# Examining the Relationship Between Noncognitive Skills and Task Completion in an Agricultural Mechanics Course

A Thesis

Presented in Partial Fulfillment of the Requirements for the

Degree of Master of Science

in the

College of Graduate Studies

University of Idaho

by

Zachery T. Putzier

Major Professor: Kasee L. Smith, Ph.D.

Committee Members: Kattlyn J. Wolf, Ph.D.; Carol L. Billing, Ph.D.

Interim Department Chair: Kattlyn J. Wolf, Ph.D.

December 2023

**Abstract**

Federal funding supports Career and Technical Education (CTE) and allows educators to give students the hands-on experiences they need to be successful later in life. Students have the opportunity to learn about trades and gain real life work experiences while in the classroom. This study is descriptive-relational and examines noncognitive tasks/task motivation in a population of high school agricultural mechanics students. In this study, self-efficacy, followthrough, teamwork, self-regulation, commitment, communication, positive outlook, and completion are described for the population and these factors are examined for differences based on population demographics. The results indicate no strong relationship between noncognitive skills overall and task completion for psychomotor or cognitive tasks. Some observations included score changes between self-efficacy and followthrough constructs based on school and although not empirical some interesting scores based on self-efficacy and gender. We recommendation future research in the area of self-efficacy and gender, specifically in self-efficacy and school as it relates to noncognitive and psychomotor tasks.

**Acknowledgements**

McKenna – You're the one that got me into this in the first place, I'm still not sure if I forgive you for all the late nights it took to get here. In all seriousness, you're one of my best friends and I wouldn't have wanted to do this with anyone else. Thank you for always being there for me, no matter what. I'm excited to see where this journey takes us, and I hope we can continue to grow on what we have found through our research.

Dr. Billing – We have known each other for a very long time. Thank you for letting me have the opportunity to be "part of your family" over the years. You were my first education professor and helped me unearth my passion for teaching. Your lessons in and out of the classroom were always helpful and are appreciated. Thank you!

Dr. Smith – Thank you for putting up with me during undergrad and all my shenanigans, your constant support willingness to help me learn will never be forgotten. Thank you for answering my countless, constant questions and helping me make sense of everything. During this whole process you taught me a lot about research and that "it will be okay". You taught me how to be a better teacher and human, for that, I will always be grateful. I look forward to continuing to work with you through Idaho Ag Ed.

Dr. Wolf – Thank you for always keeping it real and kicking me into gear when it was needed. I will always remember your classes and how helpful they were. You taught me a lot about being a teacher and those tough lessons have helped me become a stronger individual and teacher in result. Thank you for everything!

## Dedication

This thesis is dedicated to my former students. There will always be times where you are uncertain about the future and times you will want to give up. Never give-up on your dreams, through perseverance anything is possible if you have the drive. Always know that nothing is impossible.

# Table of Contents

## List of Tables

## List of Figures

# Chapter 1: Introduction

## Background

Students have the opportunity to gain career-based skills through Career and Technical education (CTE), these programs provide resources for students, teachers and programs and reaches out to all parts of the state to form lasting partnerships between education and industry (About, n.d.). There are several sectors of CTE; Family and Consumer Sciences (FCS), Business and Marketing Education (BME), and Agriculture, Food & Natural Resources (AFNR) are some examples. Within the AFNR content area, students can take courses in pathways for welding, small gas engines, animal science, plant science, and more. Idaho CTE defines pathways as "a prescribed sequence of CTE courses culminating with a capstone course" (Idaho, 2022). CTE courses are typically project-based and focus on the practical skills students can carry into adulthood and the workplace (Idaho State Department of Education, 2022). CTE courses frequently allow students to gain relevant knowledge and career skills along with workplace readiness skills necessary to compete in the current job market (Gordon, 2008).

Stone (2017, p. 155) explained, "Understanding what is called Career and Technical Education (CTE) in the United States should begin with recognition of the fact that the United States has no national system linking education and the workforce." CTE is designed to bridge the gap between secondary education and the workplace by giving students the hands-on tasks and experiences they need. The structure of CTE provides a conduit to both education and the economic structure of the United States, "CTE has the potential to play a key role in American economic competitiveness. As a nation, we cannot compete with less-developed nations on labor costs, which means we must compete on the quality of goods and

services we produce," (Stone, 2017, 156). Hyslop (2008) noted that students may not be receiving necessary workplace readiness skills unless they are exposed to CTE opportunities.

The emphasis on career-readiness is prevalent in Idaho CTE policy and practices. The Idaho Division of CTE assesses student workplace readiness through specific assessments designed to determine if students are ready to work in a trade specific job after they complete an Idaho CTE program (Workplace Readiness, 2022). The Workplace Readiness Assessment (WRA) measures understanding of the career readiness standards in personal, professional, and technical knowledge and skills. Idaho CTE students are required to complete a CTE pathway (Workplace Readiness, 2022). Each year high school seniors enrolled in a CTE capstone course take this exam.

Although often described by many different terms including soft skills, 21st century skills, or social-emotional skills (Camfield, 2015), most experts agree that a group of factors outside of cognitive ability help to drive workplace readiness (Khine & Areepattamannil, 2016). These noncognitive skills are expansive, and include concepts related to resilience, motivation, outlook, and self-efficacy (Heckman, et al., 2006). Collectively, measuring noncognitive skills allows an appraisal of an individual's predisposition to focus passion and perseverance toward a task, maintain a positive outlook on life, internalize decision-making, and assess personal skills required to achieve goals (Bandura, 1982; Duckworth, Peterson, Matthews, & Kelly, 2007; Pajares, 2009; Rotter, 1966; Scheier & Carver, 1985). Through the Work Ready Mindset Inventory (WRMI), there is a singular way that noncognitive characteristics like self-efficacy, followthrough, teamwork, self-regulation, commitment, communication, positive outlook, and completion can be assessed.

To assist students in gaining knowledge and skills related to careers, CTE programs instruct students using both cognitive and psychomotor domains of learning (Gordon, 2008). Gagne's taxonomy of learning outcomes describes three domains for learning: cognitive, affective, psychomotor (Gagne & Briggs, 1974). The interaction between cognitive and psychomotor skills can lead to knowledge and skill, while the affective domain includes attitudes and beliefs toward both the content and its application (Gagne & Briggs, 1974). The affective domain, which is closely tied to noncognitive skills, is often overlooked in examinations of student learning (Marshall, 2008) although the affective domain has large implications for student motivation and engagement (Gagne & Briggs, 1974). According to Saeed and Zyngier (2012, p. 254) "Numerous research studies have shown that intrinsically motivated students have higher achievement levels."

In AFNR subjects, there is little research to highlight what factors might influence students to complete a task or how task motivation plays a role in academic achievement in AFNR courses. Ford et al. (n.d., p. 101) said, "a large number of high school students across America lack academic motivation." De Lay and Swan (2013) noted, "secondary agriculture teachers hold a great deal of power related to student apathy and the potential impact of an agriculture program can be substantial," (p. 115).

Lack of motivation increases the need for CTE programs and teachers to focus on building well-rounded, employable students (Gordon, 2008). Noncognitive skills may help contribute to student aptitude and success (Duening, 2010; Egalite, Mill, & Greene, 2016; Usher & Pajares, 2008). Task motivation can be defined as perseverance in academic settings relates to students' motivation to persist in a task despite obstacles or challenges (Farrington, et al., 2012). The lack of motivation is occurring across the United States and is starting to be

a significant problem. According to De Lay and Swan (2014), “Teachers of secondary agricultural education have expressed a growing concern over the challenge to get students motivated to participate in the opportunities available.” Boone and Boone (2007) said, “experienced teachers struggle with a lack of student motivation evidenced by apathy, negative attitudes, and hesitation with their commitments”.

To better help educators, a solution to combat the lack in student motivation, or lack of apathy is “opening more lines of communication, parents placed in a coaching role to help their students work through individual obstacles and develop plans for personal improvement,” (De Lay & Swan, 2014, p.115). When it comes to student learning and motivating them to complete the task, “students who believe they are progressing and achieve positive outcomes will continue their commitment to learning,” (De Lay & Swan, 2013, p.108).

**Significance of the Study**

The importance of workplace readiness is central to the purpose of CTE programs (Gordon, 2008). Although the importance of teaching in both cognitive and psychomotor domains in CTE courses is well-established by researchers (Kotamaraju, 2007), little is known about the interaction of noncognitive workplace readiness skills and specific task motivation in cognitive and psychomotor tasks within CTE courses. By examining not only student noncognitive skills, but also their motivation levels toward tasks in a CTE course, we may be able to better describe the task motivation for CTE students and better integrate all three domains of learning to steer students toward career readiness.

## Purpose and Objectives

The purpose of this study was to examine the relationship between noncognitive skills and task motivation in an Agricultural Mechanics course. To meet this purpose, the study was guided by the following objectives:

1. Identify the noncognitive skills of students enrolled in agricultural mechanics and classes;
2. Describe the noncognitive skills of students enrolled in agricultural mechanics classes based on demographic characteristics (gender & grade level);
3. Identify the task motivation behaviors of students enrolled in an agricultural mechanics class based on cognitive and psychomotor tasks;
4. Describe the task motivation behaviors of students enrolled in an agricultural mechanics class based on cognitive and psychomotor tasks based on demographic characteristics (gender & grade level);
5. Determine the relationship between noncognitive skills and task motivation.

## Assumptions

Assumptions are statements made without proof of accuracy (Wargo, 2015). The following are the assumptions of this study:

1. All participants are secondary students (9-12) in the West Ada School District (WASD).
2. Students in this study experienced COVID-19 related educational changes in their middle school years which could have impeded both cognitive and noncognitive development.
3. Participants will complete all surveys honestly and impartially.

## Limitations

Limitations are the characteristics of a study that can impact the findings (Price & Murnan, 2004). The limitations of the study include:

1. Participants in this study are students who live in the state of Idaho. The West Ada School District (WASD) is the largest district in the state which may not represent all Agriculture Education Programs.
2. Differences across schools but not limited to, housing, task motivation may be situational, and access to learning opportunities within the school district.
3. Participants in this study were all students in the same classroom. As a result, the participants in this study may not be representative of an entire school population.

## Constitutive Definitions

The terms and definitions in this research study relate to career and technical education and factors affecting a student's cognitive ability. For the purpose of this study operationally defining these terms is important to understanding the context with which the study functions.

1. Career and Technical Education (CTE)
    a. Courses (at the high school level) and programs (at the postsecondary subbaccalaureate level) that focus on the skills and knowledge required for specific jobs or fields of work (About CTE, n.d.).
2. Cognitive Skill
    a. Involved in bringing in and processing information, but they are not inclusive in their ability to predict academic success (Sousa, 2011)
3. Grit
    a. Passion and perseverance toward long-term goals (Duckworth, Peterson,

Matthews, & Kelly, 2007).

4. Locus of Control
    a. A person's belief that a specific outcome is in part caused by their action (internal) or environmental factors (external) as defined by Rotter (1966).
5. Noncognitive Skill
    a. Patterns of thoughts, feelings, and behavior that affect social interactions with others (Glewwe et al., 2016, p.141).
6. Optimism
    a. A generalized expectation for a positive outcome not related to an individual's ability to perform (Scheier & Carver, 1985).
7. Psychomotor Skills
    a. Activities that are primarily movement oriented (Oermann, 1990)
8. Self-Efficacy
    a. Innate ability to achieve goals, and the related personal assessment of the skills required to achieve goals (Bandura, 1982).
9. Zoned Home High School
    a. High School located within a boundary that encompasses your residence (West Ada School District, n.d.).

**Operational Definitions**

The terms and definitions in this research study relate to career and technical education and factors affecting a student's noncognitive ability. For the purpose of this study operationally defining these terms is important to understanding the context with which the study functions.

1. Noncognitive Skills
    a. Skills that exist outside of the ability to bring in and process information (Borghans, et al., 2008) as measured by responses to Work-Ready Mindset Inventory. A personality trait that can be described as a person's thoughts, feelings, or belief.
2. Task Motivation
    a. Perseverance in academic settings relates to student motivation to persist in a task despite obstacles or challenges (Farrington, et al., 2012). Measured by class assignments completion percentage.
3. Self-Efficacy
    a. Innate ability to achieve goals, and the related personal assessment of the skills required to achieve goals (Bandura, 1982).
4. Followthrough
    a. Requires taking action to address (positively or negatively) about the behavior or outcome. Not taking action can translate to the absence of accountability (University of Minnesota, 2019).
5. Teamwork
    a. Group of individuals who work together to produce products or deliver services for which they are mutually accountable (Boston University, 2015).
6. Self-Regulation
    a. Process of continuously monitoring progress toward a goal, checking outcomes, and redirecting unsuccessful efforts (University of Nebraska, 2023).

7. Commitment
    a. The intention toward completion of a specific task (Kim & Ok, 2009).
8. Communication
    a. Effective workplace communication helps drive better results for individuals, teams, and organizations (Cooks-Campbell, 2022).
9. Positive Outlook
    a. Relates to an ability to maintain optimistic viewpoints while completing a task (Scheier & Carver, 1994).
10. Focus
    a. Individual's ability to narrow their view to the task at hand and minimize distractions (Randall & Engelhard, 2010).

**Summary**

Secondary Education and CTE go hand - in - hand in the WASD with about 10,000 students enrolled in a CTE course (S. Low, personal communication, February 17, 2023). CTE is the form of education that bridges this gap between secondary education and the workplace by giving students the hands-on tasks and experiences they need. Hyslop (2008) noted that students may not be receiving necessary workplace readiness skills unless they are exposed to CTE opportunities. The Workplace Readiness Assessment (WRA) measures understanding of the career readiness standards in personal, professional, and technical knowledge and skills and is required for all Idaho CTE students (Workplace Readiness, 2022).

