all 50 questions. When you have finished answering questions, at the bottom of the screen click *Go to Next Section*. This will take you to Section 4 of the survey.

27. Which of the following best names the worker in the picture?

○ judge
○ plumber
○ college professor
○ environmental scientist

28. Which worker is most related to the job shown in the picture for question 27?

○ welder
○ purchasing agent
○ lawyer
○ geographer

29. Which of the following best names the worker in the picture?

○ electrician
○ medical laboratory technician
○ bus driver
○ assembler

30. Which worker is most related to the job shown in the picture for question 29?

○ physician
○ auto mechanic
○ cashier
○ carpenter

31. Which of the following best names the worker in the picture?

- ○ hotel clerk
- ○ conservation scientist
- ○ school principal
- ○ secretary

32. Which worker is most related to the job shown in the picture for question 31?

- ○ housekeeper
- ○ musician
- ○ park ranger
- ○ construction manager

33. Which of the following best names the worker in the picture?

- ○ claims adjuster
- ○ firefighter
- ○ radiologist
- ○ personal fitness trainer

34. Which worker is most related to the job shown in the picture for question 33?

- ○ pilot
- ○ broadcast technician
- ○ geologist
- ○ paramedic

35. Which of the following best names the worker in the picture?

○ lawyer
○ military officer
○ surveyor
○ archeologist

36. Which worker is most related to the job shown in the picture for question 35?

○ dentist
○ police officer
○ graphic designer
○ construction manager

37. Which of the following best names the worker in the picture?

- accountant
- architect
- surgeon
- delivery driver

38. Which worker is most related to the job shown in the picture for question 37?
- machine operator
- fashion designer
- ticket agent
- nurse

39. Which of the following best names the worker in the picture?

- ○ coach
- ○ physical therapist
- ○ medical laboratory technician
- ○ restaurant server

40. Which worker is most related to the job shown in the picture for question 39?

- ○ software developer
- ○ chef
- ○ military officer
- ○ forensic scientist

41. Which of the following best names the workers in the picture?

- ○ sculptor
- ○ judge
- ○ musician
- ○ web developer

42. Which worker is most related to the job shown in the picture for question 41?

- ○ broadcast technician
- ○ real estate agent
- ○ dietician
- ○ dental hygienist

43. Which of the following best names the worker in the picture?

○ college professor
○ secretary
○ librarian
○ dietician

44. Which worker is most related to the job shown in the picture for question 43?

○ plumber
○ chemist
○ personal fitness trainer
○ customer service representative

45. Which of the following best names the worker on the right in the picture?

○ chief executive officer
○ travel agent
○ mining engineer
○ pharmacist

46. Which worker is most related to the worker shown in the picture for question 45?

○ bus driver
○ wind turbine technician
○ paleontologist
○ radiologist

47. Which of the following best names the worker in the picture?

- ○ animator
- ○ baker
- ○ claims adjuster
- ○ architect

48. Which worker is most related to the job shown in the picture for question 47?

- ○ carpenter
- ○ veterinarian
- ○ paleontologist
- ○ school principal

49. Which of the following best names the worker in the picture?

- ○ coach
- ○ hair stylist
- ○ graphic designer
- ○ baker

50. Which worker is most related to the job shown in the picture for question 49?

- ○ housekeeper
- ○ chef
- ○ software developer
- ○ dentist

51. Which of the following best names the worker in the picture?

○ geographer
○ electrician
○ chief executive officer
○ delivery driver

52. Which worker is most related to the job shown in the picture for question 51?

○ dietician
○ photographer
○ sculptor
○ wind turbine technician

53. Which of the following best names the worker in the picture?

○ welder
○ network technician
○ park ranger
○ purchasing agent

54. Which worker is most related to the job shown in the picture for question 53?

○ conservation scientist
○ real estate agent
○ physical therapist
○ secretary

55. Which of the following best names the worker in the picture?

○ animator
○ archeologist
○ auto mechanic
○ hotel clerk

56. Which worker is most related to the job shown in the picture for question 55?

○ truck driver
○ surgeon
○ surveyor
○ network technician

57. Which of the following best names the worker in the picture?

- ○ park ranger
- ○ pilot
- ○ teacher
- ○ welder

58. Which worker is most related to the job shown in the picture for question 57?

- ○ aerospace engineer
- ○ police officer
- ○ environmental scientist
- ○ secretary

59. Which of the following best names the worker in the picture?

- ○ physician
- ○ delivery driver
- ○ geologist
- ○ customer service representative

60. Which worker is most related to the job shown in the picture for question 59?

- ○ electrician
- ○ hair stylist
- ○ fashion designer
- ○ mining engineer

126

61. Which of the following best names the worker in the picture?

○ bank teller
○ firefighter
○ park ranger
○ nurse

62. Which worker is most related to the job shown in the picture for question 61?

○ coach
○ housekeeper
○ accountant
○ judge

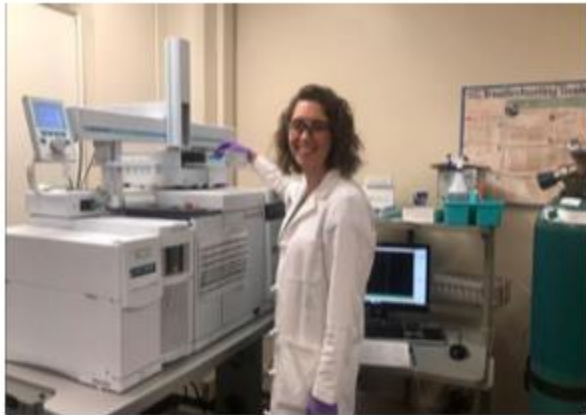**63. Which of the following best names the worker in the picture?**

- ○ lawyer
- ○ librarian
- ○ pilot
- ○ cashier

64. Which worker is most related to the job shown in the picture for question 63?

- ○ military officer
- ○ school principal
- ○ bus driver
- ○ customer service representative

65. Which of the following best names the worker in the picture?

- ○ personal fitness trainer
- ○ pharmacist
- ○ forensic scientist
- ○ ticket agent

66. Which of the following is most related to the job shown in the picture for question 65?

- ○ police officer
- ○ plumber
- ○ real estate agent
- ○ restaurant server

129

67. Which of the following best names the worker in the picture?

○ physician
○ radiologist
○ secretary
○ fashion designer

68. Which of the following is most related to the job shown in the picture for question 67?

○ photographer
○ software developer
○ surgeon
○ loan officer

69. Which of the following best names the workers in the picture?

- ○ surveyor
- ○ police officer
- ○ travel agent
- ○ chemist

70. Which of the following is most related to the job shown in the picture for question 69?

- ○ truck driver
- ○ welder
- ○ pharmacist
- ○ wind turbine technician

71. Which of the following best names the workers in the picture?

○ architect
○ broadcast technician
○ paramedic
○ carpenter

72. Which of the following is most related to the job shown in the picture for question 71?

○ firefighter
○ cashier
○ chef
○ chief executive officer

73. Which of the following best names the workers in the picture?

- ○ aerospace engineer
- ○ assembler
- ○ conservation worker
- ○ construction manager

74. Which of the following is most related to the job shown in the picture for question 73?

- ○ dentist
- ○ photographer
- ○ machine operator
- ○ medical laboratory technician

75. Which of the following best names the worker in the picture?

○ teacher
○ aerospace engineer
○ farmer
○ accountant

76. Which of the following is most related to the job shown in the picture for question 75?
○ environmental scientist
○ assembler
○ college professor
○ bank teller

Go To Next Section

EA-CAI

Section 4: Products and Services

Directions: A product is something that a customer can see, touch, feel, wear, taste, or use. Some jobs are mainly concerned with making a product. A service is a task that is done for a customer. Some jobs are mainly concerned with performing a service.

In the SAMPLE below, there are two pictures, each showing someone doing a different job. Select the picture of the worker that is doing a job that results in a product.

SAMPLE:

Which worker is doing a job that results in a product?

welder

police officer

If you selected *welder*, you are correct.

This Section includes 8 questions. For each question, select the picture of the job that results in a product by moving your cursor over the image of the job and clicking on it. A check mark will appear on the image you selected.

Continue this process until you have answered all 8 questions. When you have finished answering the questions, at the bottom of the screen click *Go to Next Section*. This will take you to Section 5 of the survey.

77. Which worker is doing a job that results in a product?

○

farmer

◉

bank teller

78. Which worker is doing a job that results in a product?

○

carpenter

nurse

○

79. Which worker is doing a job that results in a product?

○

housekeeper

photographer

○

80. Which worker is doing a job that results in a product?

O

animator

physical therapist

O

81. Which worker is doing a job that results in a product?

O

librarian

fashion designer

O

82. Which worker is doing a job that results in a product?

assembler

real estate agent

83. Which worker is doing a job that results in a product?

fire fighter

chef

84. Which worker is doing a job that results in a product?

mining engineer

coach

Go To Next Section

EA-CAI

Section 5: Different Working Conditions

Directions: Different jobs have different working conditions. Some jobs are outside, some are inside. Some jobs are active, and some are calm. Some jobs include working with a lot of people, and some jobs require working alone. In the SAMPLE below, select the phrase that best describes the job shown in the picture.

SAMPLE:

Because he is a personal fitness trainer, the worker in the picture probably most likes to

- *drive a vehicle*
- *work outdoors*
- *use hand tools*
- *work with and help people*

If you selected *work with and help people*, you are correct.

This Section includes 14 questions. For each question, select the phrase that best describes the job shown in the picture by moving your cursor over the circle in front of the phrase and clicking on it. A check mark will appear in the circle you selected.

Continue this process until you have answered all 14 questions. When you have finished answering the questions, at the bottom of the screen click *Go to Next Section*. This will take you to Section 6 of the survey.

85.

Because the worker in the picture is a wind turbine technician, he probably most like to

○ work with many people
○ work outdoors
○ work the same schedule every day
○ work in an office

86.

Because the worker in the picture is a secretary, she probably most likes to

- ○ work the same schedule every day
- ○ work outdoors
- ○ travel as part of work
- ○ work with hand tools

87.

Because the worker in the picture is a pharmacist, she probably most likes to

- ○ work outdoors
- ○ work only on weekdays
- ○ work with and help people
- ○ be creative and express herself

88.

Because the workers in the picture are chemists, they probably most like to

- ○ work with hand tools
- ○ work the same schedule every day
- ○ travel as part of work
- ○ develop and analyze new substances

89.

Because the worker in the picture is a truck driver, he probably most likes to

- ○ travel as part of work
- ○ work outdoors
- ○ use his hands to create things
- ○ work in an office setting

90.

Because the worker in the picture is a welder, he probably most likes to

- ○ use his hands to create things
- ○ work with and help people
- ○ work outdoors
- ○ work on the weekends

91.

Because the worker in the picture is a hair stylist, she probably most likes to

- ○ work outdoors
- ○ travel for work
- ○ work with and help people
- ○ develop and analyze new substances
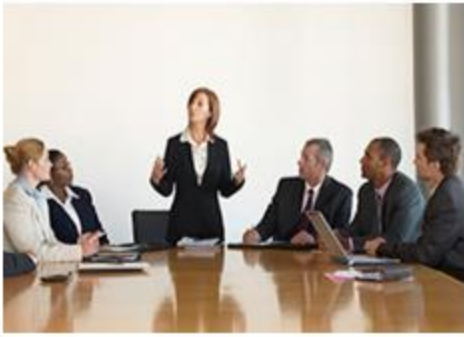
92.

Because the worker in the picture is a chief executive officer, she probably most likes to

- ○ give orders
- ○ work outdoors
- ○ work on the weekends
- ○ work with hand tools

93.

Because the worker in the picture is a paleontologist, she probably most likes to

- ○ work with many people
- ○ work with hand tools
- ○ work the same schedule every day
- ○ travel as part of work

94.

Because the workers in the picture are software developers, they probably most like to

- ○ travel as part of work
- ○ create new things and ideas
- ○ work outdoors
- ○ work without competition from other job seekers

95.

