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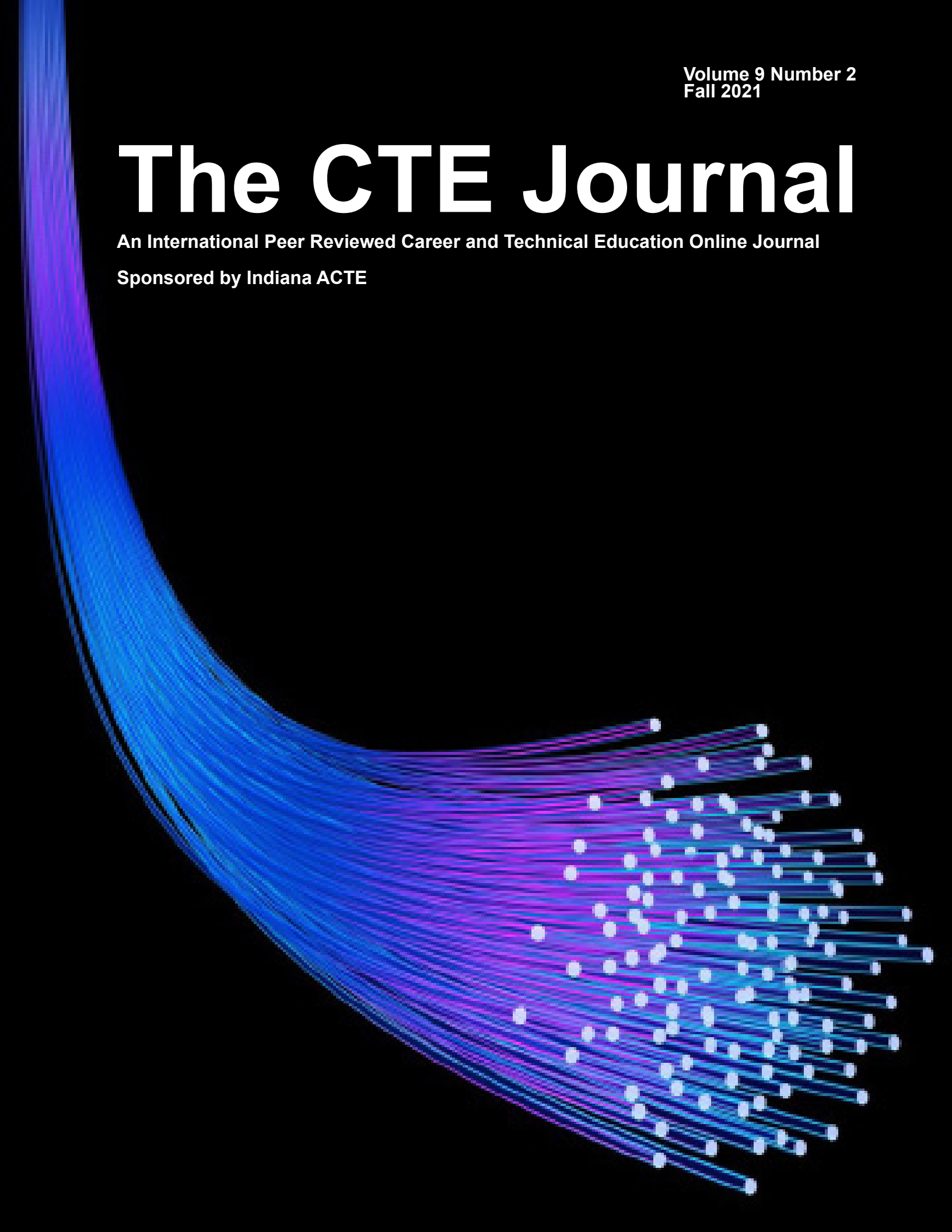


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American Indian Students' Attitudes toward Agriculture as a College Major

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Abstract

Historically, American Indians have been woefully underrepresented in the United States workforce, and even more so in the agriculture industry. To increase the diversity in the agricultural workforce, scholars have made calls to target underrepresented populations through recruitment programs. To best recruit this population requires an understanding of the factors which impact the decision to pursue higher education, and more specifically agriculture. Therefore, this study sought to explore the factors which contribute to the attitudes of secondary American Indian agricultural education students' attitudes toward agriculture as a college major. The results of multiple regression analysis yielded a statistically significant model that explained 92% of the variance in the study participants' attitudes to pursue agriculture as a college major. Those professionals who work with this population are encouraged to seek opportunities to engage potential students in programs which highlight the role an agriculture career can play in the support of students' families.