Noncognitive skills have a relationship to student aptitude (Estireis-Winkler et al. 2014; Aspinwall et al. 1992; Carden et al. 2004; & Chemerset al. 2001). There is little research available to describe the noncognitive traits of Idaho CTE students, and a large

number of high school students across America lack academic motivation (Ford et al., n.d.). This study allowed researchers to examine multiple noncognitive traits of Idaho CTE students along with their completion of course-related cognitive and psychomotor tasks. The role of an educator is to educate the student(s), noncognitive traits should be no exception. With the lack of data making the connection between noncognitive tasks and task motivation; educators may not be able to make changes to help students develop the task motivation that students need for their future. To grow positive noncognitive skills, researchers suggest allowing students to encounter practical problems, develop situational solutions, engage regularly with the guidance of a caring mentor, and experience authentic assessments of work (Farrington, et al., 2012; Khine & Areepattamannil, 2016). The student data collected could allow the educational community to gain knowledge of CTE students' current non-cognitive ability with relation to task motivation and make recommendations for the future.

# Chapter 2: Literature Review

Student noncognitive skills have been linked to the academic and personal success of students (Duckworth, Kirby, Tsukayama, Berstein, & Ericsson, 2011; Polirstok, 2017; Boman, & Yates, 2001; Miller, 2003). Part of Idaho Career and Technical Education's (ICTE) vision statement is "a premiere educational opportunity for students and adults to gain relevant workforce and leadership skills in an applied setting," (Idaho State Board of Education, p.2, 2018). This results in the need to study current noncognitive skills of CTE students. To examine the literature related to the relationship between task motivation and noncognitive skills we will examine the purpose of CTE in secondary education, CTE in secondary education and WASD, CTE in secondary education at a specific high school and how noncognitive skills play a role in CTE education. We will also examine the intersection of noncognitive skills and task motivation within CTE and the broader educational landscape.

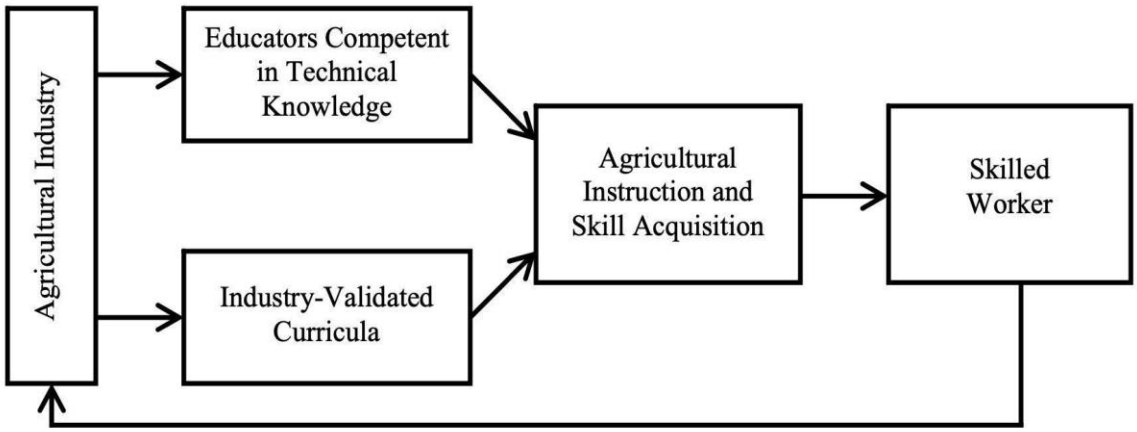
## The Purpose of CTE in Secondary Education

Career and Technical Education, formally known as vocational education, is training and instruction that prepares students with industry skill (Gordon, 2008). The Industrial Revolution began in Great Britain around 1760 and many of the technological innovations were of British origin (Why the Industrial, 2023). With advancements in technology comes the need for more jobs. Hours in the factory were usually long, from dawn to dusk, six days per week; this led to more unskilled workers needed than ever before to work the massive machines (Gordon, 2008). Toward the end of the 19th century, a middle class did emerge in industrial cities (Gordon, 2008). The sociological shift was felt throughout society, especially in education (Roberts & Ball, 2009). Formal apprenticeship programs began to decline after the industrial revolution and the development of free public education (Gordon, 2008). By

the 20th century students were not prepared with the technical skills needed to be successful. At that time 90% of the population failed to meet the basic requirements of education that are in place now. Educational advocates in the early 20th century thought the education system to be inclusive of individuals who sought skills and those seeking higher education (Miller, 1984). Miller (1984) stated that vocational education would not only make school more meaningful to most students, but "education for employment would help extend the years of education, thus increasing the level of citizenship for those persons," (p. 29). Experts agreed that students needed to be more prepared for the workforce if they were to thrive in the quickly changing society (p.29).

Integration of workforce skills into CTE has not always been clear. At the initial creation of CTE around 1914, John Dewey and David Snedden disagreed on the purpose of CTE (Roberts & Ball, 2009). Snedden supported content-centered curricula focused on skill acquisition, that was based on industry standards and delivered separately from traditional education. Dewey argued for an integrated approach, where vocational skills and academic content were blended with the purpose of developing transferable life skills (Roberts & Ball, 2009). In 1917 the Smith-Hughes Act established the federally funded vocational education system in the United States that focused on trades and skills rather than the liberal arts (Roberts & Ball, 2009). CTE today is built upon the integrated approach that Dewey foresaw CTE becoming. In Figure 2.1, Dewey visually explains the relationship between concepts (Roberts & Ball, 2009). Teachers utilize the curricula from industry to provide industry-relevant instruction that results in observable skill acquisition. The result is skilled workers that are ready for successful employment in the agricultural industry (Roberts & Ball, 2009).

*Figure 2.1*
*A content-based model for teaching agriculture*




Career and Technical Education includes multiple content areas. In the WASD, CTE courses include Agriculture, Engineering, Family and Consumer Sciences (FCS), Auto, Collision/ Repair, and Diesel. From a content-centered perspective, focusing on the agricultural side of CTE courses. The purpose of agricultural education is to develop the knowledge and skills required for successful employment in the agricultural industry (Phipps & Osborne, 1988).

The agriculture, food, and natural resources (AFNR) career cluster within CTE plays a vital role in ensuring the agriculture industry and the trades in general (Gordon, 2008). Looking specifically at AFNR; Agriculture Educators teach a variety of topics and depending on their program, may teach three or four different classes a year, or as many as 14 (National Teach Ag, 2023).

According to the National Association of Agriculture Educators (NAAE) Agriculture Educators teach by doing, and create lessons that are hands-on, and reach students, including those who might not be successful in a traditional classroom (Why Teach Agriculture, 2023).

These hands-on lessons expand classroom learning in activities outside the classroom which are suggested to help develop noncognitive skills in students (Broh, 2002 Ford, et al., 2019; Meacham et al., 2020). In the United States there are approximately 11,000 middle and high school agricultural educators. This number does not include the hundreds of Agriculture Educators in community or technical colleges, or adult farm management educators (Why Teach Agriculture, 2023).

**CTE in Idaho**

In the state of Idaho, there are N = 168 public high schools with an enrollment of approximately N = 91,437 students in secondary education grades 9 to 12. Of all secondary students in Idaho, approximately N = 42,700 are enrolled in a CTE course (Career Technical Education, 2023). In the West Ada School District (WASD) CTE courses are offered at all six high schools. Meridian High School is the site of the Career Technical School (CTS) for the district.

At the CTS, introductory level courses are taught as well as the capstones for each of the four pathways: Animal Science, Plant Science, Small Gasoline Engines, and Welding. Idaho Career Technical Schools (CTS) were established at the secondary level in the 1998-99 school year (Idaho State Department of Education, 2022). The CTS model's design ensures that Meridian High School's CTE courses draw students not only from its own campus but also from all six high schools, including those who are dual enrolled with Virtual School House. For students to be dual enrolled as a CTE student, they are required to be enrolled in their “home” high school (school in the boundary of their residence). The purpose of the CTS is to give students the opportunity to continue in their pathway(s) of interest, to gain a deeper understanding of the topic. For example, students that complete the Welding pathway have

the opportunity to test for their AWS Level 1 Certification, Entry Welder. According to the American Welding Society (AWS) (p.1, 2006) “requires performance qualification (skill) and practical knowledge (written) tests.”

Idaho public education includes 16 CTS’s that include courses in one or more of the approved career clusters. The purpose of these schools is to provide students of all ages with the academic and technical skills, knowledge and training necessary to succeed in future careers and to become lifelong learners. In total, about 12 million high school and college students are enrolled in CTE across the nation (Career Technical, 2023). This study was conducted at one of the largest CTS programs in the state.

In the WASD four of the six high schools have the introductory level courses required for students to continue into one or two of the pathways; Idaho CTE defines a pathway as “a prescribed sequence of CTE courses culminating with a capstone course,” (Idaho State Department of Education, 2023). The “zoned home high school” refers to a high school that does not have the CTS on site such as Meridian High. In the “zoned home high school” students are exposed to the entry-level course, and some of the intermediate-level courses if applicable. Once the students have completed those courses, they may take the advanced levels/capstone at the CTS. The full list of CTE pathways available at the WASD website.

In 2023 the City of Meridian had a population of 130,397 and is currently growing at a rate of 3.37% annually and its population has increased by 10.85% since the most recent census. The last census recorded a population of 117,635 in 2020 (Meridian, Idaho Population, 2023). The increase in population leads to an increase in enrollment. This spike in enrollment has caused the WASD CTE to create “double blocks” where welding courses are offered for two consecutive class periods, which allows students to complete a year-long

course during a single semester. This extended time poses challenges to student engagement and task motivation, as students often have 180 minutes a day in the same learning environment (Zepeda & Mayers, 2006)

According to the Idaho State Department of Education (2023), the 21st Century graduates are expected to have more skills than ever before. To put an emphasis on the importance of CTE in the lives of students according to the Idaho State Department of Education (2023) the 2021 Idaho State Legislature created the Workforce Readiness and CTE Diploma. The assessments and diplomas were designed to: (1) Prepare students for both college and careers; (2) All students to earn college credits while still in high school; (3) Provide a platform for students to explore Idaho's high-skill, high-demand occupations; (4) Gain practical, real-world working experience; (5) Earn employer-recognized certifications and micro-credentials; (6) Develop and articulate valuable technical and employability skills sought by employers; and (7) Enter the world after graduation confident in their ability to meet their employer's needs.

The purpose of the Workforce Readiness and CTE Diploma for employers was to allow them to: (1) Find qualified employees for their most hard-to-fill positions; (2) Reduce the time and money invested in training new employees; and (3) Identify candidates who possess the employability skills necessary to succeed in the workplace (Idaho State Department of Education, 2023). The Workplace Readiness Assessment (WRA) measures understanding of the career readiness standards in personal, professional, and technical knowledge and skills. The WRA is required for Idaho CTE students. CTE capstone students and seniors enrolled in at least their second CTE course (grades 9-12) should take the WRA (Idaho State Department of Education, 2023). These

outcomes rely on all three domains of learning (cognitive, affective, and psychomotor) and reveal the need to understand the interaction between cognitive and psychomotor tasks, and noncognitive skill development. Through the results of this assessment a student's followthrough and commitment for a task can be evaluated.

**Cognitive and Noncognitive Skills**

Cognitive and noncognitive skills work in concert to aid personal growth and development. Cognitive skills are related to processing information while noncognitive skills are related to the approaches an individual takes to completing tasks (Sousa, 2011). Kurt (2020) described cognitive tasks in three stages *rehearsal*, which involves copying and underlining information or reading it out loud; *elaboration*, where the student takes notes, paraphrases ideas, summarizes information and answers questions; and *organizing*, which includes creating concept maps and arranging ideas in a meaningful way (Kurt, 2020). Cognitive skills require the conceptualization of an abstract concept in interpreting and processing information (Sousa, 2011). Much of what happens in a traditional educational setting is allowing students to demonstrate cognitive skills (Sousa, 2011). For example, a student learning to complete a math problem repeatedly takes abstract concepts like numbers, addition, subtraction, and higher math functions and translates the concept into a tangible output.

Noncognitive skills are defined as a set of skills related to which include thoughts, feelings, or beliefs and are related to motivation toward tasks (Borghans, et al., 2008). Many researchers point to noncognitive skills as larger predictors of student success both in academic and nonacademic settings (Smith & Thapa, 2020). Researchers almost universally agree that noncognitive skills are as important or more important predictors of student success (Smith & Thapa, 2020). Noncognitive skills can be modified with targeted training

and are strongly connected to the processes of learning: learning strategies, motivation and attitudes (Molnár, p.3, 2023). In a study by Angela Duckworth on military cadets at West Point, she found that noncognitive factors of grit and physical ability in this case were more prognostic of the ultimate goal of completing a long-term goal of personal consequence (Duckworth, et al., p.23501, 2019).

Specific noncognitive skills have been examined in relation to broader fields. These concepts are related to specific noncognitive skills which may include components of self-efficacy, followthrough, teamwork, self-regulation, commitment, communication, positive outlook.

Self-efficacy relates to a students' ability to believe in their own ability to succeed (Bandura, 2010). Pajares (2002) noted that male and female students tend to respond to self-efficacy measurement tools with a different mindset. Fallan and Opstad (2016) found that students with higher levels of self-efficacy are likely to have a higher chance of succeeding in both academic and non-academic settings. According to Bandura (1997, p. 174), school is the place where children develop cognitive competencies and acquire the knowledge and problem-solving skills essential for participating effectively in society. Bandura goes on to say that a strong sense of self-efficacy fosters a high level of motivation, academic accomplishments, and development of intrinsic interest in academic subject matter (Bandura & Schunk, 1981; Relich et al., 1986; Schunk, 1984, p. 174).