Because the worker in the picture s a judge, he probably most likes to

- ○ work with computers
- ○ work outdoors
- ○ travel as part of work
- ○ work without competition from other job seekers

96.

Because the worker in the picture is a ticket agent, she probably most likes to

- ○ work with and help people
- ○ work only on weekdays
- ○ work the same schedule every day
- ○ be creative and express herself

97.

Because the worker in the picture is a sculptor, she probably most likes to

- ○ be creative and express herself
- ○ work with many people
- ○ work outdoors
- ○ give orders

98.

Because the worker in the picture is a nurse, he probably most likes to

- ○ develop new things and ideas
- ○ work with hand tools
- ○ travel as part of work
- ○ work where there are many career opportunities

Go To Next Section

EA-CAI

Section 6: Pay Earned for Jobs

Directions: Sometimes people think about the pay they can earn for a job. The SAMPLE below shows workers in two different jobs. Select the worker that you feel earns the higher pay.

SAMPLE:

Which job earns the higher pay?

teacher

veterinarian

If you selected *veterinarian*, you are correct.

This Section includes 12 questions. For each question, look at the pictures of the two workers named and select the worker that earns the higher pay by moving your cursor over the image of the job and clicking on it. A check mark will appear in the corner of the picture you selected.

Continue this process until you have answered all 12 questions. When you have finished answering the questions, at the bottom of the screen click *Go to Next Section*. This will take you to Section 7 of the survey.

99. Which job earns the higher pay?

○

machine operator

○

pharmacist

100. Which job earns the higher pay?

○

travel agent

○

school principal

101. Which job earns the higher pay?

pilot

photographer

102. Which job earns the higher pay?

paramedic

lawyer

○

103. Which job earns the higher pay?
○

construction manager
○

librarian

104. Which job earns the higher pay?
○

truck driver
○

geographer

105. Which job earns the higher pay?

assembler

archeologist

106. Which job earns the higher pay?

dental hygienist

baker

107. Which job earns the higher pay?

conservation scientist

cashier

108. Which job earns the higher pay?

delivery driver

network technician

155

109. Which job earns the higher pay?

○

restaurant server

broadcast technician

○

110. Which job earns the higher pay?

○

hotel clerk
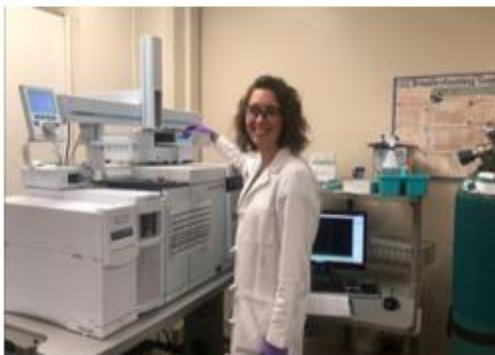
forensic scientist

○

Go To Next Section

EA-CAI

Section 7: Workers You May Know

Directions: You may know workers who hold different jobs. These workers may be family members, friends, or people you know in your community.

In this section, you will be asked if you know someone who has a specific job. If you know a worker who does the job, select "yes" by moving your cursor over the circle in front of the word "Yes" and clicking on it. If you don't know a worker who does the job, select "No" by moving your cursor over the circle in front of the word "No" and clicking on it. A check mark will appear in the circle you selected.

Continue this process until you have answered all 14 questions. When you have answered all of the questions, at the bottom of the screen click *Done* to submit your survey.

After you have completed the survey, raise your hand to let Mrs. Grimshaw know that you are done.

111. Do you know someone who is an accountant?
○ Yes
○ No

112. Do you know someone who is an aerospace engineer?
○ Yes
○ No

113. Do you know someone who is a bus driver?
○ Yes
○ No

114. Do you know someone who is a claims adjuster?

○ Yes

○ No

115. Do you know someone who is a college professor?

○ Yes

○ No

116. Do you know someone who is a customer service representative?

○ Yes

○ No

117. Do you know someone who is a dentist?

○ Yes

○ No

118. Do you know someone who is an environmental scientist?

○ Yes

○ No

119. Do you know someone who is a graphic designer?

○ Yes

○ No

120. Do you know someone who is a military officer?

○ Yes

○ No

121. Do you know someone who is a physician?

○ Yes

○ No

122. Do you know someone who is a plumber?

○ Yes

○ No

123. Do you know someone who is a purchasing agent?

○ Yes

○ No

124. Do you know someone who is a web developer?

○ Yes

○ No

Click on the *Done* button to submit your survey.

After you have completed the survey, raise your hand to let Mrs. Grimshaw know that you are done.

Done

Appendix B

Cover Letter and Guidelines for Interraters: Correction of Terminology

Date: _____

Dear _____

Thank you for your willingness to be an interrater for this study on Assessing Career Awareness of Early Adolescent Learners.

The purpose of the Early Adolescent Career Awareness Instrument (EA-CAI) is to measure early adolescent learners' awareness of the requisites, routines and rewards of career options in contemporary settings. Career awareness has been determined to be foundational to the career development continuum.

Forty-five years ago, in 1973, Fadale developed and implemented the Career Awareness Inventory. The career terminology, images, and clusters widely used at that time have since become outmoded in contemporary settings. Consequently, I have developed a new instrument to measure career awareness of early adolescent learners.

I am seeking your help to establish three mandates: correction of terminology, content validity, and construct validity. The guidelines for completing the criteria rubrics are as follows:

Phase 1: Correction of Terminology

1. Review the highlighted instrument items in the protocol document and rate each item on the corresponding rubric as appropriate or inappropriate.
2. Perform an analysis to revise or correct problematic terminology.
3. If the word is perceived as inappropriate, provide a revision or modification that would be appropriate parlance in contemporary early adolescent settings.

Phase 2: Content and Construct Validity

1. Using the provided rubric, analyze each instrument item for its relevance to the content domain by placing a check in the corresponding relevant or not relevant column.
2. Repeat the procedure to analyze the construct domain.

The purpose of this protocol is to ensure improved understanding of the test takers in today's learning environments. Please complete Phase 1 of this protocol within 10 days and return the electronic response to wendyg@vt.edu by November 22, 2019. Phase 2 will commence shortly after, pending revisions required by Phase 1.

Your contribution will assist in establishing content and construct validity of the instrument. Thank you for your participation.

Respectfully,

Wendy S. Grimshaw

Appendix C

Correction of Terminology Rubric for Interraters

Correction of Terminology Rubric for Interraters

Instructions:

You have seen the EA-CAI instrument in its original draft form. While most of the job titles included are in use by the U. S. Federal Bureau of Labor Statistics, some titles, words and concepts from the test items on the instrument have been used to maintain appropriate reading levels and to be consistent with commonly used terminology. However, these terms and concepts may be considered irrelevant, outmoded, or not applicable. Please evaluate the highlighted terms in the listing below by placing a check mark to identify whether they are appropriate or inappropriate for use by early adolescent students today. Suggest modifications as needed.

Part #	Item #	Question Word or Concept	Appropriate (Modifications not needed)	Inappropriate (Modifications needed)	Suggested Modifications of Terminology
1	Directions	Directions: Jobs can be organized into "clusters" based on what they have in common. For each test item, four jobs are listed. Only one job matches the career cluster named. Choose the letter of the job that belongs in the career cluster named. SAMPLE: *1A. Cluster: Education & Training* *A. nurse* *B. teacher* *C. truck driver* *D. lawyer* If you selected letter B, teacher, you are correct. Point the cursor to the letter B for item 1A and click to select. For these 16 survey items, select the job that matches the career cluster named.			

1	1	1. Cluster: Agriculture, Food & Natural Resources A. pharmacist B. bank teller C. college professor D. park ranger			
1	3	3. Cluster: Arts, Audio/Visual Technology & Communications A. personal fitness trainer B. plumber C. photographer D. housekeeper			
1	7	7. Cluster: Government & Public Service A. mining engineer B. restaurant server C. military officer D. physical therapist			
1	8	8. Cluster: Health Services A. cashier B. carpenter C. secretary D. physician			
1	10	10. Cluster: Human Services A. animator B. miner C. machine operator D. hair stylist			

163

1	13	13. Cluster: Manufacturing A. veterinarian B. ==assembler== C. surgeon D. coach			
3	4	4. Which worker is most related to job A shown in picture 2? A) physician B) auto mechanic ==C) cashier== D) carpenter			
3	9	9. Which of the following best names worker A in picture 6? A) lawyer ==B) military officer== C) surveyor D) archeologist			
3	34	34. Which worker is most related to job A shown in picture 17? A) electrician B) hair stylist C) fashion designer ==D) mining engineer==			

3	49	49. Which of the following best names worker A in picture 25? A) aerospace engineer ==B) conservation worker== C) assembler D) construction manager			
5	1	1. Because the worker in picture 1 is a wind turbine technician, he probably most likes to A. work with many people B. work outdoors C. work a ==regular schedule== D. work in an office			
5	4	4. Because the workers in picture 4 are chemists, they probably most like to A. work with hand tools B. work a regular schedule C. travel as a part of work D. ==develop and analyze== new things			
5	10	10. Because the workers in picture 10 are software developers, they probably most like to A. travel as part of work B. create new things and ideas C. work with ==little competition== D. work outdoors			

5	14	14. Because the worker in picture 14 is a nurse, he probably most likes to A. develop new things and ideas B. work with hand tools C. work where there are many <mark>job openings</mark> D. travel as a part of work			
7	13	13. <mark>purchasing agent</mark> A. am familiar B. don't know			

If there were any additional terms used in the instrument not highlighted on this protocol that you feel need revision, please explain and provide modification suggestions below.

Appendix D

Interrater Results: Correction of Terminology

Part #	Item #	Question Word or Concept	Reviewer #	Modifications Needed Y / N	Suggested Modifications of Terminology
1	Directions	Directions: Jobs can be organized into "clusters" based on what they have in common. For each test item, four jobs are listed. Only one job matches the career cluster named. Choose the letter of the job that belongs in the career cluster named. *SAMPLE:* *1A. Cluster: Education & Training* *A. nurse* *B. teacher* *C. truck driver* *D. lawyer* If you selected letter B, teacher, you are correct. Point the cursor to the letter B for item 1A and click to select. For these 16 survey items, select the job that matches the career cluster named.	Rater 1 Rater 2 Rater 3	N N Y	2: Jobs-Career-Occupation!! Your inventory name is including the "Career". But in your inventory, "job" and "career" were included. I think it's okay but just consider making them consistent. Just opinion. Your current version is understandable. 3: Career, career
1	1	1. Cluster: Agriculture, Food & Natural Resources A. pharmacist B. bank teller C. college professor D. park ranger	Rater 1 Rater 2 Rater 3	N N N	

167

1	3	3. Cluster: Arts, Audio/Visual Technology & Communications A. personal fitness trainer B. plumber C. photographer D. housekeeper	Rater 1 Rater 2 Rater 3	N N Y	3: House cleaner
1	7	7. Cluster: Government & Public Service A. mining engineer B. restaurant server C. military officer D. physical therapist	Rater 1 Rater 2 Rater 3	N N Y	3: Waitstaff
1	8	8. Cluster: Health Services A. cashier B. carpenter C. secretary D. physician	Rater 1 Rater 2 Rater 3	N N Y	3: Administrative assistant
1	10	10. Cluster: Human Services A. animator B. miner C. machine operator D. hair stylist	Rater 1 Rater 2 Rater 3	N N Y	3: illustrator
1	13	13. Cluster: Manufacturing A. veterinarian B. assembler C. surgeon D. coach	Rater 1 Rater 2 Rater 3	N N Y	3: constructor

3	4	4. Which worker is most related to job A shown in picture 2? A) physician B) auto mechanic C) cashier D) carpenter	Rater 1 Rater 2 Rater 3	N N N	
3	9	9. Which of the following best names worker A in picture 6? A) lawyer B) military officer C) surveyor D) archeologist	Rater 1 Rater 2 Rater 3	N N N	
3	34	34. Which worker is most related to job A shown in picture 17? A) electrician B) hair stylist C) fashion designer D) mining engineer	Rater 1 Rater 2 Rater 3	N N N	
3	49	49. Which of the following best names worker A in picture 25? A) aerospace engineer B) conservation worker C) assembler D) construction manager	Rater 1 Rater 2 Rater 3	N N Y	3: Conservationist

5	1	1. Because the worker in picture 1 is a wind turbine technician, he probably most likes to A. work with many people B. work outdoors C. work a regular schedule D. work in an office	Rater 1 Rater 2 Rater 3	N N Y	3: Work the same schedule everyday
5	4	4. Because the workers in picture 4 are chemists, they probably most like to A. work with hand tools B. work a regular schedule C. travel as a part of work D. develop and analyze new things	Rater 1 Rater 2 Rater 3	N N Y	3: Develop and analyze new substances
5	10	10. Because the workers in picture 10 are software developers, they probably most like to A. travel as part of work B. create new things and ideas C. work with little competition D. work outdoors	Rater 1 Rater 2 Rater 3	N N Y	3: Work without competition from other job seekers
5	14	14. Because the worker in picture 14 is a nurse, he probably most likes to A. develop new things and ideas B. work with hand tools C. work where there are many job openings D. travel as a part of work	Rater 1 Rater 2 Rater 3	N N Y	3: Work where there are many career opportunities

7	13	13. purchasing agent A. am familiar B. don't know	Rater 1 Rater 2 Rater 3	N N N	

If there were any additional terms used in the instrument not highlighted on this protocol that you feel need revision, please explain and provide modification suggestions below.