Introduction

Recent agriculture graduates will fill 61% of the annual industry job openings. However, this sector of the economy has struggled to attract graduates from underrepresented populations (Goecker et al., 2015; Talbert & Larke, 1995). This is not surprising as minority students comprise only 17% of all undergraduate agriculture majors (United States Department of Agriculture, 2014) and therefore, goals to diversify the agricultural workforce have been established (Stripling & Ricketts, 2016). To meet these goals, recruitment programs targeting underrepresented students have been implemented. The effects of these programs have yielded increased enrollment of minority undergraduates pursuing agriculture degrees (United States Department of Agriculture, 2014). These programs most often target African, Asian, and Hispanic or Latino American students. However, conspicuously missing from the bullseye are American Indian students.

Attempting to improve the participation of American Indians in the agricultural workforce by increasing enrollment in post-secondary agriculture programs will be challenging, at best. Among Whites, African, Asian, and Hispanic or Latino Americans, the post-secondary student demographics resemble the most recent United States population demographics (Kena et al., 2016; United States Census Bureau, 2017). However, this is not the case for American Indians. American Indians and Alaska Natives constitute approximately

1.7% of the United States population (United States Census Bureau, 2017) yet, fewer than 0.6% of the 17.3 million undergraduates enrolled in post-secondary education were American Indians or Alaska Natives (Kena et al., 2016). Similarly, these groups are awarded fewer than 1% of agriculture-related bachelor's degrees (National Science Board, 2016). However, these statistics may be misleading or even inflated, as the American Indian demographic is consolidated with Alaskan Natives, thus complicating the ability to truly discern accurate enrollment statistics.

To improve the ratio of American Indian students completing undergraduate degrees, an increase in the number of high school graduates pursuing higher education must be realized. Currently, 17% of American Indian high school graduates, compared to the national rate of 67%, enroll in post-secondary education (Oliff, 2017). Individual factors, cultural and social pressures, and lack of awareness of opportunities have been identified as factors influencing college enrollment. Students residing on reservations tend to live with large families which creates personal conflict, due in part to their perceived family support obligations (Swanson & Tokar, 1991). Since 13% of American Indians hold a bachelor's degree, current high school graduates are more likely to be first-generation college students which has been found to contribute to feelings of isolation as they are less likely to have parents with shared experiences from whom to seek guidance (Jackson & Smith, 2001). To complicate the situation, students who have contemplated leaving the reservation to pursue higher education have reported hostility from family members and tribal leaders in an attempt to prevent them from abandoning the tribe (Fann, 2004). Even though some tribes provide full financial support for post-secondary education, (Fann, 2004) few students have reported awareness of these resources (Jackson & Smith, 2001; Hoover & Jacobs, 1992). Furthermore, students have also reported that access to higher education information is often limited to those who may have the opportunity to compete in college athletics (Fann, 2004).

Theoretical Framework

This study was grounded in the theory of planned behavior (Ajzen, 1991). This theory is commonly used to understand human behavior and has been used to explore the attitudes of students toward aspects of agricultural education (Osborne & Dyer, 2000; Thompson & Russell, 1993). Ajzen (2006) identified behavioral beliefs, normative beliefs, and control beliefs as factors which influence one's decisions to act. Regarding the present study, normative beliefs were operationalized as the familial and societal attitudes toward higher education as perceived by secondary American Indian agricultural education students. Control beliefs were operationalized as the factors which influence the decision to pursue higher education as perceived by secondary American Indian agricultural education students.