Followthrough depends in part on establishing commitments and related action goals in the first place (Corno, p.308, 2023). Another term that can be associated with followthrough is volition. According to Dictionary.com, volition can be defined as the act of willing, choosing, or resolving; exercise of willing. Acting" of one's own volition" involves

mobilizing these resources and applying them when needed to direct and control efforts toward goals (Corno, p.303, 2023). Engaging volition isn't easy. It's a higher attainment than mere motivation. Motivation is the desire to do something; volition is the absolute commitment to achieving something (Ghoshal & Bruch, 2023). Components of followthrough may be tied to a combination of noncognitive factors, yet the concept is actionable enough to stand on its own as a determinant of student success (Smithers et al., 2018). Across multiple studies, the ability of a student to commit to completion of a task and see it through was found to be incredibly beneficial for successful outcomes (Smithers, et al., 2018).

A team is a group of individuals who work together to produce products or deliver services for which they are mutually accountable (Boston University, 2015). According to Yale University, a team environment allows individuals to bring their diverse perspectives to problem solving, which in turn increases their success at arriving at solutions more efficiently and effectively (We know teamwork, 2023). Great team communication is founded on a desire for mutual understanding and trust. When working together on a common goal or deliverable as an integrated whole, individual members consistently encourage and support each another (We know teamwork, 2023).

Self-Regulation includes components of maintaining an intrinsic locus of control (Rotter, 1963) and components of delayed gratification (Sahranavard & Salehiniya, 2018) as way to actively engage otherwise passive students in their academic instruction (Sahranavard & Salehiniya, 2018). When students are able to take charge of their learning or have the ability to complete a task it is teaching them valuable skills; self-regulation is desirable because of the effects that it has on educational and behavioral outcomes (Sahranavard &

Salehiniya, 2018). A way to combat students not completing their tasks or an activity is to have them be more proactive in their learning. This approach views learning as an activity that students do for themselves in a proactive way, rather than as a covert event that happens to them reactively as a result of teaching experiences (Zimmerman, 2001).

Commitment refers to affective factors involving interest, faith and acceptance of positive attitudes toward certain things (Kim & Ok, p.1, 2009). In essence, commitment is the intention toward completion of a specific task (Kim & Ok, 2009). Kim & Ok conducted their study in Pakistan and found commitment, engagement, and locus of control are predictors of academic achievement at higher education level (Kim & Ok, p.3, 2009). A study at Missouri State University looked at student commitment for coming to class and tried both positive and negative motivational approaches: Contrary to previous indications in the literature, students were motivated to commitment through a variety of means and student behavior changed when commitment levels toward class activities changed. Commitment can come from a variety of positive and negative motivational tactics in the classroom (Murray, 2005).

Communication is well-established as an important noncognitive skill for students and relates to their ability to be successful in the workplace (Crawford & Fink, 2019). Effective workplace communication helps drive better results for individuals, teams, and organizations (Cooks-Campbell, 2022). Students on a daily basis utilize informal communication to gain information and communicate with their friends. Informal communications include the emails and chats you engage in all day: making requests, asking for information, responding to requests, and giving or receiving support and guidance (Cooks-Campbell, 2022). Building communication skills in classrooms can have large

impacts on student performance (Steedly, et al., 2008) and overall employability (Crawford & Fink, 2019).

Positive outlook relates to an ability to maintain optimistic viewpoints while completing a task (Scheier & Carver, 1994). Researchers and educators have long found evidence of the association between a positive outlook and positive academic performance. Scientists from Stanford University have discovered the brain pathway that directly links a positive attitude with achievement (Hess, 2018). Positive outlook and task completion are related in the literature in numerous studies, and researchers note that positivity manifests itself in multiple ways. For instance, if students were positive about math, they tended to have more interest in math and were more likely to practice. Positivity is likely not the only factor contributing to success, regardless of IQ, a positive attitude can help anyone improve memory or lessen anxiety toward a task (Hess, 2018). Hess (2018).

Focus is an individual's ability to narrow their view to the task at hand and minimize distractions (Randall & Engelhard, 2010). This component includes the ability to see an assignment and conceptualize the importance of focusing energy toward its completion. Focus metrics have changed as more schools are switching to standard based grading. A study conducted by Gustafson (2022) found the switch to standards-based grading which focuses on the mastery of the learning target affected task completion as homework is not a part of the students' grade. When one component of the course is not graded, researchers have noted implications for completion of other components of the program (Randall & Engelhard, 2010). Gustafson (2022) also noted the importance of a variety of behaviors in completing both homework and in-class assignments.

**Noncognitive Skills and CTE**

Cheng and Hitt (2018) conducted a study of approximately 10,000 students in high school and followed them into their early years of adulthood and asked the question "are students who lack the noncognitive skills generally associated with academic success (e.g., motivation, persistence, self-control, and conscientiousness) more likely to take CTE courses?" In the study by Cheng and Hitt, it was determined that while CTE students typically have lower test scores on standardized tests, "CTE course takers have on average higher noncognitive skills," (Cheng & Hitt, 2018). They concluded that while students with increased cognitive skills are not necessarily enrolling in CTE courses in disproportionate numbers, those with higher noncognitive skill levels are enrolling in CTE at a higher rate. Kreisman and Strange (2020) observed similar findings, noting higher earnings among students taking more upper-level vocational courses.

The relationship between secondary students with little or no CTE coursework and those who complete a pathway in CTE is worth noting and may have a relationship to development of noncognitive skills. Non-CTE students have higher test scores but are more likely to drop out of high school while students actively engaged in a CTE pathway have lower test scores, are less likely to drop out of high school, and on average have higher earnings by their mid-20s (Cheng & Hitt, 2018). Researchers have noted that noncognitive skills are not measured by most standardized tests (Cheng & Hitt, 2018). Such tests capture cognitive skills by design (Cheng & Hitt, 2018). CTE courses allow students that have higher noncognitive skills the opportunity to be successful and identify what their strengths are as these skills are important for life success. Examples of these are real-life skills like public speaking, interviewing, and working collaboratively (Asvab Career, 2023). CTE is unique

because assessment comes in numerous forms like standardized test, skills test, and/or task completion.

Noncognitive skills are defined as a person's thoughts, feelings, or beliefs which are outside the realm of the ability to bring in and process information (Borghans, et al., 2008). Most standardized tests are not designed to assess noncognitive skills, these tests are designed to capture only cognitive knowledge. According to Brunello and Schlotter (2011) CTE students that successfully develop noncognitive traits in their education are more prepared to be successful intellectually, socially, and economically in society. CTE is unique because within CTE courses, assessments are completed in many forms, including standardized test, skills test, and/or task completion (Gordon, 2008).

CTE course takers have on average higher noncognitive skills, compared to otherwise-similar students they exhibit more effort on routine tasks compared to their peers (Cheng & Hitt, 2022). Noncognitive skills are among the most sought-after workforce skills (Crawford & Fink, 2020). A study conducted by the Association of Public Land-grant Universities (APLU) investigated the most important skills employers seek in new hires. The items noted were exclusively noncognitive skills, including listen effectively; communicate accurately and concisely; and identify and analyze problems (Crawford & Fink, 2019) Employees that have noncognitive skills including those who are motivated, self-regulated, and have strong social skills are vital to employers, as these traits are consistent predictors of on-the-job success (Cheng & Hitt, 2018).

The connection between noncognitive skills and demographic characteristics is noted in the literature. For example, self-efficacy is noted to be higher in individuals who have the gender more closely associated with a job task (Robinson, et al., 2020). Examining gender

differences in levels and roles of competence beliefs at the end of college can provide a greater understanding of how men and women may experience STEM settings similarly or differently and thus how these environments may be designed to promote gender equity (Robinson, et al., 2020). Several studies reveal increases in noncognitive skills as adolescents age. Cognitive and noncognitive skills change with age and with instruction (Kautz, et al., n.d.). Interventions to improve skills are effective to different degrees for different skills at different ages. Importantly, noncognitive skills are more malleable at later ages than cognitive skills (Kautz, et al., n.d.).

CTE programs put students in real-world situations that demand the development and use of noncognitive traits (Poiner, 2018). Noncognitive skills have a lot of value for employees. Employees that are motivated, self-regulated, and have strong social skills are important in the workplace; because those skills are consistent predictors of workplace success (Crawford & Fink, 2020). With the increased interest in noncognitive skills in CTE, researchers are looking at "measures of personality and attitudes-such as grit and self-efficacy-predict later educational outcomes," (Cheng & Hitt, 2018).

**Task Motivation**

In the process of learning, students complete tasks related to their ability to gain and retain information (Sousa, 2011). Researchers suggest satisfying the need for autonomy is associated with engagement, well-being, and highly desirable internal forms of motivation (Patall, et al., 2018). While engagement is used often to describe motivation, according to Trowler (2010, p. 49) "many articles, conference papers and chapters on student engagement do not contain explicit definitions." The roots of student task motivation are discussed in Ryan and Deci's (2000) self-determination theory.

According to Ryan and Deci (2000, p. 54) “being motivated means to be moved to do something.” Motivation from one person to another looks different because “they vary not only in *level* of motivation (i.e. how much motivation), but also the *orientation* of that motivation (i.e., what type of motivation) (Ryan & Deci, 2000). Intrinsic motivation can be tied to *orientation* because of “underlying attitudes and goals that give rise to action, as an example, a student can be highly motivated to do homework out of curiosity and interest or because they want the approval of the teacher,” (Ryan & Deci, 2000).

In a classroom, the components of self-determination theory are rooted in the affective learning domain (Gagne & Briggs, 1974). According to Kurt (2020) it is often challenging to measure attitude, as each individual must declare their own thoughts. Attitude is often evaluated through people, issues, objects, or events (Cherry, 2022). Task motivation is therefore a stimulation of the desired learning outcome from a student which may include overcoming a negative attitude (Cherry, 2022).

Not all tasks look the same, and task motivation may be different for different types of tasks. Gagne (1974) described learning tasks as cognitive, affective, or psychomotor. Cognitive learning tasks are those associated with conceptualizing an abstraction and processing complex thoughts through breakdown and reassimilation of knowledge (Gagne, 1974). Much of traditional education relies on students completing cognitive tasks like exams, worksheets, and other assignments which ask students to demonstrate their understanding of a concept (Sousa, 2011).

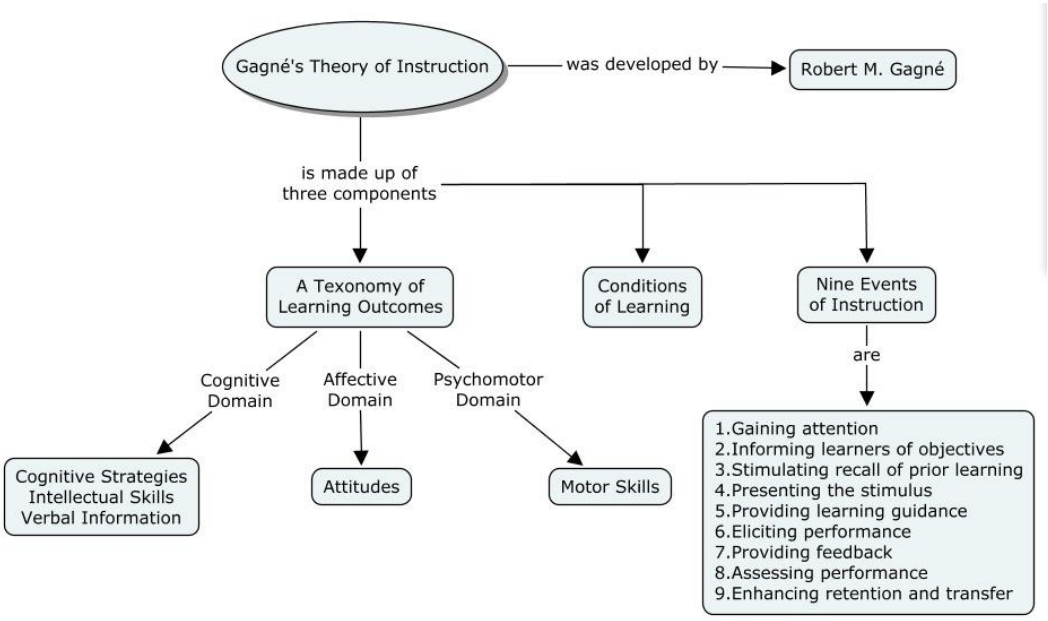
Affective tasks are those which require an emotional response (van Duijuvenvoorde, et al., 2010). Students engaging in affective tasks are often asked to reflect on their experiences and determine their emotional response to the information rather than to

demonstrate their understanding of the abstract concepts (Gagne, 1974). These concepts are sometimes seen in education in social studies and other character-based education settings (Gagne, 1974).

Psychomotor tasks are an important concept on their own, but they also depend on a cognitive component (Smith & Ragan, 2005.). The instruction of psychomotor tasks may be designed to teach the procedures related to motor skills; however, psychomotor skills must be physically practiced to be learned (Smith & Ragan, 2005.). In addition to practicing these skills, Malone (n.d.) said giving students as much information as possible on how to perform a skill improves performance. According to Smith and Ragan (2005) the way to evaluate psychomotor tasks is through repetition and correct execution of the motions.

All three types of tasks are necessary for student learning (Gagne, 1974). Gagne (1974) outlined the types of tasks in relation to each other within his theory of instruction. This theory posits that students should be instructed in and provide motivation for all three types of tasks within an educational setting. The components of cognitive, psychomotor, and affective domains for learning are shown within Gagne's theory in instruction (Gagne & Briggs, 1974) as shown in Figure 2.2.