Rater 2:

The job titles above must be identical to the ones that government official agencies indicate. As you mentioned in the front part of this guideline, I think there's no problem in your survey regarding the terms. I encourage you to use the terms above. I had a similar study in South Korea. We followed the department of labor guideline and occupation titles' classification directed by the government. If you got STANDARD name from the Federal, it will be totally okay.

Also, the vocabulary or expression is okay. You can do a pilot study for checking that.

Appendix E

Cover Letter and Revision Guidelines for Interraters: Correction of Terminology

Date: _____

Dear _____

Your feedback on the Phase 1: Corrections of Terminology protocol was very helpful. The suggestions made by the expert panel raters have been reviewed, and modifications have been made respectively.

Please review the modifications and rationale for changing or retaining terms on the attached document. Additional information about the modification process has also been included. This should be a fairly speedy process, and your response on or before January 22 is requested.

Pending consensus on Phase 1: Correction of Terminology, I will send the Phase 2: Content and Construct protocol documents. My goal is to finalize this instrument modifications process by the end of January and apply for IRB approval for the research study the first week of February. This timeline will allow me to stay on-track to graduate this semester.

Your continued assistance is genuinely appreciated!

Thank you,
Wendy

Appendix F

Correction of Terminology Final Review Rubric for Interraters

Directions: Review the modifications and rationale for changing or retaining terms below. Additional information about the modification process has also been included on the subsequent pages of this document for reference purposes. Indicate your degree of acceptance of the modifications to terms in each item, in Column 1 of the table, with a Y for "yes" or N for "no."

Table: Phase 1-Correction of Terminology

Modifications Acceptable? Y / N	Part #/ Item #	Question Word or Concept	Suggested Modifications of Terminology	Modified or Maintained Item
	1/Directions	Directions: Jobs can be organized into "clusters" based on what they have in common. For each test item, four jobs are listed. Only one job matches the career cluster named. Choose the letter of the job that belongs in the career cluster named. SAMPLE: 1A. Cluster: Education & Training A. nurse B. teacher C. truck driver D. lawyer If you selected letter B, teacher, you are correct. Point the cursor to the letter B for item 1A and click to select. For these 16 survey items, select the job that matches the career cluster named.	2: Jobs-Career-Occupation!! Your inventory name is including the "Career". But in your inventory, "job" and "career" were included. I think it's okay but just consider making them consistent. Just opinion. Your current version is understandable. 3: Career, career	Directions: Jobs can be organized into "career clusters" based on what they have in common. For each test item, four jobs are listed. Only one job matches the career cluster named. Choose the letter of the job that belongs in the career cluster named. SAMPLE: 1A. Cluster: Careers in Education E. nurse F. teacher G. truck driver H. lawyer If you selected letter B, teacher, you are correct. Point the cursor to the letter B for item 1A and click to select. For these 16 survey items, select the job that matches the career cluster named. Rationale:
				Career Clusters (www.careertech.org/Career-Clusters) are used as the organizing framework for the grouping of related jobs in the EA-CAI directions and items because they are commonly used by CTE, Guidance, and other department practitioners within school settings. The term "career" will be added to "cluster" in Part 1 of the instrument, to clarify this foundational meaning. While the terms "job," "occupation," and "career," are often used interchangeably, their definitions are, in fact, nuanced (see definitions provided). The term "career" has a broad definition, respective of a field of employment opportunity (Example: Agriculture). "Occupation" refers to the line of work a person does within a career field (Example: Farming). "Job" describes a position of employment specific to the work being done within an occupation (Example: farmer). Use of the term "job" will be maintained in this instrument, rather than modified, when referencing the remunerative position of the worker.

174

	1/3	3. Cluster: Arts, Audio/Visual Technology & Communications A. personal fitness trainer B. plumber C. photographer D. ==housekeeper==	2: The job titles above must be identical to the ones that government official agencies indicate. 3: House cleaner	3. Cluster: Careers in Arts, Audio/Visual Technology & Communications E. personal fitness trainer F. plumber G. photographer H. ==housekeeper== Rationale: Job title is consistent with US Bureau of Labor Statistics Occupational Outlook Handbook (OOH) in its abbreviated form.
	1/7	7. Cluster: Government & Public Service A. mining engineer B. ==restaurant server== C. military officer D. physical therapist	2: The job titles above must be identical to the ones that government official agencies indicate. 3: Waitstaff	7. Cluster: Careers in Government & Public Service E. mining engineer F. ==restaurant server== G. military officer H. physical therapist Rationale: Job title is consistent with US Bureau of Labor Statistics Occupational Outlook Handbook (OOH) in its singular, gender neutral form.
	1/8	8. Cluster: Health Services A. cashier B. carpenter C. ==secretary== D. physician	2: The job titles above must be identical to the ones that government official agencies indicate. 3: Administrative assistant	8. Cluster: Careers in Health Services E. cashier F. carpenter G. ==secretary== H. physician Rationale: Job title is consistent with US Bureau of Labor Statistics Occupational Outlook Handbook (OOH).

	1/10	10. Cluster: Human Services A. ==animator== B. miner C. machine operator D. hair stylist	2: The job titles above must be identical to the ones that government official agencies indicate. 3: illustrator	10. Cluster: Careers in Human Services E. ==animator== F. miner G. machine operator H. hair stylist Rationale: Job title is consistent with US Bureau of Labor Statistics Occupational Outlook Handbook (OOH).
	1/13	13. Cluster: Manufacturing A. veterinarian B. ==assembler== C. surgeon D. coach	2: The job titles above must be identical to the ones that government official agencies indicate. 3: constructor	13. Cluster: Careers in Manufacturing E. veterinarian F. ==assembler== G. surgeon H. coach Rationale: Job title is consistent with US Bureau of Labor Statistics Occupational Outlook Handbook (OOH).
	3/49	49. Which of the following best names worker A in picture 25? A) aerospace engineer B) ==conservation worker== C) assembler D) construction manager	2: The job titles above must be identical to the ones that government official agencies indicate. 3: Conservationist	49. Which of the following best names worker A in picture 25? A) aerospace engineer B) ==conservation worker== C) assembler D) construction manager Rationale: Job title is consistent with US Bureau of Labor Statistics Occupational Outlook Handbook (OOH).

	5/1	1. Because the worker in picture 1 is a wind turbine technician, he probably most likes to A. work with many people B. work outdoors C. work a regular schedule D. work in an office	3: Work the same schedule everyday	1. Because the worker in picture 1 is a wind turbine technician, he probably most likes to A. work with many people B. work outdoors C. work the same schedule every day D. work in an office Rationale: Modification based on rater suggestion.
	5/4	4. Because the workers in picture 4 are chemists, they probably most like to A. work with hand tools B. work a regular schedule C. travel as a part of work D. develop and analyze new things	3: Develop and analyze new substances	4. Because the workers in picture 4 are chemists, they probably most like to A. work with hand tools B. work a regular schedule C. travel as a part of work D. develop and analyze new substances Rationale: Modification based on rater suggestion.
	5/10	10. Because the workers in picture 10 are software developers, they probably most like to A. travel as part of work B. create new things and ideas C. work with little competition D. work outdoors	3: Work without competition from other job seekers	10. Because the workers in picture 10 are software developers, they probably most like to A. travel as part of work B. create new things and ideas C. work without competition from other job seekers D. work outdoors Rationale: Modification based on rater suggestion.

	5/14	14. Because the worker in picture 14 is a nurse, he probably most likes to A. develop new things and ideas B. work with hand tools C. work where there are many job openings D. travel as a part of work	3: Work where there are many career opportunities	14. Because the worker in picture 14 is a nurse, he probably most likes to A. develop new things and ideas B. work with hand tools C. work where there are many career opportunities D. travel as a part of work Rationale: Modification based on rater suggestion.

Sources for Modifications of Terminology

The instrument terms were selected based on information available from the U. S. Bureau of Labor Statistics. According to the U.S. Bureau of Labor Statistics, jobs can be grouped "by occupation using the Standard Occupational Classification (SOC) system. Another way to sort jobs is with the Career Clusters and pathways, a framework used by many schools and state agencies. Both methods of organizing career information are helpful for understanding the world of work, especially when they are used together" (Elka Torpey, "Clusters, pathways, and BLS: Connecting career information," *Career Outlook*, U.S. Bureau of Labor Statistics, March 2015).

Rationale for Modifications/No Changes to Job Titles

- Job titles used in the EA-CAI instrument are guided by the U. S. Bureau of Labor Statistics resources. The Occupational Outlook Handbook (OOH), is "a career resource offering information on the hundreds of occupations that provide the majority of jobs in the United States" (USBLS, https://www.bls.gov/ooh/about/occupational-information-included-in-the-ooh.htm).
- Some instrument job titles are modified to their less formal, colloquial counterpart (Example: Farm worker is abbreviated to farmer) as appropriate to the comprehension and readability levels of the learners.
- In such cases where modifications to job titles expressed in the guiding documents are made, gender-neutral delineations are maintained.
- Terms and job titles recommended for modification are listed below with respective definitions:

<u>Definitions of Terms</u>

Job: a regular remunerative position

Occupation: the principal business of one's life; vocation (the work in which a person is employed)

Career: a profession for which one trains and which is undertaken as a permanent calling; a field for or pursuit of consecutive progressive achievement especially in public, professional, or business life

Maid/Housekeeping Cleaner: one who performs any combination of light cleaning duties to maintain private households or commercial establishments, such as hotels and hospitals, in a clean and orderly <u>manner</u>

Waiter/Waitress: one who takes orders and serves food and beverages to customers in dining

Restaurant Server: the gender-neutral term for a waiter or waitress who is typically part of a wait staff

Secretary: one who performs routine clerical and administrative duties

Multimedia Artist/Animator: one who creates images that appear to move and visual effects for various forms of media and <u>entertainment</u>

Assembler/Fabricator: one who assembles finished products and the parts that go into them

Forest/Conservation Worker: one who measures and improves the quality of forests

Appendix G

Cover Letter and Guidelines for Interraters—Content and Construct Validity

Date: _____

Dear _____

Thank you, again, for your willingness to be an interrater for this study on Assessing Career Awareness of Early Adolescent Learners.

Having reached consensus on Phase 1: Correction of Terminology, I have revised the instrument and it is ready for your Phase 2: Content and Construct Validity review.