Purpose/Objectives

The purpose of this study was to explore the factors which contribute to the attitudes of secondary American Indian agricultural education students' attitudes toward agriculture as a college major. The study was guided by the following objectives:

1. Describe the attitudes of American Indian agricultural education students toward agriculture as a subject, college major, and career.
2. Describe the levels of academic and social support as perceived by American Indian agricultural education students.
3. Determine if a model exists explaining a significant portion of the variance in American Indian agricultural education students' attitudes toward agriculture as a college major, as explained by attitudes toward agriculture as a subject and career, and perceived levels of academic and social support.

Methods

This was a quantitative study. The study participants were all secondary students enrolled in agricultural education courses during the spring of 2018 ($N = 75$) at a public high school located on a federally recognized Indian reservation in New Mexico. The researcher developed survey was based upon the work of Frazee et al. (2011). The survey included 5-point Likert-type statements, with answer choices ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), and related to agriculture as an academic subject, college major, and career, with additional questions focused on academic and social support for pursuing higher education in agriculture. Upon approval to participate, all students completed the online survey over a two-day window during their scheduled agricultural education class. All study participants (100%, $N = 75$) identified themselves as American Indian and included Freshmen (14.7%, $n = 11$), Sophomores (17.3%, $n = 13$), Juniors (21.3%, $n = 16$), and Seniors (46.7%, $n = 35$) with an average age of 16.9 years.

Findings

Objective one sought to describe the attitudes of American Indian agricultural education students toward agriculture as a subject, college major, and career. As can be found in Table 1, the students held more positive attitudes to agriculture as a subject ($M=3.72$, $SD=.54$) and career ($M=3.51$, $SD=.65$) than they did agriculture as a college major ($M=3.41$, $SD=.65$).

Table 1

American Indian Students' Attitudes toward Agriculture as a Subject, College Major, and Career

Construct	M	SD
Subject	3.72	.54
Career	3.51	.60
College Major	3.41	.65

Note. Five-point Likert-type scale: 1(*Strongly Disagree*) to 5 (*Strongly Agree*).

The focus of objective two was to describe American Indian agricultural education students perceived levels of academic and social support toward pursuing agriculture as a college major. Table 2 shows that the students did not strongly agree ($M=4.51 - 5.00$) or strongly disagree ($M=1.00 - 1.50$) with any of the perceived support statements.

Table 2

American Indian Students' Perceived Academic and Social Support toward Pursuing Agriculture as a College Major

Construct/Statement	M	SD
Academic Support		
Teachers work to explain difficult content to me.	3.24	.84
I feel comfortable asking teachers for help.	3.06	.79
I am satisfied with the academic help teachers provide me.	3.34	.81
Social Support		
Tribal leaders would be supportive of my decision to go to college.	2.99	.68
My family would be supportive of my decision to go to college.	3.04	.71
My friends would be supportive of my decision to go to college.	3.37	.74
Tribal leaders would be supportive if I chose agriculture as a college major.	3.12	.69
My family would be supportive if I chose agriculture as a college major.	3.17	.88
My friends would be supportive if I chose agriculture as a college major.	3.41	.77

Note. Five-point Likert-type scale: 1 (*Strongly Disagree*) to 5 (*Strongly Agree*).

Objective three sought to determine if a model existed explaining a significant portion of the variance in American Indian agricultural education students' attitudes toward pursuing agriculture as a college major, as explained by attitudes toward agriculture as a subject and career, and perceived levels of academic and social support. The results of multiple regression analysis yielded a statistically significant model ($p < .001$) that explained 92% of the variance in one's attitude to pursue agriculture as a college major. As indicated in Table 3, all variables were included in the model explaining a portion of the variability.

Table 3

Factors Explaining American Indian Students' Attitudes toward Pursuing Agriculture as a College Major

Variable	β	Std. Error	t	p
Agriculture as a Career	.51	.06	7.73	<.001
Academic Support	.34	.04	8.44	<.001
Agriculture as a Subject	.26	.07	3.49	.001
Social Support	-.07	.03	-.08	.03

Note: $R^2 = .92$

Conclusions

The findings suggest, at least with this specific study population, beliefs toward agriculture as an academic subject and career as well as the academic and social support American Indian students receive can influence their intentions to pursue agriculture as a college major. It is clear the sense of belonging and the influence of the local community and tribal leaders play a

significant role in the career decisions students. Conclusions drawn from the findings cannot be generalized to groups outside of the study population. However, the findings from this study can be used as a foundation from which to guide future research.