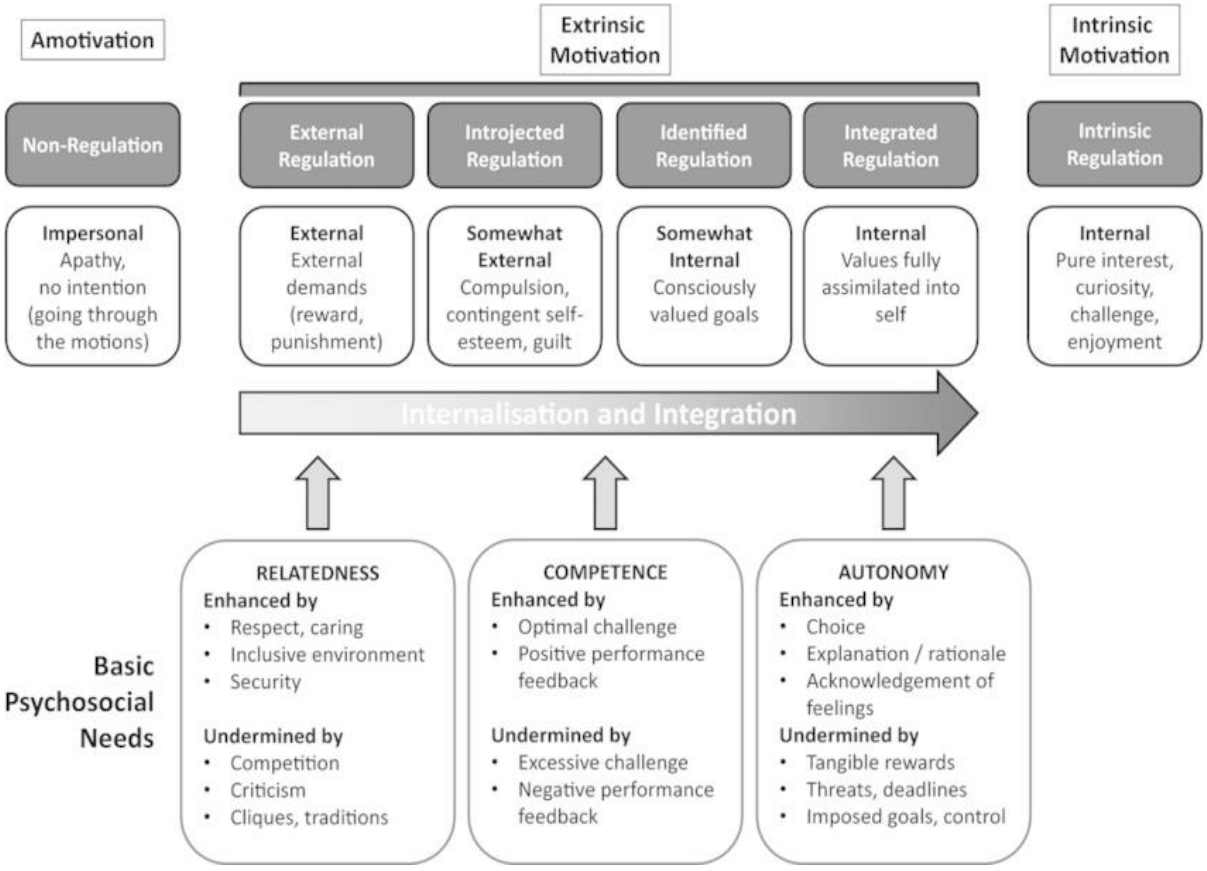
*Figure 2.2*
*Gagne's (1974) Theory of Instruction*




**Conceptual Framework**

Self-determination theory is used as the basis of this study to examine the relationship between noncognitive skills and task motivation. When analyzing Ryan and Deci (2000) self-determination theory as shown in Figure 2.3, higher levels of noncognitive skills such as persistence, self-discipline, focus, confidence, and teamwork may impact self-determination levels. Self-determination can be defined as: the ability or process of making one's own choices or controlling one's own life (Ackerman, 2018). These noncognitive skills result in more success as an employee compared to an employee that does not (Khine & Areepattamannil, 2016).

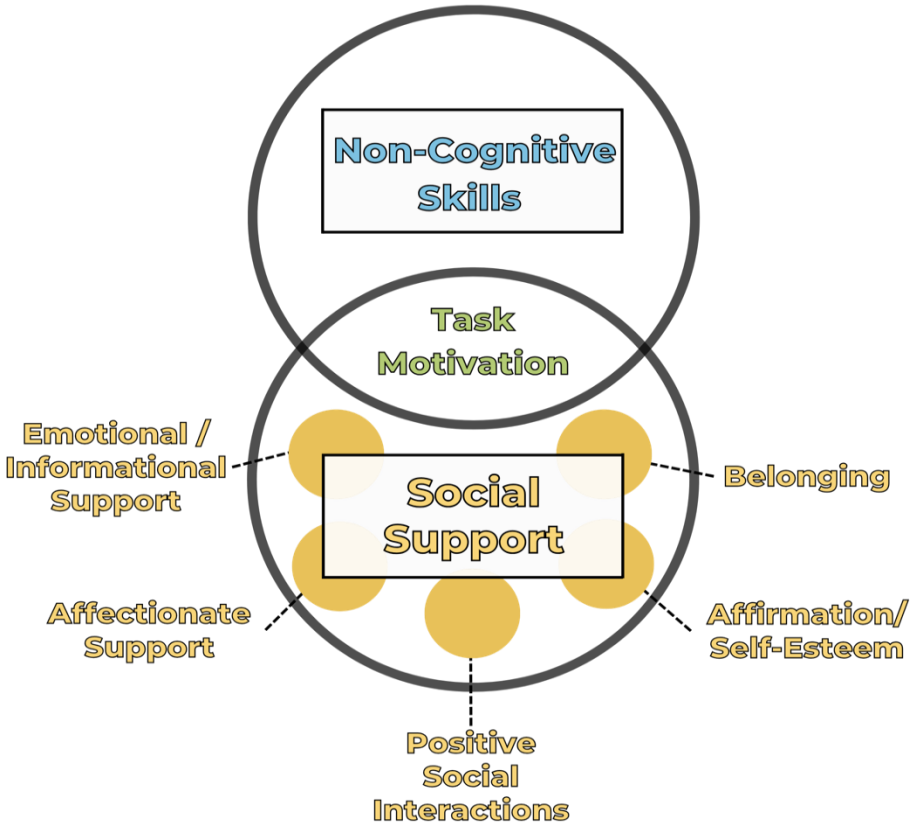
*Figure 2.3*
*Ryan and Deci's Self Determination Theory*




The conceptual framework for this study is shown in Figure 2.4. This framework draws from motivational theories embedded in Ryan and Deci's self-determination theory to guide the initial motivation to complete a task, or "task motivation."' Research on noncognitive skills suggest that these skills can have a large impact on the actual completion of a task and may influence the attitudes and behaviors of students who are undertaking new cognitive and psychomotor learning (Heckman, et al., 2006). Outside of the scope of this study, the conceptual framework also includes components of social support which may be critical in developing task motivation. A greater intrinsic motivation could be due to their noncognitive skills being higher, sense of belonging, and social support. Intrinsic motivation produces the most positive consequences, whereas certain types of extrinsic motivation

(especially external regulation) and amotivation produce the most negative ones (Vallerand, 2000, p. 314).

*Figure 2.4*
*Conceptual Framework*




In the review of literature, we identified some examples of noncognitive skills that have been linked to academic and personal success in students. In examining the literature related to the relationship between task motivation and noncognitive skills it was found that the purpose of CTE in secondary education was to have content-centered curricula focused on skill acquisition. This was based on industry standards and delivered separately from traditional education. Dewey argued for an integrated approach, where vocational skills and

academic content were blended with the purpose of developing transferable life skills (Roberts & Ball, 2009).

# Chapter 3: Methods

This study was conducted using descriptive survey and correlational research methods. The purpose of this study was to describe the noncognitive skills of high school agricultural mechanics students in relation to task motivation. Additionally, the research sought to examine the relationship between noncognitive skills and task motivation with students in Ag Mechanics courses. To meet this purpose, the study was guided by the following objectives:

1. Identify the noncognitive skills of students enrolled in agricultural mechanics and classes;
2. Describe the noncognitive skills of students enrolled in agricultural mechanics classes based on demographic characteristics (gender & grade level);
3. Identify the task motivation behaviors of students enrolled in an agricultural mechanics class based on cognitive and psychomotor tasks;
4. Describe the task motivation behaviors of students enrolled in an agricultural mechanics class based on cognitive and psychomotor tasks based on demographic characteristics (gender & grade level);
5. Determine the relationship between noncognitive skills and task motivation.

## Population

The population of this study was a census of N = 55 students enrolled in Welding II and Welding III at Meridian High School in Spring 2023. Access to these students was provided as the primary researcher was the instructor for the course. The administration at Meridian High School granted permission to survey these students within this research. Students enroll in Welding II beginning at a sophomore level and Welding III beginning at a junior level. All of these students came from one of the six high schools in the WASD and arrived daily by bus or self-transport. These students were chosen in these specific classes

because of the prevalence of both cognitive and psychomotor tasks within the course curriculum throughout the semester.

**Instrument and Dependent Variables**

The instrument used in this study was the Work-Ready Mindset Inventory (WRMI) which includes items to measure the noncognitive skills of adolescents in alignment with both the CTE work readiness framework and the Association of Public Land Grant Universities (APLU) work readiness standards. The instrument included two sections. First a demographics section which will allowed participants to report their age, gender, previous experience with the course subject, and purpose for enrolling in the class. The second section included 52 Likert-type items which students responded to on a 5 point scale, where 1 = not at all like me and 5 = very much like me. The full instrument is available in Appendix C and a breakdown of WRMI statements by construct are included in Appendix B.

The WRMI is an online instrument designed for students to self-report their agreement on workplace readiness statements that align to components of grit, optimism, self-efficacy, locus of control, communication and teamwork. The full list of statements can be found in Appendix B.

The WRMI instrument was piloted as a standalone instrument with adolescent populations as a component of this study. Items on the WRMI were derived from four previous instruments: Duckworth's (Duckworth & Quinn, 2009) short form grit scale; Bandura's general self-efficacy scale, the Life Orientation Test-Revised (Bandura, 1982); and Rotter's (Rotter's Locus of Control Scale, n.d.) locus of control scale. The analysis of previous distributions led to 52 items which were rescaled to a five-point Likert scale.

The dependent variables used to describe task completion were student completion of tasks in their agricultural mechanics courses. Each assignment through the term was

categorized as either cognitive or psychomotor based on the characteristics of the assignment. Cognitive tasks were primarily those which are based on the Miller Open Book online learning system. This system allows students to work at their own pace to review and/ or gain a deeper understanding of concepts taught or being taught. Once students completed the video, they took an assessment of their cognitive understanding of welding and welding processes. Miller Open Book is a unique teaching tool because; students are able to pause, re-wind, visually watch the video, listen to the video, and the option to read the notes as the video is being presented. Psychomotor assignments include those which allow students to demonstrate their knowledge of the physical processes associated with welding. A table of anticipated tasks and categorization is shown in Appendix A. Miller Open Book Assignments were labeled as MOB. Completion of each assignment was tracked and used as a dichotomous measure of task motivation.

**Reliability and Validity**

The constructs for the WRMI include: Self Efficacy, Followthrough, Teamwork, Self Regulation, Commitment, Communication, Positive Outlook, and Completion. Previous post hoc reliability for the separate components of the WRMI have found Cronbach's Alpha levels at levels from $\alpha = 0.81 - 0.96$. A Cronbach's Alpha was used to calculate the reliability of the constructs of the WRMI within an adolescent population and post hoc for the subjects in this study. Reliability is shown in Table 3.1. The constructs within the WRMI, as shown in Appendix B. Nunnally & Bernstein (1994) state that alpha levels at 0.70 or above are acceptable.

*Table 3.1*
*Instrument Reliability Summary*

| Instrument | Number of Items | *Previous Adolescent Reliability* | *Post-hoc Reliability* |
|---|---|---|---|
| Self Efficacy | 9 | 0.84 | 0.81 |
| Followthrough | 4 | 0.70 | 0.73 |
| Teamwork | 4 | 0.79 | 0.77 |
| Self Regulation | 3 | 0.72 | 0.72 |
| Commitment | 3 | 0.86 | 0.82 |
| Communication | 3 | 0.71 | 0.71 |
| Positive Outlook | 2 | 0.69 | 0.72 |
| Completion | 56 | N/A | 0.76 |

The content validity of the instrument has previously been established through a review by several individuals including undergraduate and graduate researchers at the University of Idaho and two faculty members who specialize in social science research.

**Participant Recruitment**

All students enrolled in Welding II and Welding III classes at Meridian High School were recruited for participation. University of Idaho approval through the Institutional Review Board was obtained prior to recruitment. As the WRMI participation was incorporated into a curriculum on workplace readiness in the Welding II and Welding III class, we received exempt classification. Administrator approval at all school locations was

received without the need for parental consent. Student assent occurred as a notice embedded in the online instrument.

**Data Collection**

Data collection occurred in class for both the online instrument and assignment completion components. The instrument was distributed as a link to the Microsoft platform, TEAMs. Students took the whole instrument in one class period, averaging about 20 minutes total.

Task motivation was collected in an Excel spreadsheet from student gradebook entries. For each task, the completion 0 = not completed and 1= completed was recorded along with the actual score for each assignment. The task was considered complete if the student turned in any submission that was not blank for the task. Scores on assignments allowed an additional measure of quality and scale-based completion data for analysis.

**Data Analysis**

Data was collected through Qualtrics software for the components of the WRMI instrument and dichotomous task completion was collected in an Excel spreadsheet indication. Analysis of each objective is shown in Table 3.2.

Students were all enrolled in agricultural mechanics courses in West Ada School District in the spring semester of 2023. Courses included Welding II and Welding III. Students were predominantly upperclassmen, with 45.7% junior and 10.9% seniors. The students in this class were overwhelmingly male with $n$ = 42(91.3) indicating male, and $n$ = 3(6.5%) indicating female.