The Early Adolescent – Career Awareness Inventory (EA-CAI) was designed to assess the career awareness of adolescent learners. The goal of the EA-CAI instrument is to determine students' awareness of career options, requisites, routines, and rewards available in the contemporary employment field. To ensure the EA-CAI is measuring the targeted variables (careers and career awareness), both the content and construct validity of each variable in a given question must be assessed. Guidelines for completing the criteria rubrics are as follows:

Content Validity

Each question in the EA-CAI was designed to address the targeted content area (careers). To ensure each question is indeed accurately addressing the targeted content, the validity of the content reflected in each must be assessed. You are being tasked with *assessing the content validity* for the questions included in the EA-CAI - do these questions measure the content they were intended to measure?

To assess the EA-CAI for content validity, please review and evaluate the wording of each instrument question. Provide your rating on its relevancy to the career content in the operational definition for the instrument.

Construct Validity

As with content, each question in the EA-CAI was designed to address the targeted construct (career awareness). To ensure each question is indeed accurately addressing the targeted construct, the validity of the construct reflected in each must be assessed. You are being tasked with *assessing the construct validity* for the questions included in the EA-CAI - do these questions measure the construct they were intended to measure?

To assess the EA-CAI for construct validity, please review and evaluate the overall question of each instrument section. Provide your rating on the relevancy to the measurement of the construct *career awareness*.

Please complete Phase 2 of this protocol within 7 days and return the electronic response to wendyg@vt.edu by January 31, 2020.

Thank you,

Wendy

179

Appendix H

Content and Construct Interrater Validation Rubric

The Early Adolescent – Career Awareness Inventory (EA-CAI) was designed to assess the career awareness of adolescent learners. The goal of the EA-CAI instrument is to determine students' awareness of career options, requisites, routines, and rewards available in the contemporary employment field. To ensure the EA-CAI is measuring the targeted variables (careers and career awareness), both the content and construct validity of each variable in a given question must be assessed.

Content Validity

Each question in the EA-CAI was designed to address the targeted content area (careers). To ensure each question is indeed accurately addressing the targeted content, the validity of the content reflected in each must be assessed. You are being tasked with *assessing the content validity* for the questions included in the EA-CAI - do these questions measure the content they were intended to measure?

To assess the EA-CAI for content validity, please review and evaluate the wording of each instrument question. Provide your rating on its relevancy to the career content in the operational definition for the instrument.

Construct Validity

As with content, each question in the EA-CAI was designed to address the targeted construct (career awareness). To ensure each question is indeed accurately addressing the targeted construct, the validity of the construct reflected in each must be assessed. You are being tasked with *assessing the construct validity* for the questions included in the EA-CAI - do these questions measure the construct they were intended to measure?

To assess the EA-CAI for construct validity, please review and evaluate the overall question of each instrument section. Provide your rating on the relevancy to the measurement of the construct *career awareness*.

1

Instructions for assessing the content and construct validity

Instrument questions are organized on the following pages by respective sections (I – VII). Please place a check mark (✓) in the appropriate box to indicate whether or not each instrument question accurately reflects the targeted Content (career) and Construct (career awareness).

Section I: Categorize occupations by Career Clusters. (16 questions)
Jobs can be organized into "career clusters" based on what they have in common. For each question, four jobs are listed. Only one job matches the career cluster named. Choose the letter of the job that belongs in the career cluster named.

Questions	Content		Construct	
	Valid	Not Valid	Valid	Not Valid
1. Which job matches the Cluster: Careers in Agriculture, Food & Natural Resources? A. pharmacist B. bank teller C. college professor D. park ranger				
2. Which job matches the Cluster: Careers in Architecture & Construction? A. surveyor B. ticket agent C. software developer D. fashion designer				
3. Which job matches the Cluster: Careers in Arts, Audio/Visual Technology & Communications? A. personal fitness trainer B. plumber C. photographer D. housekeeper				

2

181

Questions	Content		Construct	
	Valid	Not Valid	Valid	Not Valid
4. Which job matches the Cluster: Careers in Business Management & Administration? A. chief executive officer B. radiologist C. welder D. aerospace engineer				
5. Which job matches the Cluster: Careers in Education? A. claims adjuster B. librarian C. chef D. dentist				
6. Which job matches the Cluster: Careers in Finance? A. farmer B. archeologist C. electrician D. accountant				
7. Which job matches the Cluster: Careers in Government & Public Administration? A. mining engineer B. restaurant server C. military officer D. physical therapist				

3

Questions	Content		Construct	
	Valid	Not Valid	Valid	Not Valid
8. Which job matches the Cluster: Careers in Health Sciences? A. cashier B. carpenter C. secretary D. physician				
9. Which job matches the Cluster: Careers in Hospitality & Tourism? A. police officer B. architect C. welder D. travel agent				
10. Which job matches the Cluster: Careers in Human Services? A. animator B. miner C. machine operator D. hair stylist				
11. Which job matches the Cluster: Careers in Information Technology? A. graphic designer B. geographer C. housekeeper D. environmental scientist				
12. Which job matches the Cluster: Cluster: Careers in Law, Public Safety, Corrections & Security? A. police officer B. musician C. bus driver D. auto mechanic				

4

		Content		Construct	
Questions	**Valid**	**Not Valid**	**Valid**	**Not Valid**	
13. Which job matches the Cluster: Careers in Manufacturing? A. veterinarian B. assembler C. surgeon D. coach					
14. Which job matches the Cluster: Careers in Marketing? A. dietician B. forensic scientist C. real estate agent D. pilot					
15. Which job matches the Cluster: Careers in Transportation, Distribution & Logistics? A. delivery driver B. dental hygienist C. broadcast technician D. geologist					
16. Which job matches the Cluster: Careers in Science, Technology, Engineering & Mathematics? A. hotel clerk B. school principal C. judge D. chemist					

5

Section II: Identify occupations based on level of education. (10 questions)

Some workers have to go to college to be able to do a job. On this section, one worker in each list needs a college degree. Select the letter of the worker that has to earn a college degree.

		Content		Construct	
Questions	**Valid**	**Not Valid**	**Valid**	**Not Valid**	
1. Which worker needs a college degree? A. baker B. dental hygienist C. hotel clerk D. carpenter					
2. Which worker needs a college degree? A. delivery driver B. chef C. bank teller D. aerospace engineer 3. Which worker needs a college degree? A. surgeon B. plumber C. farmer D. auto mechanic					
4. Which worker needs a college degree? A. secretary B. sculptor C. physician D. travel agent					

6

183

Questions	Content		Construct	
	Valid	Not Valid	Valid	Not Valid
5. Which worker needs a college degree? A. personal fitness trainer B. ticket agent C. restaurant server D. pharmacist				
6. Which worker needs a college degree? A. hair stylist B. fire fighter C. architect D. machine operator				
7. Which worker needs a college degree? A. real estate agent B. housekeeper C. web developer D. school principal				
8. Which worker needs a college degree? A. welder B. construction manager C. broadcast technician D. dentist				

Questions	Content		Construct	
	Valid	Not Valid	Valid	Not Valid
9. Which worker needs a college degree? A. purchasing agent B. lawyer C. customer service representative D. bus driver				
10. Which worker needs a college degree? A. claims adjuster B. photographer C. veterinarian D. truck driver				

184

Section III: Identify occupations from a picture. (50 questions)

Directions: People can do many different jobs. Some types of jobs are pictured in this section. Look at each picture. Then identify the worker by selecting the name that matches the job being done.

SAMPLE:

3A) Which of the following best names worker A in the sample picture?
A) hair stylist
B) nurse
C) bank teller
D) teacher

If you selected D, *teacher*, you are correct. Point your cursor to the letter D for question 3A and click to select. Next, look at the sample picture again. Select a worker that is closely related to the job of a teacher from the list in question 3B.

SAMPLE:
3B) Which worker is most related to job A shown in the sample picture?
A) truck driver
B) farmer
C) librarian
D) veterinarian

If you selected C, *librarian*, you are correct. Point your cursor to the letter C for question 3B and click to select. For these 30 questions, look at the picture. Select the name of the worker. Then select another worker that is closely related to the worker pictured.

Image	Questions	Content		Construct	
		Valid	Not Valid	Valid	Not Valid
	1. Which of the following best names the worker in picture 1? A) judge B) plumber C) college professor D) environmental scientist				
	2. Which worker is most related to the job shown in picture 1? A) welder B) purchasing agent C) lawyer D) geographer				
	3. Which of the following best names the worker in picture 2? A) electrician B) medical laboratory technician C) bus driver D) assembler				
	4. Which worker is most related to the job shown in picture 2? A) physician B) auto mechanic C) cashier D) carpenter				
	5. Which of the following best names the worker in picture 3? A) hotel clerk B) conservation scientist C) school principal D) secretary				
	6. Which worker is most related to job A shown in picture 3? A) housekeeper B) musician C) park ranger D) construction manager				

Image	Questions	Content		Construct	
		Valid	Not Valid	Valid	Not Valid
	7. Which of the following best names the worker in picture 4? A) claims adjuster　　B) firefighter C) radiologist　　　　D) personal fitness trainer				
	8. Which worker is most related to the job shown in picture 4? A) pilot　　　　　B) broadcast technician C) geologist　　　D) paramedic				
	9. Which of the following best names the worker in picture 6? A) lawyer　　　　B) military officer C) surveyor　　　D) archeologist				
	10. Which worker is most related to the job shown in picture 5? A) dentist　　　　　B) police officer C) graphic designer　D) construction manager				
	11. Which of the following best names the worker in picture 6? A) accountant　　B) architect C) surgeon　　　D) delivery driver				
	12. Which worker is most related to the job shown in picture 6? A) machine operator　B) fashion designer C) ticket agent　　　D) nurse				

Image	Questions	Content		Construct	
		Valid	Not Valid	Valid	Not Valid
	13. Which of the following best names the worker in picture 7? A) coach　　　　　　B) physical therapist C) medical laboratory D) restaurant server 　Technician				
	14. Which worker is most related to the job shown in picture 7? A) software developer　B) chef C) military personnel　D) forensic scientist				
	15. Which of the following best names the workers in picture 8? A) sculptor　　　B) judge C) musician　　　D) web developer				
	16. Which worker is most related to the job shown in picture 8? A) broadcast technician　B) real estate agent C) dietician　　　　　　D) dental hygienist				
	17. Which of the following best names the worker in picture 9? A) college professor　B) secretary C) librarian　　　　　D) dietician				
	18. Which worker is most related to the job shown in picture 9? A) plumber　　　　B) chemist C) personal fitness　D) customer service 　trainer　　　　　　　representative				

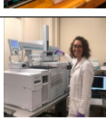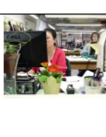| Image	Questions	Content		Construct	
		Valid	Not Valid	Valid	Not Valid
	19. Which of the following best names the worker on the right in picture 10? A) chief executive officer B) travel agent C) mining engineer D) pharmacist				
	20. Which worker is most related to the job shown in picture 10? A) bus driver B) wind turbine technician C) paleontologist D) radiologist				
	21. Which of the following best names the worker in picture 11? A) animator B) baker C) claims adjuster D) architect				
	22. Which worker is most related to the job shown in picture 11? A) carpenter B) veterinarian C) paleontologist D) school principal				
	23. Which of the following best names the worker in picture 12? A) coach B) hair stylist C) graphic designer D) baker				
	24. Which worker is most related to the job shown in picture 12? A) housekeeper B) chef C) software developer D) dentist				

Image	Questions	Content		Construct	
		Valid	Not Valid	Valid	Not Valid
	25. Which of the following best names the worker in picture 13? A) geographer B) electrician C) chief executive officer D) delivery driver				
	26. Which worker is most related to the job shown in picture 13? A) dietician B) photographer C) sculptor D) wind turbine technician				
	27. Which of the following best names the worker in picture 14? A) welder B) network technician C) park ranger D) purchasing agent				
	28. Which worker is most related to the job shown in picture 14? A) conservation scientist B) real estate agent C) physical therapist D) secretary				
	29. Which of the following best names the worker in picture 15? A) animator B) archeologist C) auto mechanic D) hotel clerk				
	30. Which worker is most related to the job shown in picture 15? A) truck driver B) surgeon C) surveyor D) network technician				