Implications/Recommendations

As the profession seeks to increase the diversity of the students pursuing post-secondary education in agriculture and, ultimately the agriculture industry, attention must be paid to this demographic. Incorporating academic and social support programs along with youth organizations like the FFA and 4-H into the lives of American Indian students may aid in the recognition of the positive benefits of pursuing agriculture as an academic and career option. As the social influence had a negative impact on the decision to pursue a career in agriculture, it is recommended that institutions seeking to enroll these students in their programs start their recruiting strategies with the potential students' tribal leaders. Finally, it is recommended that agricultural education scholars continue to pursue diversity and multicultural research to build the knowledge base surrounding underrepresented populations in an effort recruit and retain these groups into this sector of the economy and society.

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Classroom Exercises for Client-Server Infrastructure Creation

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Abstract

The demand is increasing for client-server developers and personnel that can create an infrastructure to support these types of applications (Scarsella & Stofega, 2021). To keep pace with the demand, educators and schools are increasingly required to provide the necessary skills and training. In this research article, the demand and career pathways for client-server application development, client/server environments and infrastructures, and classroom exercises to teach client-server application development are presented.

Introduction

The goal of this article is to provide educators the necessary tools and information in order to teach students how to create their first client-server application. The article begins by providing a common set of definitions related to client-server application development. Next, a literature review specific to application development (e.g., history, demand, careers, and market space) is presented. Within the literature review, the history of client server programming and modern client server architecture is presented. This will set the context for further discussion of the domain. Then the importance of teaching application development is discussed in the context of career pathways within the field. Finally, four classroom exercises are presented that will engage students in learning about client-server infrastructure, database deployment, and application development. Although the focus of this research article is on the pedagogical aspects of client-server application development, it is important to note that the application development exercises will result in a fully functional application on a local Windows machine that connects to a MySQL database on a Windows Server.

Definitions

Application development - The process of designing (software development) for a computational system. This process may include programming, designing, testing, debugging, and maintaining software.

Client (or Client Application) - An application either on a desktop, laptop or mobile (i.e, phone) device that makes requests to a server.

Client server - A distributed application structure that partitions tasks or workloads between the providers of a resource or service, called servers, and service requesters called clients.

Database - An organized collection of structured information, or data, typically stored electronically in a computer system.

Integrated Development Environment (IDE) - A comprehensive software development environment that provides editing, publishing, debugging, and compiling features all in one package.

Server - The back-end system of a database application in a client-server architecture that performs tasks such as data analysis, storage, data manipulation, archiving, and other non-user-specific tasks.

Literature Review

In this section, the authors will present a review of the literature pertinent to the discussion on client-server and mobile application development. This review will begin by describing the history and evolution of mobile applications then exploring the demand for client-server applications as well as their market space. Following that, career pathways and educational requirements for client-server application developers will be discussed. Finally, the income potential, as well as the responsibilities of the developers, will be explored.

Technology has always been evolving and changing for years and will continue to do so in the virtually driven world. The history of the mobile app began with the first development of the mobile device and the first mobile phones whose microchips required the most basic of software to send and receive voice calls in 1973 (Suihi & Mwakalonge, 2016). Mobile phones were initially designed for functions like calling and sending texts, however, over the years phones were designed with some simple mobile applications like calculators, calendars, and simple games developed in the Java Framework. The first-ever developed smartphone was from IBM in 1973 that had simple mobile application functions (Jamsheer, 2019).

Even in the modern era, client server architecture is a popular architecture in many respects and is implemented in a variety of ways. Sharma and Kumar (2021) discuss the architecture in terms of facilitation of input from a large number of users providing a large amount of data. In their system, they provided online students a way to provide course feedback. The system saved months in terms of manual (i.e., human) processing of the traditional paper feedback forms. Additionally, no postage was required. This resulted in a faster and less expensive system. This phenomenon tends to be a driving force behind the architecture: better, faster, more agile, and less expensive than other alternatives.

Pathways to careers in application development.