*Table 3.2*

*Demographic Variables. Selected Student Characteristics (n = 46)*

| Demographic Variables | *f* | *%* |
|---|---|---|
| Grade | | |
| 10 | 20 | 43.5 |
| 11 | 21 | 45.7 |
| 12 | 5 | 10.9 |
| Gender | | |
| Male | 42 | 91.3 |
| Female | 3 | 6.5 |
| School | | |
| Rocky Mountain | 7 | 15.2 |
| Mountain View | 11 | 23.9 |
| Meridian | 11 | 23.9 |
| Centennial | 7 | 15.2 |
| Owyhee | 9 | 19.6 |
| Special Education Classification | | |
| IEP on file | 7 | 15.2 |
| No IEP on file | 38 | 82.6 |
| Racial/Ethnic Heritage | | |
| Non-Hispanic White | 39 | 84.8 |
| Black, Afro-Caribbean, or African American | 1 | 2.2 |
| Native | 4 | 8.7 |
| Latino or Hispanic American | 8 | 17.4 |
| East Asian or Asian American | 1 | 2.2 |
| Pacific Islander | 0 | 0 |
| Other | 1 | 2.2 |

Meridian CTS is a magnet program with students from five high schools attending for welding classes. The five schools are Centennial High School, Eagle High School, Meridian High School, Mountain View High School, Owyhee High School, and Rocky Mountain High School. Differences exist in the schools, as shown in Table 3.3.

*Table 3.3*

*Self-Efficacy Between Schools. Selected Student Characteristics (n = 46)*

| Self-Efficacy Between Schools | n | M | SD |
|---|---|---|---|
| Centennial High School | 7 | 3.90 | .530 |
| Meridian High School | 11 | 3.97 | .429 |
| Mountain View High School | 11 | 4.17 | .413 |
| Owyhee High School | 9 | 3.91 | .613 |
| Rocky Mountain High School | 7 | 4.31 | .526 |
| Total | 45 | 4.05 | .498 |

Students were all enrolled in agricultural mechanics courses in West Ada School District in the Spring semester of 2023. Courses included Welding II and Welding III. Student involvement in CTE was reported at 43.5% in year 1, 45.7% in year 2, 10.9% in year 3.

*Table 3.4*

*Student Involvement. Selected Student Characteristics (n = 46)*

| Student Involvement | *f* | *%* |
|---|---|---|
| Years CTE | | |
| 1 | 20 | 43.5 |
| 2 | 21 | 45.7 |
| 3 | 5 | 10.9 |
| Job | 29 | 63.0 |
| Individual Sport | 12 | 26.1 |
| Team Sport | 19 | 41.3 |
| Art | 3 | 6.5 |
| Music | 5 | 10.9 |
| FCCLA | 0 | 0 |
| FFA | 5 | 10.9 |
| BPA | 0 | 0 |
| DECA | 0 | 0 |
| HOSA | 1 | 2.2 |
| Skills USA | 0 | 0 |
| TSA | 1 | 2.2 |
| STUCO | 1 | 2.2 |
| Other | 4 | 8.7 |

Students were all enrolled in agricultural mechanics courses in West Ada School District in the Spring semester of 2023. Courses included Welding II and Welding III. Student involvement in CTE was 43.5% in year 1, 45.7% in year 2, and 10.9% in year 3.

*Table 3.5*

*Parent Occupation. Selected Student Characteristics (n = 46)*

| Parent Occupation | *f* | *%* |
|---|---|---|
| Architecture and Engineering | 8 | 17.4 |
| Art and Design | 3 | 6.5 |
| Building and Grounds Cleaning | 5 | 10.9 |
| Business and Financial | 15 | 32.6 |
| Community and Social Service | 3 | 6.5 |
| Computer and Inf. | 4 | 8.7 |
| Construction and Extraction | 6 | 13.0 |
| Education Training and Library | 7 | 15.2 |
| Entertainment and Sports | 1 | 2.2 |
| Farming, Fishing and Forestry | 1 | 2.2 |
| Food Preparation and Service | 3 | 6.5 |
| Healthcare | 10 | 21.7 |
| Installation, Maintenance and Repair | 2 | 4.3 |
| Legal | 1 | 2.2 |
| Life Physical and Social Science | 0 | 0 |
| Management | 5 | 10.9 |
| Media and Communication | 0 | 0 |
| Military | 4 | 8.7 |
| Office and Admin Support | 3 | 6.5 |
| Personal Care and Service | 1 | 2.2 |
| Production and Manufacturing | 4 | 8.7 |
| Public Health and Safety | 3 | 6.5 |
| Sales | 8 | 17.4 |
| Transportation | 3 | 6.5 |

Table 3.5 cont'd

Note: Students could select multiple career paths based on parental occupation and indicated occupation of one or more parents, therefore not all totals will equal 100%.

# Chapter 4: Results and Findings

The purpose of this study was to examine the relationship between noncognitive skills and task motivation in an Agricultural Mechanics course. Demographic data was collected from individuals who were enrolled in CTE courses in the West Ada School District. The results of this research could allow educators to better understand what motivates students to complete tasks and how psychomotor and noncognitive skills play a role.

Five objectives were identified to accomplish the purpose of this study. The objectives were:

1. Identify the noncognitive skills of students enrolled in agricultural mechanics and classes;
2. Describe the noncognitive skills of students enrolled in agricultural mechanics classes based on demographic characteristics (gender, grade level, years in CTE courses);
3. Identify the task motivation behaviors of students enrolled in an agricultural mechanics class based on cognitive and psychomotor tasks;
4. Describe the task motivation behaviors of students enrolled in an agricultural mechanics class based on cognitive and psychomotor tasks based on demographic characteristics (gender, grade level, years in CTE courses);
5. Determine the relationship between noncognitive skills and task motivation.

## Objective 1: Identify the noncognitive skills of students enrolled in agricultural mechanics classes

Objective one aimed to identify noncognitive skills, as measured through the Work Ready Mindset Inventory (WRMI) in agriculture mechanics students at West Ada High School. Results for noncognitive skills overall and by construct are included in Table 4.1. Results indicated overall scores ranging from 2.63 to 4.17 with an overall mean of $M = 3.45$

(0.34). Summated scores for WRMI constructs included 4.06(0.50) for self efficacy, 3.20 (0.72) for followthrough, 3.26 (0.77) for teamwork, 2.86 (0.56) for self regulation, 4.05 (0.63) for commitment, 3.47 (0.73) for communication, 2.85 (0.98) for positive outlook, 3.01 (0.59) for focus.

*Table 4.1*
*Work Ready Mindset Scores (WRMI) for Students in Agricultural Mechanics Courses (n = 46)*

| WRMI Construct | Min | Max | M | SD |
|---|---|---|---|---|
| Self Efficacy | 3.22 | 5.0 | 4.06 | 0.50 |
| Followthrough | 1.75 | 4.50 | 3.20 | 0.72 |
| Teamwork | 1.50 | 4.50 | 3.26 | 0.77 |
| Self Regulation | 1.67 | 4.00 | 2.86 | 0.56 |
| Commitment | 2.67 | 5.00 | 4.05 | 0.63 |
| Communication | 2.00 | 5.00 | 3.47 | 0.73 |
| Positive Outlook | 1.00 | 5.00 | 2.85 | 0.98 |
| Focus | 1.00 | 4.00 | 3.01 | 0.59 |
| WRMI Overall | 2.63 | 4.17 | 3.45 | 0.34 |

Note: WRMI items are scored on a 1-5 scale where 1= “not at all like me” and 5= “very much like me.”

**Objective 2: Describe the noncognitive skills of students based on demographic characteristics (gender, grade level, and school)**

Objective two included an investigation of noncognitive skills based on demographic characteristics for agricultural mechanics in West Ada School District. Results in Table 4.2 indicated overall WRMI scores of 3.46 (0.34) for males and 3.26 (0.78) for females. Scores

for WRMI constructs indicated 4.06 (0.50) for self efficacy, 3.20 (0.72) for followthrough, 3.26 (0.77) for teamwork, 2.86 (0.56) for self-regulation, 4.05 (0.63) for commitment, 3.47 (0.73) for communication, 2.85 (0.98) for positive outlook, 3.01 (0.59) for focus. It is important to note the small number of respondents who indicated female and refrain from generalizations or comparisons between genders. Results based on gender are shown in Table 4.2.

*Table 4.2*
*Work Ready Mindset Scores (WRMI) for Students in Agricultural Mechanics Courses (n = 46) based on gender*

| WRMI Construct | *n* | M | SD |
|---|---|---|---|
| Self Efficacy | | | |
| Male | 42 | 4.07 | 0.51 |
| Female | 3 | 3.78 | 0.22 |
| Total | 46 | 4.06 | 0.50 |
| Followthrough | | | |
| Male | 41 | 3.24 | 0.72 |
| Female | 3 | 2.58 | 0.52 |
| Total | 46 | 3.20 | 0.72 |
| Teamwork | | | |
| Male | 42 | 3.24 | 0.80 |
| Female | 3 | 3.41 | 0.38 |
| Total | 46 | 3.26 | 0.77 |
| Self Regulation | | | |
| Male | 42 | 2.87 | 0.57 |
| Female | 3 | 2.77 | 0.56 |
| Total | 46 | 2.86 | 0.56 |
| Commitment | | | |
| Male | 42 | 4.07 | 0.64 |
| Female | 3 | 3.66 | 0.33 |
| Total | 46 | 4.05 | 0.63 |
| Communication | | | |
| Male | 41 | 3.48 | 0.74 |
| Female | 3 | 3.11 | 0.50 |
| Total | 46 | 3.47 | 0.73 |
| Positive Outlook | | | |
| Male | 42 | 2.84 | 1.00 |
| Female | 3 | 2.66 | 0.28 |
| Total | 46 | 2.85 | 0.98 |
| Focus | | | |
| Male | 42 | 2.97 | 0.60 |
| Female | 3 | 3.33 | 0.28 |
| Total | 46 | 3.01 | 0.59 |

Table 4.2 cont'd

| | | | |
|---|---|---|---|
| WRMI Overall | | | |
| Male | 39 | 3.46 | 0.34 |
| Female | 3 | 3.26 | 0.07 |
| Total | 42 | 3.44 | 0.33 |

Note: WRMI items are scored on a 1-5 scale where 1= "not at all like me" and 5= "very much like me".

Objective two included an investigation of noncognitive skills based on demographic characteristics for agricultural mechanics in West Ada School District. Results in Table 4.3 indicated overall WRMI scores of 3.51 (0.30) for tenth graders, 3.41 (0.36) for eleventh graders, 3.41 (0.32) for twelfth graders. Scores for WRMI constructs under self efficacy indicated 4.01 (0.40) for tenth grade, 4.14 (0.56) for eleventh grade, 3.97 (0.46) for twelfth grade; followthrough 3.18 (0.79) for tenth grade, 3.22 (0.64) for eleventh grade, 3.15 (0.82) for twelfth grade; teamwork 3.61(0.69) for tenth grade, 2.94(0.73) for eleventh grade, 3.30(0.64) for twelfth grade; self regulation 2.93(0.37) for tenth grade, 2.90(0.66) for eleventh grade, 2.40(0.43) for twelfth grade; commitment 3.98(0.58) for tenth grade, 4.04(0.72) for eleventh grade, 4.13(0.50) for twelfth grade; communication 3.53(0.70) for tenth grade, 3.41(0.81) for eleventh grade, 3.53(0.44) for twelfth grade; positive outlook 3.14(0.79), 2.70(1.06), 2.60(1.14); and focus 3.09 (0.71) for tenth grade, 2.90 (0.50) for eleventh grade, 3.10 (0.22) for twelfth grade. It is important to note the small number of respondents who indicated twelfth grade and refrain from generalizations or comparisons between grade levels. Results based on grade level are shown in Table 4.3.

*Table 4.3*
*Work Ready Mindset Scores (WRMI) for Students in Agricultural Mechanics Courses (n = 46) based on grade level*

| WRMI Construct | *n* | M | SD |
|---|---|---|---|
| Self Efficacy | | | |
| 10 | 21 | 4.01 | 0.40 |
| 11 | 22 | 4.14 | 0.56 |
| 12 | 5 | 3.97 | 0.46 |
| Total | 48 | 4.07 | 0.48 |
| Followthrough | | | |
| 10 | 20 | 3.18 | 0.79 |
| 11 | 22 | 3.22 | 0.64 |
| 12 | 5 | 3.15 | 0.82 |
| Total | 7 | 3.20 | 0.71 |
| Teamwork | | | |
| 10 | 21 | 3.61 | 0.69 |
| 11 | 22 | 2.94 | 0.73 |
| 12 | 5 | 3.30 | 0.64 |
| Total | 48 | 3.27 | 0.76 |
| Self Regulation | | | |
| 10 | 21 | 2.93 | 0.37 |
| 11 | 22 | 2.90 | 0.66 |
| 12 | 5 | 2.40 | 0.43 |
| Total | 48 | 2.86 | 0.54 |
| Commitment | | | |
| 10 | 21 | 3.98 | 0.58 |
| 11 | 22 | 4.04 | 0.72 |
| 12 | 5 | 4.13 | 0.50 |
| Total | 48 | 4.02 | 0.63 |
| Communication | | | |
| 10 | 21 | 3.53 | 0.70 |
| 11 | 21 | 3.41 | 0.81 |
| 12 | 5 | 3.53 | 0.44 |
| Total | 47 | 3.48 | 0.72 |

Table 4.3 cont'd

| | | | |
|---|---|---|---|
| Positive Outlook | | | |
| 10 | 21 | 3.14 | 0.79 |
| 11 | 22 | 2.70 | 1.06 |
| 12 | 5 | 2.60 | 1.14 |
| Total | 48 | 2.88 | 0.96 |
| Focus | | | |
| 10 | 21 | 3.09 | 0.71 |
| 11 | 22 | 2.90 | 0.50 |
| 12 | 5 | 3.10 | 0.22 |
| Total | 48 | 3.01 | 0.58 |
| WRMI Overall | | | |
| 10 | 19 | 3.51 | 0.30 |
| 11 | 21 | 3.41 | 0.36 |
| 12 | 5 | 3.41 | 0.32 |
| Total | 45 | 3.45 | 0.33 |

Note: WRMI items are scored on a 1-5 scale where 1= "not at all like me" and 5= "very much like me".