187

Image	Questions	Content		Construct	
		Valid	Not Valid	Valid	Not Valid
	31. Which of the following best names the worker in picture 16? A) park ranger B) pilot C) teacher D) welder				
	32. Which worker is most related to the job shown in picture 16? A) aerospace engineer B) police officer C) environmental scientist D) secretary				
	33. Which of the following best names the worker in picture 17? A) physician B) delivery driver C) geologist D) customer service representative				
	34. Which worker is most related to the job shown in picture 17? A) electrician B) hair stylist C) fashion designer D) mining engineer				
	35. Which of the following best names the worker in picture 18? A) bank teller B) firefighter C) park ranger D) nurse				
	36. Which worker is most related to the job shown in picture 18? A) coach B) housekeeper C) accountant D) judge				

Image	Questions	Content		Construct	
		Valid	Not Valid	Valid	Not Valid
	37. Which of the following best names the worker in picture 19? A) lawyer B) librarian C) pilot D) cashier				
	38. Which worker is most related to the job shown in picture 19? A) military officer B) school principal C) bus driver D) customer service representative				
	39. Which of the following best names the worker in picture 20? A) personal fitness trainer B) pharmacist C) forensic scientist D) ticket agent				
	40. Which of the following is most related to the job shown in picture 20? A) police officer B) plumber C) real estate agent D) restaurant server				
	41. Which of the following best names the workers in picture 21? A) physician B) radiologist C) secretary D) fashion designer				
	42. Which of the following is most related to the job shown in picture 21? A) photographer B) software developer C) surgeon D) loan officer				

Image	Questions	Content		Construct	
		Valid	Not Valid	Valid	Not Valid
	43. Which of the following best names the workers in picture 22? A) surveyor　　　B) police officer C) travel agent　　D) chemist				
	44. Which of the following is most related to the job shown in picture 22? A) truck driver　　B) welder C) pharmacist　　D) wind turbine technician				
	47. Which of the following best names the workers in picture 24? A) architect　　　B) broadcast technician C) paramedic　　　D) carpenter				
	48. Which of the following is most related to the job shown in picture 24? A) firefighter　　B) cashier C) chef　　　　　D) chief executive officer				
	49. Which of the following best names the workers in picture 25? A) aerospace engineer　B) assembler C) conservation worker　D) construction manager				
	50. Which of the following is most related to the job shown in picture 25? A) dentist　　　　B) photographer C) machine operator　D) medical laboratory technician				

Section IV: Categorize occupations as service- or product- oriented. (8 questions)

Directions: A product is something that a customer can see, touch, feel, wear, taste or use. Some jobs are mainly concerned with making a product. A service is a task that is done for a customer. Some jobs are mainly concerned with performing a service. In this survey section, pairs of workers are shown. Select the worker from each pair that is doing a job that results in a product.

SAMPLE:

4A) Which worker is doing a job that makes a product?

A.　welder　　　　　　　　　　　*B. police officer*

If you selected A, *welder*, you are correct. Point your cursor to the letter A for question 4A and click to select. For these 8 questions, select the worker in each pair that is doing a job that results in a product.

Image A	Image B	Questions	Content		Construct	
			Valid	Not Valid	Valid	Not Valid
		1. Which worker is doing a job that results in a product? A. farmer B. bank teller				
		2. Which worker is doing a job that results in a product? A. carpenter B. nurse				
		3. Which worker is doing a job that results in a product? A. housekeeper B. photographer				
		4. Which worker is doing a job that results in a product? A. animator B. physical therapist				
		5. Which worker is doing a job that results in a product? A. librarian B. fashion designer				

Image A	Image B	Questions	Content		Construct	
			Valid	Not Valid	Valid	Not Valid
		6. Which worker is doing a job that results in a product? A. assembler B. real estate agent				
		7. Which worker is doing a job that results in a product? A. fire fighter B. chef				
		8. Which worker is doing a job that results in a product? A. mining engineer B. coach				

Section V: Identify related job activities and work conditions. (14 questions)

Directions: Different jobs have different working conditions. Some jobs are outside, some are inside. Some jobs are active, and some are calm. Some jobs include working with a lot of people, and some jobs require working alone. On this survey section, select the phrase that best describes the job shown in the picture. (FKGL 5.4)

SAMPLE: Picture 5A

5A) Because he is a personal fitness trainer, the worker in picture 5A probably likes to
A. drive a vehicle
B. work outdoors
C. use hand tools
D. work with and help people

If you selected D, *work with and help people*, you are correct. Point your cursor to the letter D for question 5A and click to select. For these 14 questions, select the phrase that best describes the job shown in the picture.

Image	Questions	Content		Construct	
		Valid	Not Valid	Valid	Not Valid
	1. Because the worker in picture 1 is a wind turbine technician, he probably most likes to A. work with many people B. work outdoors C. work the same schedule every day D. work in an office				
	2. Because the worker in picture 2 is a secretary, she probably most likes to A. work the same schedule every day B. work outdoors C. travel as part of work D. work with hand tools				
	3. Because the worker in picture 3 is a pharmacist, she probably most likes to A. work outdoors B. work only weekdays C. work with and help people D. be creative and express herself				
	4. Because the workers in picture 4 are chemists, they probably most like to A. work with hand tools B. work the same schedule every day C. travel as a part of work D. develop and analyze new substances				

Image	Questions	Content		Construct	
		Valid	Not Valid	Valid	Not Valid
	5. Because the worker in picture 5 is a truck driver, he probably most likes to A. travel as part of work B. work outdoors C. use his hands to create things D. work in an office setting				
	6. Because the worker in picture 6 is a welder, he probably most likes to A. use his hands to create things B. work with and help people C. work outdoors D. work on the weekends				
	7. Because the worker on the left in picture 7 is a hair stylist, she probably most likes to A. work outdoors B. travel for work C. work with and help people D. develop and analyze new things				
	8. Because the worker in the center of picture 8 is a chief executive officer, she probably most likes to A. give orders B. work outdoors C. work on the weekends D. work with hand tools				

Image	Questions	Content		Construct	
		Valid	Not Valid	Valid	Not Valid
	9. Because the worker in picture 9 is a paleontologist, she probably most likes to A. work with many people B. work with hand tools C. work the same schedule every day D. travel as part of work				
	10. Because the workers in picture 10 are software developers, they probably most like to A. travel as part of work B. create new things and ideas C. work outdoors D. work without competition from other job seekers				
	11. Because the worker in picture 11 is a judge, he probably most likes to A. work with computers B. work outdoors C. travel as a part of work D. work with little competition				
	12. Because the worker on the left in picture 12 is a ticket agent, she probably most likes to A. work with and help people B. work only weekdays C. work the same schedule every day D. be creative and express herself				

		Content			Construct	
Image	Questions	Valid	Not Valid		Valid	Not Valid
	13. Because the worker in picture 13 is a sculptor, she probably most likes to A. be creative and express herself B. work with many people C. work outdoors D. give orders					
	14. Because the worker in picture 14 is a nurse, he probably most likes to A. develop new things and ideas B. work with hand tools C. travel as a part of work D. work where there are many career opportunities					

Section VI: Identify related pay and prestige. (12 items)

Sometimes people think about the pay they can earn for a job. In this section, you will be shown workers in two different jobs. For each question, select the worker that you feel has the higher pay.

SAMPLE:
6A) Which job earns the higher pay?
    A) teacher   *B) veterinarian*

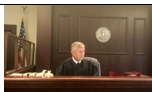
If you selected B, veterinarian, you are correct. Point your cursor to the letter B for question 5A and click to select. For these 12 questions, select the worker that earns the higher pay.

193
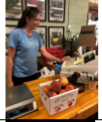
			Content		Construct	
Image A	Image B	Questions	Valid	Not Valid	Valid	Not Valid
		1. Which job earns the higher pay? A) pharmacist B) machine operator				
		2. Which job earns the higher pay? A) travel agent B) school principal				
		3. Which job earns the higher pay? A) pilot B) photographer				

			Content		Construct	
Image A	Image B	Questions	Valid	Not Valid	Valid	Not Valid
		4. Which job earns the higher pay? A) paramedic B) lawyer				
		5. Which job earns the higher pay? A) construction manager B) coach				
		6. Which job earns the higher pay? A) truck driver B) geographer				
		7. Which job earns the higher pay? A) assembler B) archeologist				
		8. Which job earns the higher pay? A) dental hygienist B) baker				

Image A	Image B	Questions	Content		Construct	
			Valid	Not Valid	Valid	Not Valid
		9. Which job earns the higher pay? A) conservation scientist B) cashier				
		10. Which job earns the higher pay? A) delivery driver B) network technician				
		11. Which job earns the higher pay? A) restaurant server B) broadcast technician				
		12. Which job earns the higher pay? A) hotel clerk B) forensic scientist				

Session VII: Familiarity with workers holding a variety of jobs. (14 items)

You may know workers who hold different jobs. These workers may be family members, friends, or people you know in your community. In this section, there are 14 jobs listed. If you know a worker who does the job, select letter A for "am familiar." If you don't know a worker who does the job, select letter B for "don't know."

Questions	Content		Construct	
	Valid	Not Valid	Valid	Not Valid
1. accountant A. am familiar B. don't know				
2. aerospace engineer A. am familiar B. don't know				
3. bus driver A. am familiar B. don't know				
4. claims adjuster A. am familiar B. don't know				
5. college professor A. am familiar B. don't know				
6. customer service representative A. am familiar B. don't know				
7. dentist A. am familiar B. don't know				
8. environmental scientist A. am familiar B. don't know				
9. graphic designer A. am familiar B. don't know				

Questions	Content			Construct	
	Valid	Not Valid		Valid	Not Valid
10. military officer A. am familiar B. don't know					
11. physician A. am familiar B. don't know					
12. plumber A. am familiar B. don't know					
13. purchasing agent A. am familiar B. don't know					
14. web developer A. am familiar B. don't know					

Appendix I

Institutional Review Board Approval Letter

VIRGINIA TECH.

Division of Scholarly Integrity and
Research Compliance
Institutional Review Board
North End Center, Suite 4120 (MC 0497)
300 Turner Street NW
Blacksburg, Virginia 24061
540/231-3732
irb@vt.edu
http://www.research.vt.edu/sirc/hrpp

MEMORANDUM

DATE: October 22, 2020

TO: John Wells, Wendy Sue Grimshaw

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires October 29, 2024)

PROTOCOL TITLE: Assessing the Career Awareness of Early Adolescent Learners

IRB NUMBER: 20-204

Effective October 22, 2020, the Virginia Tech Institution Review Board (IRB) approved the New Application request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

https://secure.research.vt.edu/external/irb/responsibilities.htm

(Please review responsibilities before beginning your research.)

PROTOCOL INFORMATION:

Approved As: **Expedited, under 45 CFR 46.110 category(ies) 7**
Protocol Approval Date: **October 22, 2020**
Progress Review Date: **October 22, 2021**

ASSOCIATED FUNDING:

The table on the following page indicates whether grant proposals are related to this protocol, and which of the listed proposals, if any, have been compared to this protocol, if required.

Invent the Future

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
An equal opportunity, affirmative action institution

198

Appendix J

Institutional Review Board Amendment Request Approval Letter

Division of Scholarly Integrity and
Research Compliance
Institutional Review Board
North End Center, Suite 4120 (MC 0497)
300 Turner Street NW
Blacksburg, Virginia 24061
540/231-3732
irb@vt.edu
http://www.research.vt.edu/sirc/hrpp

MEMORANDUM

DATE: January 19, 2021

TO: John Wells, Wendy Sue Grimshaw

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires October 29, 2024)

PROTOCOL TITLE: Assessing the Career Awareness of Early Adolescent Learners

IRB NUMBER: 20-204

Effective January 18, 2021, the Virginia Tech Institution Review Board (IRB) approved the Amendment request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at:

https://secure.research.vt.edu/external/irb/responsibilities.htm

(Please review responsibilities before beginning your research.)