Examining noncognitive scores based on schools revealed an overall total WRMI score for the five of the six West Ada high schools of 3.44 (0.33). Individual WRMI construct totals for five of the six West Ada high schools in Table 4.4 indicated 4.05 (0.49) for self efficacy; 3.19 (0.72) for followthrough; 3.25 (0.77) for teamwork; 2.86 (0.56) for self regulation; 4.04 (0.63) for commitment; 3.46 (0.73) for communication; 2.83 (0.97) for positive outlook; and 3.00 (0.59) for focus. It is important to note that not all six West Ada high schools were recognized in this study; there was no data from Eagle High School.

*Table 4.4*

*Work Ready Mindset Scores (WRMI) for Students in Agricultural Mechanics Courses (n = 46) based on school*

| WRMI Construct | *n* | M | SD |
|---|---|---|---|
| Self Efficacy | | | |
| Centennial High School | 7 | 3.90 | 0.53 |
| Meridian High School | 11 | 3.97 | 0.42 |
| Mountain View High School | 11 | 4.17 | 0.41 |
| Owyhee High School | 9 | 3.91 | 0.61 |
| Rocky Mountain High School | 7 | 4.31 | 0.52 |
| Total | 45 | 4.05 | 0.49 |
| Followthrough | | | |
| Centennial High School | 7 | 2.78 | 0.74 |
| Meridian High School | 11 | 3.20 | 0.90 |
| Mountain View High School | 11 | 3.34 | 0.83 |
| Owyhee High School | 9 | 3.27 | 0.50 |
| Rocky Mountain High School | 6 | 3.29 | 0.33 |
| Total | 44 | 3.19 | 0.72 |
| Teamwork | | | |
| Centennial High School | 7 | 3.32 | 0.90 |
| Meridian High School | 11 | 3.47 | 0.71 |
| Mountain View High School | 11 | 3.43 | 0.57 |
| Owyhee High School | 9 | 3.00 | 0.75 |
| Rocky Mountain High School | 7 | 2.89 | 1.02 |
| Total | 45 | 3.25 | 0.77 |
| Self Regulation | | | |
| Centennial High School | 7 | 2.95 | 0.67 |
| Meridian High School | 11 | 2.69 | 0.52 |
| Mountain View High School | 11 | 2.72 | 0.61 |
| Owyhee High School | 9 | 3.07 | 0.61 |
| Rocky Mountain High School | 7 | 3.00 | 0.27 |
| Total | 45 | 2.86 | 0.56 |
| Commitment | | | |
| Centennial High School | 7 | 4.19 | 0.37 |
| Meridian High School | 11 | 4.03 | 0.54 |
| Mountain View High School | 11 | 4.00 | 0.68 |
| Owyhee High School | 9 | 3.92 | 0.81 |
| Rocky Mountain High School | 7 | 4.14 | 0.79 |
| Total | 45 | 4.04 | 0.63 |

Table 4.4 cont'd

| | | | |
|---|---|---|---|
| Communication | | | |
| Centennial High School | 7 | 3.71 | 0.67 |
| Meridian High School | 11 | 3.39 | 0.72 |
| Mountain View High School | 11 | 3.54 | 0.70 |
| Owyhee High School | 9 | 3.40 | 0.79 |
| Rocky Mountain High School | 6 | 3.22 | 0.88 |
| Total | 44 | 3.46 | 0.73 |
| Positive Outlook | | | |
| Centennial High School | 7 | 3.28 | 1.46 |
| Meridian High School | 11 | 3.04 | 0.72 |
| Mountain View High School | 11 | 2.54 | 0.96 |
| Owyhee High School | 9 | 2.55 | 0.88 |
| Rocky Mountain High School | 7 | 2.85 | 0.89 |
| Total | 45 | 2.83 | 0.97 |
| Focus | | | |
| Centennial High School | 7 | 2.92 | 0.67 |
| Meridian High School | 11 | 3.36 | 0.23 |
| Mountain View High School | 11 | 3.09 | 0.58 |
| Owyhee High School | 9 | 2.94 | 0.39 |
| Rocky Mountain High School | 7 | 2.42 | 0.78 |
| Total | 45 | 3.0 | 0.59 |
| WRMI Overall | | | |
| Centennial High School | 7 | 3.48 | 0.39 |
| Meridian High School | 11 | 3.48 | 0.32 |
| Mountain View High School | 10 | 3.44 | 0.32 |
| Owyhee High School | 9 | 3.38 | 0.43 |
| Rocky Mountain High School | 5 | 2.45 | 0.18 |
| Total | 42 | 3.44 | 0.33 |

Note: WRMI items are scored on a 1-5 scale where 1= "not at all like me" and 5= "very much like me".

**Objective 3: Identify the task motivation behaviors of students enrolled in an agricultural mechanics class based on cognitive and psychomotor tasks**

Objective three included an investigation of cognitive skills, psychomotor skills and course grade for agricultural mechanics in West Ada School District. Scores for constructs in

Table 4.5 indicated 79.84 (10.67) grade, 93.14 (10.80) for cognitive skills, 82.16 (13.72) for psychomotor skills.

*Table 4.5*
*Grade and Completion Scores for Students in Agricultural Mechanics Courses (n = 46)*

| Task Completion Scores | Min | Max | M | SD |
|---|---|---|---|---|
| Grade | 56 | 96 | 79.84 | 10.68 |
| Cognitive Completion Percentage | 51.43 | 100 | 93.14 | 10.80 |
| Psychomotor Completion Percentage | 1.50 | 100 | 82.16 | 13.72 |

Note: Completion percentages were scored on yes, they completed or no they did not complete. 1 = Completed and 0 = Not completed.

**Objective 4: Describe task motivation behaviors of students enrolled in an agricultural mechanic's class based on cognitive and psychomotor tasks based on demographic characteristics**

Objective four identified task completion throughout a student's time in CTE courses in agriculture mechanics at West Ada High Schools. Results for grade overall and task completion are included in Table 4.6. Summated scores included 77.00 (6.91) for grade year 1, 80.39 (11.25) for grade year 2, 81.55 (12.74) for grade year 3; 98.18 (2.31) for cognitive task completion year 1, 93.88 (9.02) for cognitive task completion year 2, 86.49 (15.94) for cognitive task completion year 3; 82.11 (12.77) for psychomotor task completion year 1, 84.44(13.08) for psychomotor task completion year 2, 77.24(15.85) for psychomotor task completion year 3; and 79.84(10.67) for grade total, 93.14(10.71) for cognitive task completion, 82.16(12.72) for psychomotor task completion.

*Table 4.6*
*Grade, Cognitive Task Completion and Psychomotor Task Completion Scores for Students in Agricultural Mechanics Courses (n = 46)*

| Task Completion Scores by year | *n* | M | SD |
|---|---|---|---|
| Grade | | | |
| Year 1 | 11 | 77.00 | 6.91 |
| Year 2 | 23 | 80.39 | 11.25 |
| Year 3 | 11 | 81.55 | 12.74 |
| Cognitive Task Completion | | | |
| Year 1 | 11 | 98.18 | 2.31 |
| Year 2 | 24 | 93.88 | 9.02 |
| Year 3 | 22 | 86.49 | 15.94 |
| Psychomotor Task Completion | | | |
| Year 1 | 11 | 82.11 | 12.77 |
| Year 2 | 24 | 84.44 | 13.08 |
| Year 3 | 11 | 77.24 | 15.85 |
| Total | | | |
| Grade | 45 | 79.84 | 10.67 |
| Cognitive Task Completion | 46 | 93.14 | 10.71 |
| Psychomotor Task Completion | 46 | 82.16 | 12.72 |

Note: WRMI items are scored on a 1-5 scale where 1= “not at all like me” and 5= “very much like me.”

**Objective 5: Determine the relationship between noncognitive skills and task motivation**

Objective five examined the relationship between task completion and noncognitive skills. Results are shown in Table 4.7. Davis (1971) was used to determine strength of association. Through examination of correlations, a moderate correlation between types of motivation was determined. Strong correlations were found between self-efficacy and the overall WRMI score (.77) and communication and WRMI score. A strong correlation was also found between commitment and self-efficacy (.66). Moderate relationships were also found between teamwork and the WRMI score (.400), focus and the WRMI score (.310),

followthrough and self-efficacy (.440), communication and self-efficacy (.471), commitment and followthrough (.430), communication and followthrough (.432), communication and teamwork (.400), positive outlook and teamwork (.303), positive outlook and self-regulation (.332), focus and commitment (.375), positive outlook and communication (.354), and focus and communication (.375).

*Table 4.7*

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Cognitive Task Completion | -- | | | | | | | | | |
| 2. Psychomotor Task Completion | .496 | -- | | | | | | | | |
| 3. WRMI Overall | .221 | .208 | -- | | | | | | | |
| 4. Self-efficacy | .051 | .105 | .771 | -- | | | | | | |
| 5. Followthrough | .048 | .114 | .539 | .437 | -- | | | | | |
| 6. Teamwork | .324 | .009 | .395 | .053 | .110 | -- | | | | |
| 7. Self-regulation | .138 | .077 | .262 | -.058 | -.115 | .008 | -- | | | |
| 8. Commitment | .182 | .265 | .751 | .663 | .428 | .101 | 0.83 | -- | | |
| 9. Communication | .071 | .091 | .813 | .471 | .432 | .395 | .171 | .511 | -- | |
| 10. Positive Outlook | .107 | .112 | .501 | .107 | .107 | .303 | .332 | .209 | .354 | -- |
| 11. Focus | .072 | .055 | .306 | .246 | .246 | .073 | -.018 | .375 | .375 | 0.12 |

This study examined how noncognitive skills relate to task motivation in an Agricultural Mechanics based course. Demographic data was collected from individuals who were enrolled in CTE courses in the West Ada School District. The results of this research will allow educators to better understand what motivates students to complete tasks and how psychomotor and noncognitive skills play a role. When looking at noncognitive skills, its variations between schools were interesting; it was also identified that as students progressed year after year in CTE courses, their task completion decreased. Self-efficacy as a factor was interesting to examine considering the scores for males and females. In each of the five high

schools surveyed there are demographic differences that are worth further discussion. In chapter five we will dive deeper into the conclusions of this study and provide recommendations for future studies.

# Chapter 5: Conclusions and Recommendations

Noncognitive skills are expansive, and include concepts related to resilience, motivation, outlook, and self-efficacy (Heckman, et al., 2006). A review of literature review resulted in a lack of a descriptive analysis of noncognitive skills in CTE students in Idaho. In this study, we examined multiple noncognitive skills of CTE students to examine the relationship between noncognitive skills and task motivation along with task completion.

Intrinsic motivation could be a factor when considering the lack of relationship between noncognitive skills and task completion. The tasks that students are assigned are straightforward, but students may not see how this will benefit them in the future. Miller Open Book is designed to help students gain a better understanding of the concepts being taught and demonstrated. However, the presentation of this online platform is such that it discourages most students from wanting to complete the tasks. Assigned welding skills are defined by industry need and recommendation. Specific types of welds are meant to teach students the basics but challenge them with increasingly difficult skills to master. It is possible the skills challenge is too great for the allotted coursework time, causing students to become unmotivated and not complete the task. If students do not understand how the skill benefits them, it could be the reason why there was no relationship between noncognitive skills and task completion.

As agricultural educators work to develop programs that help prepare students for careers, it is imperative to teach noncognitive skills (Phipps & Osborne, 1988). There is a need to understand the implications of noncognitive skills as they relate to each other and to task completion (Phipps & Osborne, 1988).

To improve noncognitive skills overall, CTE teachers can incorporate more achievable goal setting, chunking tasks, positive communication, and reflection to help improve self-efficacy in students. Additional investigation into the noncognitive traits of other ag mechanic course populations could help to confirm or dispute the findings in this study. We recommend further examination into the potential causes for the difference observed in this study.

Our study showed that the average followthrough was $M = 3.19$ between the five of six West Ada High Schools surveyed. Mountain View High School led with an average of 3.34 and Centennial had an average of 2.78. When comparing economic disadvantage and self-efficacy of each school, follow through averages make sense because; lower socioeconomic positions have higher odds for daily emotional symptoms and lower levels self-efficacy and high social competence compared to schoolchildren from higher socioeconomic positions (Meilstrup, et.al.). According to Clear (2020) akrasia (or procrastination) is what prevents you from following through on a task. Mechanics students may have the short-term gratification of completing a task, but in the long run that gratification dissipates because researchers have discovered that the present self prefers instant gratification, not long-term payoff (Clear, 2020). Commitment can come from a variety of positive and negative motivational tactics in the classroom (Murray, 2005). For both teachers and students this could mean finding tasks that can be completed in a shorter amount of time or finding tasks that work to improve the commitment and followthrough of the student.

It is worth noting that students' mean scores for psychomotor task completion had a moderate relationship to self-efficacy and followthrough. Students who score higher

noncognitive skills, who are enrolled in an ag mechanic's course may have higher psychomotor skills due to their grit and motivation to complete tasks. Second, agricultural mechanics courses are marketed towards and sought out by students that thrive on hands-on tasks. Agricultural mechanics courses are typically more hands-on and require more psychomotor tasks. Students who have enrolled in these courses are likely to have more grit, optimism, and self-efficacy towards completing a task. However, in this research, the findings did not support that conclusion.

The assignments in this course are about 50% cognitive and 50% psychomotor. When students score low in the cognitive completion area that does not mean they are ill prepared for the workforce, this could mean they would rather spend their time completing the psychomotor tasks and happen to excel at them. Students that enroll in a welding course want to be welding, doing something hands on where they can move around, and don't want to do the "clerical" side that can come with the job. To better meet the needs of these students, adapting course materials and teaching practices to emphasize the importance of the cognitive components could in result improve their grit, optimism, and self-efficacy towards completing a task.

More research is needed to explore differences and causations. Future research to compare all agricultural mechanics students and those who are enrolled in other psychomotor task developing CTE courses is recommended. These could be diesel, auto, collision, etc. Examining this concept within other CTE courses could help develop a clear picture of how course assignments across CTE are related to the development and implementation of noncognitive skills.