PROTOCOL INFORMATION:

Approved As: **Expedited, under 45 CFR 46.110 category(ies) 7**
Protocol Approval Date: **October 22, 2020**
Progress Review Date: **October 22, 2021**

ASSOCIATED FUNDING:

The table on the following page indicates whether grant proposals are related to this protocol, and which of the listed proposals, if any, have been compared to this protocol, if required.

Invent the Future

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY
An equal opportunity, affirmative action institution

Appendix K

Recruitment Video Script

RECRUITMENT STEPS:

The following recruitment procedures will occur sequentially via the school's secure online Learning Management System.

1. Graduate researcher presents a pre-recorded reading of the introduction to the research study provided in the consent forms and invites students to participate (see script below).
2. Graduate researcher distributes the Recruitment Packet (parent consent and student assent forms), prefaced by a cover letter, which includes details (rationale, purpose, procedures, and timeline) explaining the research to which participants are being recruited.

SAY:

My name is Mrs. Grimshaw ▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪. Today, we are inviting you to participate in a research study to develop a survey that can be used to assess the level of career awareness among early adolescent learners such as you. Our research about students' career awareness has been approved by the Institutional Review Board at Virginia Tech (IRB # 20-204).

Career awareness is defined as "an understanding of the existence of and requirements for a wide array of professions" (Cole, 2011). Typically, career awareness is developed during students' elementary years, and includes knowledge of the requirements, routines and rewards of jobs and careers. This research study will investigate the potential for measuring the career awareness of early adolescent learners using an electronic survey.

We are inviting you to participate in this research study because you are enrolled as a sixth grade student at ▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪▪. Participation in this study is voluntary, meaning you and your parents can decide whether or not you will participate. You can choose not to participate, and the decision will not be held against you. You can choose to participate, and later change your mind. You can also ask unlimited questions before deciding whether or not you want to participate in the study.

If you choose to participate, you will be taking a survey that tells me what you think about careers. This electronic survey will be given to all participating sixth grade students ▪▪▪▪▪▪ ▪▪▪▪▪ and will take approximately one hour to complete. The survey has a total of 124 multiple choice questions. There are no risks or benefits to you for participating in the study. As a ▪▪▪▪▪ ▪▪▪▪▪▪▪▪ student, your participation in this study will have no effect on your grades or on your relationship with Virginia Tech. The information from the survey is simply to help me better understand what students your age think about careers and jobs.

Today, I am providing you with a packet that includes information about the research study, my contact information, as well as parent consent and student assent forms. The Parent/Student Consent Packet is posted to your Canvas module, and should be reviewed with your parents at

home. If you agree to participate in the research study, both the Parent Consent Form and the Student Assent Form need to be electronically completed, signed, and returned to me in Canvas no later than (day, date).

If you have any questions about the study, you can contact the Principle Investigator Dr. John G. Wells, or myself, by phone or email.

Appendix L

Consent Packet Cover Letter

October _____, 2020

Dear Parent or Guardian,

As a graduate student at Virginia Tech, I am pursuing a PhD in Integrative STEM Education. My dissertation research is focused on the career development of students in K-12 education settings. This semester, I will be conducting research to develop a new survey instrument that will assess the career awareness of early adolescent learners, specifically 6th grade students at ███ ██████████.

The development of this new career assessment instrument will rely on data collected during an on-line survey that will be administered to participating sixth grade students. Participation has no connection to the school curriculum, courses, or student grades. Because your child is in the sixth grade, he/she is being invited to participate. I am providing you with information about the research study in the linked parent Consent and student Assent forms.

Please review the Consent and Assent documents at home with your child. If you wish to allow your child to participate in the research study, please complete and sign both the Consent and Assent forms electronically. In order to participate, both forms should be submitted online via your child's secure ████ Canvas account by (day, date).

As an incentive to participate in this study, all students who complete and submit both the Parent Consent form and the Student Assent form will be automatically entered into a drawing. Eleven study participants from █████████████████████████ will be randomly selected to receive a Walmart gift card valued at $20. Depending on the number of eligible participants, each participant name will have at least a 1 in 30 chance of being selected.

Students who agree to participate, and who submit the Parent Consent and Student Assent forms as instructed, will receive notification of next steps through their Canvas account by (day, date).

If you have any questions, please feel free to contact me.

Sincerely,

Wendy S. Grimshaw

████████████

████████████

Appendix M

Parental Consent for A Child to Take Part in a Research Study Form

Title of research study: Assessing the Career Awareness of Early Adolescent Learners (IRB # 20-204)

Principal Investigator: Dr. John G. Wells
Other study contact(s): Wendy S. Grimshaw

Key Information: The following is a short summary of this study to help you decide whether or not you will allow your child to be a part of this study. More detailed information is listed later on in this form.

We are inviting your child to participate in this research study because they are enrolled as a sixth-grade student at ███████████████████.

What should I know about my child being in this research study?

- Someone will explain this research study to you
- Whether or not you want your child to participate is up to you
- You can choose not to have your child to participate
- You can agree to have your child participate and later change your mind
- Your decision will not be held against your child
- You can ask all the questions you want before deciding

What should I know about *this* research study?

The purpose of this study is to develop a survey that will accurately assess the career awareness of early adolescent learners. As an early adolescent learner, sixth grade students typically have career awareness: "an understanding of the existence of and requirements for a wide array of professions" (Cole, 2011). This research study will investigate the potential for measuring the career awareness of early adolescent learners with an electronic survey.

- The survey will be administered on-line and will consist of 124 multiple choice questions.
- Completing the survey will take about one hour, including directions and log-in time.
- The decision to allow or not allow your child to participate will in no way affect their grades or relationship with the school.
- Participation in the study presents no known risks or benefits for your child.

Detailed Information: The following is more detailed information about this study in addition to the information listed above.

Who can I talk to?

If you have questions, concerns, or complaints, or think the research has hurt you, talk to the research team at

Dr. John G Wells: jgwells@vt.edu, (540) 231-8471

Wendy S Grimshaw: wendyg@vt.edu , (540) 387-2513

This research has been reviewed and approved by the Virginia Tech Institutional Review Board (IRB). You may communicate with them at 540-231-3732 or irb@vt.edu if:

- You have questions about your rights as a research subject
- Your questions, concerns, or complaints are not being answered by the research team
- You cannot reach the research team
- You want to talk to someone besides the research team to provide feedback about this research

How many people will be studied?

We plan to include about 300 people in this research study.

What happens if I say yes, I want to be in this research?

- Your child will be asked to complete an electronic survey about jobs and careers.
- No identifying information about your child will be collected, and the survey responses will be anonymous.
- Your child's participation in this research study will last approximately one hour, including directions and log-in time.
- Your child will complete the study within a scheduled one-week time frame and will not miss any instructional class time to participate in this study.
- The EA-CAI survey will be administered on-line and will consist of 124 multiple choice questions.
- Your child will complete the survey on the Survey Monkey platform using their school-issued Chromebook device.
- Survey responses will be recorded and kept confidential on the graduate researcher's password protected Survey Monkey account.
- Once the survey has been completed, data will be used to determine the validity and reliability of the EA-CAI survey instrument, and the results will be used to inform the researcher's dissertation.

What Else Do I Need to Know?

To encourage student participation in this research, a random drawing will be held.

- All students who complete and submit the Parent Consent and the Student Assent forms will be automatically entered into a drawing.
- Eleven study participants from ███████████████████████ will be randomly selected to receive a Walmart gift card valued at $20.
- The 11 names will be randomly selected using a secure digital random generator tool. Depending on the number of eligible participants, each student name will have at least a 1 in 30 chance of being selected.
- To maintain participant confidentiality, no identifiable information other than first and last names of the 11 student participants randomly selected in the drawing will be sent in a password protected list to the school Principal.
- The Principal will mail a selection notification letter and the gift card to each of the 11 selected participants at the home addresses on file at ████████████████.

What happens if I say yes, but I change my mind later?

You can leave the research at any time, for any reason, and it will not be held against you.

If you decide to leave the research, contact the investigator so that the investigator can remove your child from the study roster. Data collected prior to the time of the withdrawal will be deleted.

Is there any way being in this study could be bad for me? (Detailed Risks)

There are no known risks to participating in this study.

What happens to the information collected for the research?

The research team will share no information that identifies the participants, school, or school district participating in this research study. All non-identifying collected data will be maintained confidentially and will be protected from unauthorized disclosure.

We will make every effort to limit the use and disclosure of your personal information, including research study records, only to people who have a need to review this information. We cannot promise complete confidentiality. Organizations that may inspect and copy your information include the IRB, Human Research Protection Program, and other authorized representatives of Virginia Tech.

The survey data results of this research study may be presented in summary form at conferences, in presentations, reports to the sponsor, academic papers, and as part of a thesis/dissertation.

Signature Block for Capable Adult

Your signature on this form documents your permission for your child to take part in this research. A copy of this form will be made available to you online for your records.

_____   _____
Signature of Parent/Guardian   Date

_____
Printed name of Parent/Guardian

_____   _____
Signature of person obtaining consent   Date

_____
Printed name of person obtaining consent

Appendix N

Student Assent to Take Part in a Research Study Form

Title of research study: Assessing the Career Awareness of Early Adolescent Learners (IRB #20-204)

Principal Investigator: Dr. John G. Wells, jgwells@vt.edu, (540) 231-8471
Other study contact(s): Wendy S. Grimshaw, wendyg@vt.edu, (540)387-2513

We want to tell you about a research study we are doing. A research study is a way to learn information about something. For this research study, we would like to find out more about career awareness. Career awareness is an understanding of the requirements, routines, and rewards related to different jobs and careers. You are being asked to take part in this research study because, as a sixth grader, you are considered an early adolescent learner. There is potential to measure the career awareness of early adolescent learners with an electronic survey instrument. The data from this study will be used to create a useful survey instrument called the Early Adolescent Career Awareness Instrument (EA-CAI).

If you agree to be in the study, you will be asked to complete an electronic survey about jobs and careers.

- The survey will be administered on-line and will consist of 124 multiple choice questions.
- Completing the survey will take about one hour, including directions and log-in time.
- The survey will be taken within a one-week time frame, and you will not miss any instructional class time.

Possible risks involved with this research study include: Risks are no more than would be expected in everyday life.

We do not know if you will be helped by being in this study. We may learn something that will help other children with understanding jobs and careers in the future.

What Else Do I Need to Know?

To encourage student participation in this research, a random drawing will be held.

- Once you have completed and submitted both the Parent Consent and Student Assent forms, your name will be entered into the drawing for a chance to receive one of 11 Walmart Gift Cards valued at $20 each.
- The 11 names will be randomly selected using a secure digital random generator tool. Depending on the number of eligible participants, each student name will have at least a 1 in 30 chance of being selected.
- To maintain participant confidentiality, no identifiable information other than first and last names of the 11 student participants randomly selected in the drawing will be sent in a password protected list to the school Principal.

- The Principal will mail a selection notification letter and a gift card to each of the 11 selected participants at the home addresses on file at ████████████████████.

You can ask Dr. John G. Wells or Wendy S. Grimshaw, at the contact information provided above, questions at any time about anything in this study. You can also ask your parent or guardian any questions you might have about this study.

If you have questions, are angry or are upset about something that happened while in the study, and/or are unable to reach the researchers, please tell your parent or guardian to please reach out to the Virginia Tech Institutional Review Board ("IRB") at 540-231-3732 or irb@vt.edu.

You do not have to join this research study. It is up to you. You can change your mind or stop at any time. Deciding to participate or not participate will have no effect on your grades, or your relationship with the school or teachers. No one will be upset if you do not sign this paper or if you change your mind later.

If you would like to be in this study, please print and sign your name in the spaces below. A copy of this form will be available for download online if you wish to have a copy for yourself.