We also recommend research related to examining the factors influencing a student's decision to complete a task within a class. Knowing students' motivations to complete a task can allow educators to give students various opportunities and methods. This research could show the importance of self-efficacy in task completion. Additionally, teacher educators could better prepare CTE teachers to recruit and retain students if the factors related to the observed differences in noncognitive skills and psychomotor skills were further explored.

Self-efficacy significantly affects academic performance. Therefore, the gender-personality orientation may reveal an important relation to self-efficacy and academic performance. A key component to self-efficacy is self-confidence, high school students display this every day in their daily interactions (Fallan & Opstad, 2016). The relationship between self-efficacy and years in CTE is interesting. First year CTE students surveyed had a self-efficacy score of 4.00. Students in their second year of CTE scored 4.01, and students in their third year of CTE scored a 4.22. First year welding students are still learning the basics of welding, navigating the shop environment and how to function in a non-traditional classroom, this would explain their lower score on self-efficacy. While students in their third year of CTE are more comfortable with the shop environment, shop processes and technical skill acquisition, this may explain their higher score on self-efficacy. From beginning to end, students gain confidence, and their successes increase. It is well known that an individual's belief that he or she can master a specific task or topic is positively related to the probability of succeeding (Fallan & Opstad, 2016).

Future research should consider examining gender differences in self-efficacy in other ag mechanics courses. Pajares (2002) noted that male and female students tend to respond to self-efficacy measurement tools with a different mindset. Male students tend to use an

inflated sense of confidence while female students tend to be more modest in their response (Pajares, 2002).

Considering the different ways genders perceive their sense of confidence can be used by educators when designing lessons for their students. Knowing that male students may have a higher self-efficacy than their female counterparts related to completing psychomotor tasks in an agricultural mechanics setting could allow educators to be more precise in how content is being delivered. Content delivery can come in different instructional forms such as demonstration, visual ques, videos, group activities. When using different learning or teaching strategies, being more cognizant of verbiage being used could make all the difference when strengthening self-efficacy in not only female student but all students. With the small number of female participants in this research, we can't allow it to speak for the entire gender. As educators interact with students and develop lessons, teachers can be more direct with promoting self-efficacy in their students by utilizing encouraging words and allowing for reflection.

Self-efficacy can be defined as one's ability to succeed (Bandura, 2010). In this study self-efficacy at each of the six high schools was evaluated. While numbers prohibited empirical testing between school sites, noncognitive scores between schools warrant further examination. Rocky Mountain High School had the highest average self-efficacy score of 4.31 and Centennial High School had the lowest average self-efficacy score of 3.90. According to the West Ada School District, Centennial High School ranks fifth at 22% for economic disadvantage (West Ada, n.d.). While the differences in noncognitive skills based on socio-economic status for the participants in this study are not supported, results indicate that there is a need for the topic to be examined further in agricultural mechanics courses.

Further study on how socioeconomic status affects noncognitive skills in agricultural mechanics would provide students with a better opportunity when learning. If teachers have more knowledge about the relationship between socio-economic status and noncognitive skills, they can adapt, scaffold learning, and enhance curriculum to support their specific students. In the last year at West Ada School District, there has been a focus to provide more support to English language learning students. Teachers have been provided with more resources to better support those students and improve their learning.

There was a moderate relationship between teamwork and cognitive task completion. This relationship indicates that students with higher predisposition to working on a team are more likely to complete cognitive tasks. This illustrates why teachers should utilize more team or group assignments since students are more likely to complete those cognitive tasks together. In the West Ada School District, math teachers are doing more group work and "team tests" where students work together to complete the tasks. By changing the curriculum to be presented this way, students are having to communicate more with their peers, problem solve, and must learn valuable teamwork skills. More research into the relationship of teamwork and cognitive task completion should be conducted so educators can continue to find better methods to educate students in a way that will motivate them to get the task(s) done.

While we did not explore variations between males and females due to the significantly uneven distribution of students in each category. However, the averages for the completion of psychomotor tasks among male and female students in this study, coupled with the breakdown of self-efficacy scores by gender, suggest that gender imbalance in agricultural mechanics courses merit further investigation. With only three female students in

this study, no real conclusion can be drawn. This begs the following question: Does a gender difference for psychomotor task completion or self-efficacy exist in agricultural education students? A supporting factor for this question could be the necessity for repetition. Gender differences in agricultural mechanics have been examined in several studies. Future research should continue this line of inquiry, especially as it relates to willingness to complete a task.

Looking specifically at psychomotor tasks, Smith and Ragan (2005) discussed the way to evaluate psychomotor tasks through repetition and correct execution of the motions. Students with more follow through and commitment may find more difficult courses enjoyable because they are more likely to deliberately practice the course content. In this study it was identified that followthrough and completion had a very low correlation to psychomotor task completion. If students had more opportunity to increase repetition to become proficient at a task or having tasks that boosted self confidence in areas of struggle, there could be a higher correlation in future studies. Additional research could focus on determining whether the findings in Ryan & Deci (2000), that intrinsic motivation can be tied to *orientation* because of "underlying attitudes and goals that give rise to action, as an example, a student can be highly motivated to do homework out of curiosity and interest or because they want the approval of the teacher". A quantitative study could examine the number of hours students spend practicing a skill and compare between course, hours spent and noncognitive skills.

To help explain some of the differences found in this research, future research should examine a more level field of data collection between males and females. Ryan & Deci (2000) suggested self-determination theory as shown in Figure 2.3, higher levels of noncognitive skills like; persistence, self-discipline, focus, confidence, and teamwork may

impact self-determination levels. It could be the case that female students have higher levels of persistence, self-discipline and focus which allows them to be motivated for consistent practice.

Based on this research, we recommend training specifically focused on helping students improve their psychomotor skills. Malone (n.d.) said giving students as much information as possible on how to perform a skill improves performance. As students prepare to complete a task this increase in information provides an opportunity for students to have all the pieces needed to be successful. Malone continued to say that encouraging or focusing on errors during training can improve performance, retention, and transfer of procedural skills. Teachers could scaffold the content further and allow for more small student hands on activity allowing students practice prior to the actual task. Further research should examine a class that has had this extra scaffolding versus a class that has not. How would this difference affect the psychomotor skills and their completion percentage by students?

The findings of this study allow for several conclusions. For the students in this study, there was not a strong relationship between noncognitive skills overall and task completion for psychomotor or cognitive tasks. Although the relationship overall was not found for overall noncognitive skills related to task completion, we did find several relationships which warrant further discussion. There are three items within the data that are worth noting, specifically the differences between gender and psychomotor task completion, gender and self-efficacy, school and follow through.

Since the WRMI does not assess task completion in students, it is hard to gather a comparison to noncognitive skills. The lack of relationship between noncognitive skills and task completion may be caused by several factors. One possible explanation is that

noncognitive skills might not be considered significant during students' completion of school assignments. This lack of emphasis could stem from the school culture, the dynamics within their specific classroom, or influences from their experiences in other high schools or their home environment. This perspective might be influenced by the educational culture, which may prioritize cognitive aspects over socio-emotional development in the academic setting. As a result, the significance of noncognitive skills in the context of schoolwork completion might be understated, potentially limiting the holistic development of students. Earlier, the results pertaining to school variances and demographic factors were identified; considering these, it could substantiate this notion. To gain a better understanding of the comparison between noncognitive skills and task completion, another study should be conducted to see if it confirms or conflicts before a decision is made.

The relationship of the WRMI Overall and the constructs is important to note because it shows that this study needs to be done with more individuals in the future to gather stronger data. When noting the association of these constructs to the overall WRMI score, scores with values of .30 or higher were taken because they had moderate to very strong association to the WRMI Overall score. Teamwork was the only one to note because of its moderate association scoring a .324. Self-Efficacy scored a .051, followthrough .048, self-regulation .138, commitment .182, communication .071, and positive outlook .107.

In this study, we examined noncognitive skills and their relation to task completion. We can conclude that while we found no strong relationship between task completion and noncognitive tasks in this study, we were able to examine components of noncognitive skills and their relationship to each other. CTE courses frequently allow students to gain relevant knowledge and career skills along with workplace readiness skills necessary to compete in

the current job market (Gordon, 2008). In future studies of task motivation, the noncognitive skills could still be assessed. However, finding a way to test for self-regulation in an ag mechanic's course could prove to be effective in identifying what drives task completion in high school students, because most experts agree that a group of factors outside of cognitive ability help drive workplace readiness (Khine & Areepattamannil, 2016).

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## Appendix A: Categorization of Tasks

| Welding II | | | | | |
|---|---|---|---|---|---|
| **Assignment** | **Category** | **Possible Points** | **Due Date** | **Assignment Average (both classes combined** | **Percentage of Students 70% or Higher** |
| Millermatic 252 Parts ID Activity | Noncognitive | 20 | 1/25/2023 | 100 | 94% |
| MOB 1 - Fillet Welding Symbols | Noncognitive | 100 | 1/26/2023 | 87.4 | 88% |
| MOB 2 - Groove Welding Symbols | Noncognitive | 100 | 1/26/2023 | 93.04 | 97% |
| MOB 3 - Blueprint Reading | Noncognitive | 100 | 1/26/2023 | 90.17 | 94% |
| GMAW Unit Test | Noncognitive | 53 | 1/31/2023 | 39.29 | 58% |
| MOB 4 - Introduction to Metals - Metal Classifications | Noncognitive | 100 | 2/2/2023 | 93.38 | 97% |
| MOB 5 - Introduction to Metals - Mechanical Processes | Noncognitive | 100 | 2/2/2023 | 92.65 | 94% |
| MOB 6 - History and Overview | Noncognitive | 100 | 2/2/2023 | 88.24 | 94% |
| MOB 7 - | Noncognitive | 100 | 2/2/2023 | 88.7 | 100% |

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|---|---|---|---|---|---|
| GTAW Advantages and Limitations | | | | | |
| Metal Identification Lab | Psychomotor | 20 | 2/6/2023 | 100 | 97% |
| MOB 8 - Primary and Secondary Power | Noncognitive | 100 | 2/9/2023 | 92.94 | 91% |
| MOB 9 - Current | Noncognitive | 100 | 2/9/2023 | 87.38 | 94% |
| MOB 10 - Equipment | Noncognitive | 100 | 2/9/2023 | 95.09 | 100% |
| MOB 11 - Arc Starting Methods - GTAW | Noncognitive | 100 | 2/9/2023 | 97.06 | 97% |
| GTAW Unit Test | Noncognitive | 63 | 2/13/2023 | 47.24 | 70% |
| Welding Symbols Video Drawings | Psychomotor | 30 | 2/15/2023 | 24.71 | 67% |
| MOB 12 - Wire Feeders | Noncognitive | 100 | 2/16/2023 | 86.74 | 88% |
| MOB 13 - GTAW-P Welding | Noncognitive | 100 | 2/16/2023 | 94.11 | 94% |
| MOB 14 - The Welding Gun | Noncognitive | 100 | 2/16/2023 | 91.39 | 100% |
| MOB 15 - Equipment Torch and Parts | Noncognitive | 100 | 2/16/2023 | 91.91 | 97% |

| | | | | | |
|---|---|---|---|---|---|
| MOB 16 - Welding Variables | Noncognitive | 100 | 2/23/2023 | 100 | 100% |
| MOB 17 - Automated - GTAW | Noncognitive | 100 | 2/23/2023 | 78.9 | 94% |
| MOB 18 - GMAW Wires | Noncognitive | 100 | 2/23/2023 | 94.12 | 97% |
| MOB 19 - GTAW Electrodes | Noncognitive | 100 | 2/23/2023 | 89.71 | 94% |
| MOB 20 - Arc Transfer Modes - GMAW | Noncognitive | 100 | 3/2/2023 | 90.75 | 97% |
| MOB 21 - Shielding Gasses #1 | Noncognitive | 100 | 3/2/2023 | 94.11 | 91% |
| MOB 22 - Shielding Gasses #2 | Noncognitive | 100 | 3/2/2023 | 88.24 | 91% |
| MOB 23 - GTAW Filler Metals | Noncognitive | 100 | 3/2/2023 | 86.26 | 97% |
| MOB 24 - Spot, Plug, and Slot Welding | Noncognitive | 100 | 3/2/2023 | 81.62 | 91% |
| MOB 25 - Power Supply and Welding Prep | Noncognitive | 100 | 3/9/2023 | 92.15 | 94% |
| MOB 26 - Welding Techniques #2 | Noncognitive | 100 | 3/9/2023 | 81.18 | 85% |

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|---|---|---|---|---|---|
| MOB 27 - Aluminum Weld Preparation | Noncognitive | 100 | 3/9/2023 | 86.55 | 91% |
| MOB 28 - Common Weld Defects | Noncognitive | 100 | 3/9/2023 | 76.85 | 73% |
| MOB 29 - Aluminum GTAW | Noncognitive | 100 | 3/16/2023 | 84.71 | 91% |
| MOB 30 - Trouble Shooting GMAW Systems | Noncognitive | 100 | 3/16/2023 | 81.62 | 85% |
| MOB 31 - Trouble Shooting GTAW Systems | Noncognitive | 100 | 3/16/2023 | 85.88 | 85% |
| SMAW 01 - Pad E7018 | Psychomotor | 100 | 5/16/2023 | 86.24 | 91% |
| SMAW 02 - Pad E6011 | Psychomotor | 100 | 5/16/2023 | 82 | 88% |
| SMAW 03 - 2F E7018/ E6011 | Psychomotor | 100 | 5/16/2023 | 64.41 | 73% |
| SMAW 04 - Groove 7018 | Psychomotor | 100 | 5/16/2023 | 74.82 | 58% |
| SMAW 05 - 3F up E6011 double sided | Psychomotor | 100 | 5/16/2023 | 53.77 | 38% |
| SMAW 06 - 4F 7018 | Psychomotor | 100 | 5/16/2023 | 68.24 | 55% |
| Oxy - Ace 01 - 2F double sided | Psychomotor | 100 | 5/16/2023 | 70.18 | 76% |

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|---|---|---|---|---|---|
| Oxy - Ace 02 - 3B up | Psychomotor | 100 | 5/16/2023 | 79.71 | 85% |
| Oxy - Ace 03 - Lap Braze | Psychomotor | 100 | 5/16/2023 | 74.41 | 91% |
| Oxy - Ace 04 - 2F Braze | Psychomotor | 100 | 5/16/2023 | 58.88 | 73% |
| Oxy - Ace 05 - 3/4 Strip Cut | Psychomotor | 100 | 5/16/2023 | 70.41 | 79% |
| GTAW 01 - Straight Bead Mild Steel | Psychomotor | 100 | 5/16/2023 | 75.77 | 82% |
| GTAW 02 - Straight Bead Aluminum | Psychomotor | 100 | 5/16/2023 | 54.65 | 61% |
| GTAW 03 - 2F Mild Steel double sided | Psychomotor | 100 | 5/16/2023 | 65.12 | 67% |
| GTAW 04 - 1B Aluminum | Psychomotor | 100 | 5/16/2023 | 46.29 | 41% |
| GTAW 05 - Lap Stainless Steel | Psychomotor | 100 | 5/16/2023 | 43.82 | 35% |
| GMAW 01 - Pad | Psychomotor | 100 | 5/16/2023 | 85.82 | 100% |
| GMAW 02 - 1B | Psychomotor | 100 | 5/16/2023 | 74.29 | 82% |
| GMAW 03 - Lap | Psychomotor | 100 | 5/16/2023 | 86.59 | 91% |
| GMAW 04 - 2F triple pass/ single pass | Psychomotor | 100 | 5/16/2023 | 85 | 97% |
| GMAW 05 - 2F 14ga both | Psychomotor | 100 | 5/16/2023 | 75.41 | 67% |

| | | | | | |
|---|---|---|---|---|---|
| sides | | | | | |
| GMAW 06 - 2B 14ga | Psychomotor | 100 | 5/16/2023 | 69.24 | 67% |
| GMAW 07 - 3F up both sides | Psychomotor | 100 | 5/16/2023 | 70.47 | 61% |
| GMAW 08 - 3F down both sides | Psychomotor | 100 | 5/16/2023 | 60.82 | 61% |
| Cut Practical Metal - GMAW/ SMAW | Psychomotor | 100 | 5/31/2023 | 100 | 97% |
| Cut Practical Metal - GTAW/ Oxy | Psychomotor | 100 | 5/31/2023 | 95.29 | 94% |
| Practical- Oxy/ GTAW | Psychomotor | 100 | 5/31/2023 | 72.06 | 47% |
| Practical- SMAW/ GMAW | Psychomotor | 100 | 5/31/2023 | 72.94 | 73% |
| Shop Clean-Up | Psychomotor | 100 | 5/31/2023 | 100 | |
| Final - Cumulative | Noncognitive | 43 | 5/31/2023 | 80.09 | |

| **Welding III** | | | | |
|---|---|---|---|---|
| **Assignment** | **Category** | **Possible Points** | **Due Date** | **Percentage of Students 70% or Higher** |
| Plasma Arc Cutting Exam | Noncognitive | 34 | 1/18/2023 | 78% |
| Plasmacam - Lesson 1 | Noncognitive | 50 | 1/23/2023 | 100% |

| | | | | |
|---|---|---|---|---|
| Plasmacam - Lesson 2 | Noncognitive | 50 | 1/23/2023 | 100% |
| Plasmacam - Lesson 3 | Noncognitive | 50 | 1/25/2023 | 100% |
| Plasmacam - Lesson 4 | Noncognitive | 50 | 1/25/2023 | 100% |
| Plasma Certification Exam | Noncognitive | 49 | 1/27/2023 | 89% |
| Plasmacam - Quiz 1 | Noncognitive | 100 | 1/31/2023 | 89% |
| Plasmacam - Quiz 2 | Noncognitive | 100 | 1/31/2023 | 94% |
| Plasmacam - Quiz 3 | Noncognitive | 100 | 2/2/2023 | 78% |
| Plasmacam - Quiz 4 | Noncognitive | 100 | 2/15/2023 | 63% |
| Plasmacam - Quiz 5 | Noncognitive | 100 | 2/23/2023 | 78% |
| Plasmacam - Quiz 6 | Noncognitive | 100 | 3/13/2023 | 52% |
| Plasmacam - Cutting Project | Psychomotor | 200 | 3/17/2023 | 68% |
| AET Profile Update | Noncognitive | 10 | 3/30/2023 | 78% |
| America Revealed - Electric Nation | Noncognitive | 27 | 3/30/2023 | 89% |
| DAM Notes | Noncognitive | 15 | 3/30/2023 | 78% |
| Unit 33 Electricity Terms | Noncognitive | 20 | 4/6/2023 | 47% |
| Unit 33 Electricity | Noncognitive | 34 | 4/6/2023 | 36% |

| Questions | | | | |
|---|---|---|---|---|
| Wire Board Construction | Psychomotor | 100 | 4/26/2023 | 94% |
| Wire Exercise 1 | Noncognitive | 100 | 4/28/2023 | 94% |
| Wire Exercise 2 | Noncognitive | 100 | 4/28/2023 | 94% |
| Wire Exercise 3 | Noncognitive | 100 | 4/28/2023 | 94% |
| Wire Exercise 4 | Noncognitive | 100 | 4/28/2023 | 94% |
| Wire Exercise 5 | Noncognitive | 100 | 4/28/2023 | 89% |
| Wire Exercise 6 | Noncognitive | 100 | 4/28/2023 | 68% |
| Practical Wiring 1 | Psychomotor | 100 | 5/24/2023 | 73% |
| Practical Wiring 2 | Psychomotor | 100 | 5/24/2023 | 94% |
| Practical Wiring 3 | Psychomotor | 100 | 5/24/2023 | 84% |
| Practical Wiring 4 | Psychomotor | 100 | 5/24/2023 | 68% |
| Practical Wiring 5 | Psychomotor | 100 | 5/24/2023 | 68% |
| Practical Wiring 6 (bonus) | Psychomotor | 100 | 5/24/2023 | 10% |
| Wire Board Destruction | Psychomotor | 100 | 5/24/2023 | 94% |
| Spring Final Exam | Noncognitive | 297 | 5/26/2023 | |
| Shp Clean - Up | Psychomotor | 100 | 5/31/2023 | |

# Appendix B: Work-Ready Mindset Inventory Categorization

| Item | Source | Reverse | Factor | Factor Name |
|---|---|---|---|---|
| I can overcome setbacks to conquer an important challenge | GRIT | N | 1 | Self-Efficacy |
| I am resourceful when unexpected things happen | SELF-EFFICACY | N | 1 | Self-Efficacy |
| I can solve most problems if I try hard enough | SELF-EFFICACY | N | 1 | Self-Efficacy |
| I can usually handle whatever comes my way | SELF-EFFICACY | N | 1 | Self-Efficacy |
| When a problem arises, I an usually find several solutions | SELF-EFFICACY | N | 1 | Self-Efficacy |
| Getting what I want is a result of my own efforts | LOC | N | 1 | Self-Efficacy |
| I think gaining experience helps people get better at a task | LOC | N | 1 | Self-Efficacy |
| I can accomplish hard tasks if I work hard enough at them. | LOC | N | 1 | Self-Efficacy |
| I think people are more motivated to complete something when they know the importance of the task | PRCN/APLU | N | 1 | Self-Efficacy |
| The opportunity to take on new projects often distracts me from projects I am already working on | GRIT | y | 2 | Follow Through |
| I often have trouble following through on projects I start* | GRIT | Y | 2 | Follow Through |
| I finish whatever I begin | GRIT | N | 2 | Follow Through |
| I have been very committed to a project but lost interest in it over time | GRIT | y | 2 | Follow Through |
| I generally prefer to work alone rather than in a team* | PRCN/APLU | Y | 3 | Teamwork |
| Groups of people can generally accomplish more than someone working on their own. | PRCN/APLU | N | 3 | Teamwork |
| I can find a way to get along with most people | PRCN/APLU | N | 3 | Teamwork |
| In a team, there are generally one or more people who frustrate me* | PRCN/APLU | Y | 3 | Teamwork |
| People who succeed are usually in the right place at the right time* | LOC | Y | 4 | Self-Regulation |
| Most things that happen to me are out of my control* | LOC | Y | 4 | Self-Regulation |
| I have complete control over my own destiny | LOC | N | 4 | Self-Regulation |
| I don't give up easily on projects I am passionate about | GRIT | N | 5 | Commitment |
| I enjoy working hard at a task and being successful | LOC | N | 5 | Commitment |
| I like to work on projects that are related to a bigger picture | PRCN/APLU | N | 5 | Commitment |
| It is important for people to share their thoughts with others | PRCN/APLU | N | 6 | Communication |
| I am able to clearly explain what I am thinking to others | PRCN/APLU | N | 6 | Communication |
| I find it easy to speak up in a group | PRCN/APLU | N | 6 | Communication |
| I believe if something can go wrong, it generally will* | OPTIMISM | Y | 7 | Positive Outlook |
| Things that are going to happen will likely happen no matter what I do | LOC | Y | 7 | Positive Outlook |
| I enjoy tasks where I can be successful without a lot of effort* | LOC | Y | 8 | Completion |
| People are usually more important than projects to me | PRCN/APLU | N | 8 | Completion |

## Appendix C: Work-Ready Mindset Inventory Items

| # | Item |
|---|---|
| 1 | The opportunity to take on new projects often distracts me from projects I am already working on |
| 2 | I don’t give up easily on projects I am passionate about |
| 3 | I often have trouble following through on projects I start* |
| 4 | I finish whatever I begin |
| 5 | I have been very committed to a project but lost interest in it over time |
| 6 | My core interests change from year to year |
| 7 | I can overcome setbacks to conquer an important challenge |
| 8 | Being discouraged can make me more likely to give up on a project* |
| 9 | Being discouraged makes me want to put in extra effort to be successful |
| 10 | There are times I want to give up, but I keep going until I accomplish my goals |
| 11 | I generally expect good things to happen to me |
| 12 | I believe if something can go wrong, it generally will* |
| 13 | People often comment that I have a positive outlook on life |
| 14 | I think good things are going to happen in my future |
| 15 | When things are uncertain, I usually think the best will happen |
| 16 | Things do not generally go my way* |

17 I can generally solve problems if I try hard enough

18 I can adapt my approach to help reach my goals

19 I rarely fail at things I set out to do

20 I am resourceful when unexpected things happen

21 I can solve most problems if I try hard enough

22 I usually fail at the tasks I try to complete*

23 I can usually handle whatever comes my way

24 When a problem arises, I an usually find several solutions

25 Getting what I want is a result of my own efforts

26 Things that are going to happen will likely happen no matter what I do

27 People who succeed are usually in the right place at the right time*

28 I think gaining experience helps people get better at a task

29 Most things that happen to me are out of my control*

30 There are few things that I cannot have an influence over

31 I can accomplish hard tasks if I work hard enough at them.

32 There are many things I could never accomplish, no matter how hard I tried*

33 I have complete control over my own destiny

34 It is important for people to share their thoughts with others

35 I think working hard alone is more important than being able to work with others*

36 I generally prefer to work alone rather than in a team*

37 I think groups of people can generally accomplish more than someone working on their own.

38 I can clearly explain what I am thinking to others

39 I find it easy to speak up in a group

40 Most people get what they deserve in life

41 People who work hard are often overlooked for awards and recognition*

42 I can make decisions that help me be more successful

43 I can find a way to get along with most people

44 In a team, there are generally one or more people who frustrate me*

45 I enjoy working hard at a task and being successful

46 I enjoy tasks where I can be successful without a lot of effort*

47 It is important to know the reason behind the things I do

48 I like to work on projects that are related to a bigger picture

49 Working on a small part of the solution is as important as working on a broader solution

50 I think people are more motivated to complete something when they know the importance of the task

51 People are usually more important than projects to me

52 As long as the job is done there is little need to talk about how it was completed*

**Appendix D: Data Analysis Plan by Objective**

| Objective | Data | Analysis |
|---|---|---|
| Identify the noncognitive skills of students enrolled in agricultural mechanics classes; | Scores on WRMI constructs | Descriptive analysis of each WRMI construct (Mean, SD) |
| Describe the noncognitive skills of students enrolled in agricultural mechanics classes based on demographic characteristics (gender & grade level). | Scores on WRMI Constructs<br><br>Responses to demographic items | Descriptive analysis (Mean, SD) of each WRMI construct for both gender and grade level<br><br>Comparison through t-tests for gender and one-way ANOVA for grade level |
| Identify the task motivation behaviors of students enrolled in an agricultural mechanics class based on cognitive and psychomotor tasks; | Dichotomous task completion score for each student for each course task<br><br>Summated task scores<br><br>Mean task score for each task for each student | Descriptive (frequency & %) of task completion for both cognitive and psychomotor tasks<br><br>Descriptive (Mean, SD) of summated task score for student group for both cognitive and psychomotor tasks<br><br>Descriptive (Mean, SD) of task score for both cognitive and psychomotor tasks |
| Describe the task motivation behaviors of students enrolled in an agricultural mechanics class based on cognitive and psychomotor tasks based on demographic characteristics (gender & grade level). | Dichotomous task completion score for each student for each course task<br><br>Summated task scores<br><br>Mean task score for each task for each student<br><br>Responses to demographic items | Descriptive analysis (frequency, %) of task completion for both gender and grade level<br><br>Descriptive analysis (Mean, SD) of summative task score for both gender and grade level<br><br>Comparison of summated task scores through t-tests for gender and one-way |

| | | |
|---|---|---|
| | | ANOVA for grade level |
| Determine the relationship between noncognitive skills and task motivation; | Scores on WRMI Constructs<br><br>Dichotomous task completion score for each student for each course task<br><br>Summated task scores<br><br>Mean task score for each task for each student | Correlation between of summated task scores and each WRMI construct |