Signature Block for Children

_____
Participant's Printed Name

_____   _____
Participant's Signature   Date

_____   _____
Printed name of person obtaining assent

_____   _____
Signature of person obtaining assent   Date

Appendix O

Administration Video Script

ADMINISTRATION SESSION:

The following administration procedures will occur sequentially via the school's secure online Learning Management System for only the section of students meeting participation prerequisites.

1. **Graduate researcher publishes an embedded pre-recorded reading of the introduction to the research study provided in the consent forms (italicized below).**
2. **Graduate researcher publishes the written directions for accessing the EA-CAI Survey using a link and password.**

Video Script:

My name is Mrs. Grimshaw ▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓▓*.*

Today you will be taking a survey that tells me what you think about careers. This survey will be given to all participating sixth grade students in our school. The survey focuses on the ideas you have about jobs in many career fields. The information from the survey will help me understand what students your age think about careers and jobs.

Participation in this survey is voluntary. The answers you choose will not be shared with anyone. There are no consequences, good or bad, for completing this survey. Your answers will simply tell me what you think about jobs and careers.

This survey should take you about 45 minutes to complete. There are seven sections on this survey, with a total of 124 multiple choice questions to answer. Each question will have either two or four answer choices from which to choose. Some questions will have images that you will need to look at before answering the question.

You are to answer the questions to the best of your ability using your school-issued Chromebook device. If you use a text reader, this tool will be available to you. You will need to complete all questions in a section of the survey before you can move on to another section. Should you wish to stop participating in this study, you can exit the survey at any time, and your responses will not be saved.

To continue participating in the study, read and complete the Survey Link and Log-In Directions provided under the Part 2: EA-CAI Survey Instructions heading in the Canvas module.

Appendix P

Administration Written Directions

ADMINISTRATION SESSION:

The following administration procedures will occur sequentially via the school's secure online Learning Management System for only the section of students meeting participation prerequisites.

1. Graduate researcher publishes an embedded pre-recorded reading of the introduction to the research study provided in the consent forms.
2. Graduate researcher publishes the written directions for accessing the EA-CAI Survey using a link and password (below).

WRITTEN DIRECTIONS:

When you are ready to begin the survey, you can click on the "EA-CAI Survey" link, located at the bottom of this page, one time. This will take you to the Survey Monkey log-in page.

Once the page loads, you should see a light gray box labeled 'Enter Password.'

Type the word 'candy' in the light gray box. Use only lower-case letters.

EA-CAI

This survey requires a password.If you do not know the password, contact the author of this survey for further assistance.

Enter Password
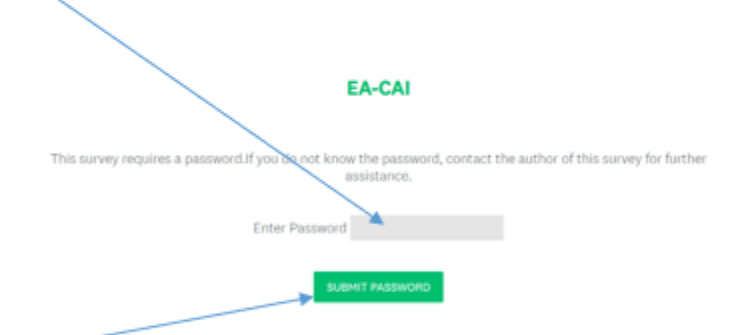
SUBMIT PASSWORD

Then **click** the green button that says 'Submit Password' to go to the Introduction and Sample screen of the survey.

Click the EA-CAI Survey link below to open the Survey Monkey Log-In page:

EA-CAI Survey

Appendix Q

Incentive Distribution Instruction Email to Principal

Dear ▮▮▮▮,

As a means of incentivizing student participation in the Assessing the Career Awareness of Early Adolescent Learners research study (IRB # 20-204), a random drawing will be conducted. All participating students will be entered into the drawing. Eleven participants from ▮▮▮▮▮▮ ▮▮▮▮▮▮▮▮▮ will be randomly selected to receive a $20 Walmart Gift Card.

To maintain participant confidentiality, no identifiable information other than first and last names of the 11 individuals randomly selected in the drawing is being provided to you for distribution of the incentive. The list of names of 11 selected participants has been recorded on the attached password protected Microsoft Excel document. In a separate email you will receive the password to unlock the document.

Once unlocked, please send each of the 11 randomly selected study participants one gift card and one notification of selection letter (using the attached template) to the student's home mailing address. The 11 gift cards will be delivered to you through the inter-office mail.

After the gift cards and letters have been mailed, please delete the list of student names. Then send me an email to confirm that the drawing incentive distribution has been concluded and the list of 11 participants has been deleted.

Thank you,

Wendy Grimshaw

Appendix R

Principal Password Email for Drawing Incentive Distribution

To: _____

CC: jgwells@vt.edu; wendyg@vt.edu

Subject: Participant Drawing Incentive Password

Dear █████████,

Please use █████████████████████████ as the password to unlock the protected Excel document sent to you in a previous email and access the list of student names.

Sincerely,

Wendy Grimshaw

Appendix S

Participant Drawing Selection Letter

(Date: Month-Day-Year)

Dear _____,

I am pleased to inform you that your name was randomly selected in the Early Adolescent Career Awareness research study (Virginia Tech IRB # 20-204) participant drawing. Your $20 Walmart gift card is enclosed.

Thank you for your participation!

Sincerely,

Wendy Grimshaw

Appendix T

Flesch-Kincaid Readability Statistics for the EA-CAI Instrument

Total EA-CAI Instrument:

Readability Statistics   ? ✕

Counts

Words	2,599
Characters	12,107
Paragraphs	220
Sentences	200

Averages

Sentences per Paragraph	1.3
Words per Sentence	12.0
Characters per Word	4.4

Readability

Flesch Reading Ease	74.2
Flesch-Kincaid Grade Level	5.8
Passive Sentences	4.5%

Total Section 1:

Readability Statistics   ?   ✕

Counts

Words	303
Characters	1,682
Paragraphs	26
Sentences	28

Averages

Sentences per Paragraph	1.3
Words per Sentence	10.5
Characters per Word	5.3

Readability

Flesch Reading Ease	54.6
Flesch-Kincaid Grade Level	8.2
Passive Sentences	7.1%

Section 1 Directions:

Readability Statistics   ?   ✕

Counts

Words	146
Characters	706
Paragraphs	9
Sentences	12

Averages

Sentences per Paragraph	2.4
Words per Sentence	11.7
Characters per Word	4.6

Readability

Flesch Reading Ease	71.9
Flesch-Kincaid Grade Level	6.1
Passive Sentences	16.6%

Section 1 Questions:

Readability Statistics   ?   ✕

Counts

Words	157
Characters	976
Paragraphs	17
Sentences	16

Averages

Sentences per Paragraph	1.0
Words per Sentence	9.5
Characters per Word	5.9

Readability

Flesch Reading Ease	38.4
Flesch-Kincaid Grade Level	10.2
Passive Sentences	0.0%

Section 2:

Readability Statistics   ?   ✕

Counts

Words	206
Characters	977
Paragraphs	20
Sentences	21

Averages

Sentences per Paragraph	1.4
Words per Sentence	9.4
Characters per Word	4.5

Readability

Flesch Reading Ease	75.4
Flesch-Kincaid Grade Level	5.0
Passive Sentences	0.0%

Section 3:

Readability Statistics   ?   ✕

Counts

Words	933
Characters	4,087
Paragraphs	69
Sentences	66

Averages

Sentences per Paragraph	1.1
Words per Sentence	13.8
Characters per Word	4.2

Readability

Flesch Reading Ease	75.9
Flesch-Kincaid Grade Level	6.1
Passive Sentences	3.0%

Section 4:

Readability Statistics   ?   ✕

Counts

    Words   295
    Characters   1,343
    Paragraphs   25
    Sentences   22

Averages

    Sentences per Paragraph   1.5
    Words per Sentence   12.0
    Characters per Word   4.2

Readability

    Flesch Reading Ease   79.2
    Flesch-Kincaid Grade Level   5.1
    Passive Sentences   4.5%

Section 5:

Readability Statistics   ?   ✕

Counts

    Words   182
    Characters   853
    Paragraphs   11
    Sentences   12

Averages

    Sentences per Paragraph   3.0
    Words per Sentence   12.3
    Characters per Word   4.5

Readability

    Flesch Reading Ease   75.9
    Flesch-Kincaid Grade Level   5.7
    Passive Sentences   0.0%

Section 6:

Readability Statistics   ?   ✕

Counts

Words	252
Characters	1,270
Paragraphs	32
Sentences	23

Averages

Sentences per Paragraph	1.3
Words per Sentence	9.0
Characters per Word	4.3

Readability

Flesch Reading Ease	84.5
Flesch-Kincaid Grade Level	3.7
Passive Sentences	0.0%

Section7:

Readability Statistics   ?   ✕

Counts

Words	304
Characters	1,308
Paragraphs	20
Sentences	25

Averages

Sentences per Paragraph	1.2
Words per Sentence	12.1
Characters per Word	4.1

Readability

Flesch Reading Ease	73.4
Flesch-Kincaid Grade Level	6.0
Passive Sentences	12.0%

Appendix U

Item Analysis Mean Statistic Data

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
q0001	51	1	0	1	.65	.483	.233	-.634	.333	-1.665	.656
q0002	51	1	0	1	.53	.504	.254	-.121	.333	-2.068	.656
q0003	51	1	0	1	.96	.196	.038	-4.893	.333	22.834	.656
q0004	51	1	0	1	.76	.428	.184	-1.286	.333	-.361	.656
q0005	51	1	0	1	.92	.272	.074	-3.232	.333	8.789	.656
q0006	51	1	0	1	.88	.325	.106	-2.446	.333	4.144	.656
q0007	51	1	0	1	.88	.325	.106	-2.446	.333	4.144	.656
q0008	51	1	0	1	.96	.196	.038	-4.893	.333	22.834	.656
q0009	51	1	0	1	.82	.385	.148	-1.749	.333	1.101	.656
q0010	51	1	0	1	.76	.428	.184	-1.286	.333	-.361	.656
q0011	51	1	0	1	.61	.493	.243	-.455	.333	-1.868	.656
q0012	51	1	0	1	.92	.272	.074	-3.232	.333	8.789	.656
q0013	51	1	0	1	.92	.272	.074	-3.232	.333	8.789	.656
q0014	51	1	0	1	.86	.348	.121	-2.173	.333	2.830	.656
q0015	51	1	0	1	.86	.348	.121	-2.173	.333	2.830	.656
q0016	51	1	0	1	.90	.300	.090	-2.786	.333	5.996	.656
q0017	51	1	0	1	.98	.140	.020	-7.141	.333	51.000	.656
q0018	51	1	0	1	.88	.325	.106	-2.446	.333	4.144	.656
q0019	51	1	0	1	.96	.196	.038	-4.893	.333	22.834	.656
q0020	51	1	0	1	.88	.325	.106	-2.446	.333	4.144	.656
q0021	51	1	0	1	.82	.385	.148	-1.749	.333	1.101	.656
q0022	51	1	0	1	.63	.488	.238	-.543	.333	-1.776	.656
q0023	51	1	0	1	.61	.493	.243	-.455	.333	-1.868	.656
q0024	51	1	0	1	.78	.415	.173	-1.425	.333	.030	.656
q0025	51	1	0	1	.98	.140	.020	-7.141	.333	51.000	.656
q0026	51	1	0	1	.80	.401	.161	-1.578	.333	.508	.656
q0027	51	0	1	1	1.00	.000	.000	.	.	.	.
q0028	51	1	0	1	.88	.325	.106	-2.446	.333	4.144	.656
q0029	51	0	1	1	1.00	.000	.000	.	.	.	.
q0030	51	1	0	1	.96	.196	.038	-4.893	.333	22.834	.656
q0031	51	1	0	1	.94	.238	.056	-3.865	.333	13.462	.656
q0032	51	1	0	1	.84	.367	.135	-1.945	.333	1.853	.656
q0033	51	1	0	1	.90	.300	.090	-2.786	.333	5.996	.656
q0034	51	1	0	1	.73	.451	.203	-1.041	.333	-.954	.656
q0035	51	1	0	1	.51	.505	.255	-.040	.333	-2.082	.656

q0036	51	1	0	1	.98	.140	.020	-7.141	.333	51.000	.656
q0037	51	0	1	1	1.00	.000	.000	.	.	.	.
q0038	51	1	0	1	.98	.140	.020	-7.141	.333	51.000	.656
q0039	51	0	1	1	1.00	.000	.000	.	.	.	.
q0040	51	0	1	1	1.00	.000	.000	.	.	.	.
q0041	51	0	1	1	1.00	.000	.000	.	.	.	.
q0042	51	1	0	1	.84	.367	.135	-1.945	.333	1.853	.656
q0043	51	1	0	1	.88	.325	.106	-2.446	.333	4.144	.656
q0044	51	1	0	1	.41	.497	.247	.370	.333	-1.941	.656
q0045	51	1	0	1	.96	.196	.038	-4.893	.333	22.834	.656
q0046	51	1	0	1	.45	.503	.253	.203	.333	-2.040	.656
q0047	51	1	0	1	.98	.140	.020	-7.141	.333	51.000	.656
q0048	51	1	0	1	.86	.348	.121	-2.173	.333	2.830	.656
q0049	51	0	1	1	1.00	.000	.000	.	.	.	.
q0050	51	3	0	3	.98	.374	.140	2.159	.333	19.267	.656
q0051	51	0	1	1	1.00	.000	.000	.	.	.	.
q0052	51	1	0	1	.88	.325	.106	-2.446	.333	4.144	.656
q0053	51	0	1	1	1.00	.000	.000	.	.	.	.
q0054	51	1	0	1	.78	.415	.173	-1.425	.333	.030	.656
q0055	51	0	1	1	1.00	.000	.000	.	.	.	.
q0056	51	1	0	1	.80	.401	.161	-1.578	.333	.508	.656
q0057	51	0	1	1	1.00	.000	.000	.	.	.	.
q0058	51	1	0	1	.86	.348	.121	-2.173	.333	2.830	.656
q0059	51	1	0	1	.96	.196	.038	-4.893	.333	22.834	.656
q0060	51	1	0	1	.98	.140	.020	-7.141	.333	51.000	.656
q0061	51	0	1	1	1.00	.000	.000	.	.	.	.
q0062	51	0	1	1	1.00	.000	.000	.	.	.	.
q0063	51	0	1	1	1.00	.000	.000	.	.	.	.
q0064	51	1	0	1	.98	.140	.020	-7.141	.333	51.000	.656
q0065	51	1	0	1	.57	.500	.250	-.286	.333	-1.998	.656
q0066	51	1	0	1	.33	.476	.227	.729	.333	-1.531	.656
q0067	51	0	1	1	1.00	.000	.000	.	.	.	.
q0068	51	1	0	1	.80	.401	.161	-1.578	.333	.508	.656
q0069	51	1	0	1	.90	.300	.090	-2.786	.333	5.996	.656
q0070	51	1	0	1	.82	.385	.148	-1.749	.333	1.101	.656
q0071	51	1	0	1	.94	.238	.056	-3.865	.333	13.462	.656
q0072	51	1	0	1	.92	.272	.074	-3.232	.333	8.789	.656
q0073	51	1	0	1	.76	.428	.184	-1.286	.333	-.361	.656

q0074	51	1	0	1	.96	.196	.038	-4.893	.333	22.834	.656
q0075	51	0	1	1	1.00	.000	.000	.	.	.	.
q0076	51	1	0	1	.90	.300	.090	-2.786	.333	5.996	.656
q0077	51	1	0	1	.82	.385	.148	-1.749	.333	1.101	.656
q0078	51	1	0	1	.88	.325	.106	-2.446	.333	4.144	.656
q0079	51	1	0	1	.82	.385	.148	-1.749	.333	1.101	.656
q0080	51	1	0	1	.84	.367	.135	-1.945	.333	1.853	.656
q0081	51	0	1	1	1.00	.000	.000	.	.	.	.
q0082	51	1	0	1	.84	.367	.135	-1.945	.333	1.853	.656
q0083	51	1	0	1	.90	.300	.090	-2.786	.333	5.996	.656
q0084	51	1	0	1	.90	.300	.090	-2.786	.333	5.996	.656
q0085	51	1	0	1	.96	.196	.038	-4.893	.333	22.834	.656
q0086	51	1	0	1	.92	.272	.074	-3.232	.333	8.789	.656
q0087	51	1	0	1	.96	.196	.038	-4.893	.333	22.834	.656
q0088	51	1	0	1	.82	.385	.148	-1.749	.333	1.101	.656
q0089	51	1	0	1	.96	.196	.038	-4.893	.333	22.834	.656
q0090	51	1	0	1	.92	.272	.074	-3.232	.333	8.789	.656
q0091	51	1	0	1	.96	.196	.038	-4.893	.333	22.834	.656
q0092	51	1	0	1	.92	.272	.074	-3.232	.333	8.789	.656
q0093	51	1	0	1	.82	.385	.148	-1.749	.333	1.101	.656
q0094	51	1	0	1	.86	.348	.121	-2.173	.333	2.830	.656
q0095	51	1	0	1	.94	.238	.056	-3.865	.333	13.462	.656
q0096	51	1	0	1	.69	.469	.220	-.827	.333	-1.371	.656
q0097	51	1	0	1	.94	.238	.056	-3.865	.333	13.462	.656
q0098	51	1	0	1	.47	.504	.254	.121	.333	-2.068	.656
q0099	51	0	0	0	.00	.000	.000	.	.	.	.
q0100	51	1	0	1	.20	.401	.161	1.578	.333	.508	.656
q0101	51	1	0	1	.98	.140	.020	-7.141	.333	51.000	.656
q0102	51	1	0	1	.94	.238	.056	-3.865	.333	13.462	.656
q0103	51	1	0	1	.92	.272	.074	-3.232	.333	8.789	.656
q0104	51	1	0	1	.75	.440	.194	-1.159	.333	-.685	.656
q0105	51	1	0	1	.63	.488	.238	-.543	.333	-1.776	.656
q0106	51	1	0	1	.92	.272	.074	-3.232	.333	8.789	.656
q0107	51	1	0	1	.98	.140	.020	-7.141	.333	51.000	.656
q0108	51	0	1	1	1.00	.000	.000	.	.	.	.
q0109	51	0	1	1	1.00	.000	.000	.	.	.	.
q0110	51	0	1	1	1.00	.000	.000	.	.	.	.
Valid N (listwise)	51										

Appendix V

Total Instrument Descriptive Statistics Analysis

		S1	S2	S3	S4	S5	S6	S7	Total
N	Valid	51	51	51	51	51	51	51	51
	Missing	0	0	0	0	0	0	0	0
Mean		13.2157	8.3333	44.2745	7.0196	12.1569	9.3137	14.0000	108.3137
Std. Error of Mean		.39039	.33801	.69962	.23007	.30980	.16207	.00000	1.82756
Median		14.0000	9.0000	46.0000	8.0000	13.0000	10.0000	14.0000	115.0000
Mode		14.00	10.00	46.00	8.00	13.00	10.00	14.00	117.00
Std. Deviation		2.78793	2.41385	4.99631	1.64305	2.21244	1.15741	.00000	13.05142
Variance		7.773	5.827	24.963	2.700	4.895	1.340	.000	170.340
Range		12.00	9.00	19.00	5.00	9.00	4.00	.00	50.00
Minimum		4.00	1.00	30.00	3.00	5.00	7.00	14.00	70.00
Maximum		16.00	10.00	49.00	8.00	14.00	11.00	14.00	120.00
Percentiles	25	13.0000	7.0000	41.0000	6.0000	12.0000	8.0000	14.0000	103.0000
	50	14.0000	9.0000	46.0000	8.0000	13.0000	10.0000	14.0000	115.0000
	75	15.0000	10.0000	48.0000	8.0000	13.0000	10.0000	14.0000	117.0000

Frequency Table

S1

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	4.00	1	2.0	2.0	2.0
	6.00	1	2.0	2.0	3.9
	7.00	2	3.9	3.9	7.8
	8.00	1	2.0	2.0	9.8
	10.00	2	3.9	3.9	13.7
	11.00	3	5.9	5.9	19.6
	12.00	2	3.9	3.9	23.5
	13.00	9	17.6	17.6	41.2
	14.00	11	21.6	21.6	62.7
	15.00	10	19.6	19.6	82.4
	16.00	9	17.6	17.6	100.0
	Total	51	100.0	100.0	

S2

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	1.00	1	2.0	2.0	2.0
	3.00	3	5.9	5.9	7.8
	4.00	2	3.9	3.9	11.8
	5.00	3	5.9	5.9	17.6
	6.00	1	2.0	2.0	19.6
	7.00	3	5.9	5.9	25.5
	9.00	15	29.4	29.4	54.9
	10.00	23	45.1	45.1	100.0
	Total	51	100.0	100.0	

S3

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	30.00	1	2.0	2.0	2.0
	31.00	1	2.0	2.0	3.9
	32.00	1	2.0	2.0	5.9
	34.00	1	2.0	2.0	7.8
	37.00	2	3.9	3.9	11.8
	38.00	3	5.9	5.9	17.6
	40.00	1	2.0	2.0	19.6
	41.00	3	5.9	5.9	25.5
	43.00	2	3.9	3.9	29.4
	44.00	1	2.0	2.0	31.4
	45.00	1	2.0	2.0	33.3
	46.00	14	27.5	27.5	60.8
	47.00	3	5.9	5.9	66.7
	48.00	13	25.5	25.5	92.2
	49.00	4	7.8	7.8	100.0
	Total	51	100.0	100.0	

S4

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3.00	5	9.8	9.8	9.8
	4.00	1	2.0	2.0	11.8
	5.00	2	3.9	3.9	15.7
	6.00	5	9.8	9.8	25.5
	7.00	5	9.8	9.8	35.3
	8.00	33	64.7	64.7	100.0
	Total	51	100.0	100.0	

S5

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5.00	2	3.9	3.9	3.9
	7.00	2	3.9	3.9	7.8
	8.00	2	3.9	3.9	11.8
	10.00	1	2.0	2.0	13.7
	11.00	2	3.9	3.9	17.6
	12.00	6	11.8	11.8	29.4
	13.00	28	54.9	54.9	84.3
	14.00	8	15.7	15.7	100.0
	Total	51	100.0	100.0	

S6

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	7.00	4	7.8	7.8	7.8
	8.00	10	19.6	19.6	27.5
	9.00	9	17.6	17.6	45.1
	10.00	22	43.1	43.1	88.2
	11.00	6	11.8	11.8	100.0
	Total	51	100.0	100.0	

S7

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	14.00	51	100.0	100.0	100.0

Total

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	70.00	1	2.0	2.0	2.0
	73.00	1	2.0	2.0	3.9
	77.00	1	2.0	2.0	5.9
	81.00	1	2.0	2.0	7.8
	84.00	1	2.0	2.0	9.8
	90.00	1	2.0	2.0	11.8
	91.00	1	2.0	2.0	13.7
	94.00	1	2.0	2.0	15.7
	96.00	1	2.0	2.0	17.6
	97.00	1	2.0	2.0	19.6
	100.00	1	2.0	2.0	21.6
	101.00	1	2.0	2.0	23.5
	103.00	1	2.0	2.0	25.5
	105.00	1	2.0	2.0	27.5
	106.00	3	5.9	5.9	33.3
	111.00	2	3.9	3.9	37.3
	112.00	2	3.9	3.9	41.2
	113.00	1	2.0	2.0	43.1
	114.00	2	3.9	3.9	47.1
	115.00	5	9.8	9.8	56.9
	116.00	6	11.8	11.8	68.6
	117.00	9	17.6	17.6	86.3
	118.00	1	2.0	2.0	88.2
	119.00	5	9.8	9.8	98.0
	120.00	1	2.0	2.0	100.0
	Total	51	100.0	100.0	

236