Demand for mobile applications. The demand for mobile application developers is expected to grow dramatically over the next several years. Estimates expect the market to reach between \$407 billion (Allied Market Research, na) and \$653 billion (Technavio) industry by 2026. That is an annual growth rate of 18% to 21%, respectively. Fueled by this expected growth in the market, the demand for mobile application developers is high.

The Bureau of Labor Statistics (2021) indicated that there were 1,469,200 mobile application developers in 2019. That number of jobs for mobile application developers is expected to

increase by 22% through 2029. The median salary for the job has been estimated to be between \$77,000 - \$110,00 (Bureau of Labor Statistics, 2021, Payscale.com, 2021, Salary.com, 2021). This demand is why CNN Money (2017) identified mobile application developers as the number one job in their list of 100 best jobs in America.

The market space for mobile application development has increased significantly over the very short term and is projected to grow substantially in the future. According to Statista (2021), mobile application downloads worldwide in 2020 were 218 billion and are projected to reach 297.8 billion by 2023. This represents a large-scale demand-side pull for mobile application programmers.

Pathways to careers in mobile application development.

Responsibilities. While coding is at the heart of an application developer's work (either on the client side or the server side), it is not their only responsibility. Indeed.com (2021) provides a comprehensive breakdown of these responsibilities:

- Working with the client to identify the application requirements
- Developing a prototype of the application
- Testing prior to the launch of the application
- Troubleshooting and debugging
- Updating existing applications
- Developing documentation

Education. In order to be a mobile application developer, it is best to be able to code in a variety of programming languages such as JavaScript, Kotlin, C++, C#, Python, PHP, and Swift (Moyers, 2021). Most mobile application developers have received a bachelor's degree in computer science (Zippia.com, 2020). The Bureau of Labor and Statistics (U.S. Bureau of Labor Statistics, 2021b) does note, though, that companies also hire programmers who have only earned an associate's degree.

Earning potential. The earning potential for mobile application developers is quite good. Entry-level mobile application developers can expect to earn around \$60,000 - \$65,000 (Glassdoor, 2021; Payscale.com, 2021; Salary.com, n.d.). As they progress in their careers, mobile application developers have the potential to earn as high as \$120,000.

Pathways to careers in database developer/administrator.

Responsibilities. The lifeblood of any organization is information. Access to relevant data in a timely fashion and appropriate format is what allows organizations to make informed, strategic decisions. It is expected that the amount of data created, consumed, and stored globally will reach 79 zettabytes in 2022 and exceed 181 zettabytes by 2025 (Holst, 2021). It is the responsibility of database developers to design and secure the databases that will host this enormous volume of data in a format that facilitates queries and analysis. Specific duties defined by the U.S. Bureau of Labor Statistics (2021a) include:

- Ensure that data is secure
- Identify needs for databases
- Conduct testing and implement improvements
- Provide users with access and permissions
- Merge old databases into new ones
- Monitor database performance
- Troubleshoot and fix problems

Education. Most companies expect database developers to have earned at least a bachelor degree that contains relevant database coursework (DiscoverDataScience.org, 2021; U.S. Bureau of Labor Statistics, 2021a). Typically, the degree will be in computer science, information technology, or in business. In addition to the degree, there are many industry certifications that evidence knowledge of vendor-specific database applications from companies like Microsoft, Oracle, and IBM .

Earning potential. Being a database developer is another lucrative career. Entry level database developers can expect to earn \$60,000 - \$66,000 (Glassdoor.com, n.d.; Salary.com, 2021). Experience and certifications can quickly increase earning potential to an average salary of \$90,000 - \$95,000 (Glassdoor.com, n.d.; Indeed.com, 2021a; Salary.com, 2021). It is expected that the demand for database developers will grow 10% from 2019 through 2029 (U.S. Bureau of Labor Statistics, 2021a)

Classroom Activities

1. **Windows Server (free trial) setup**
2. **Install MySQL (free, open source)**
3. **Install Visual Studio Community Edition (free) on the client machine**
4. **Program the SQL select on the client**

The following classroom activities are designed to engage students in the exploration of client-server programming. There is no *a priori* knowledge of mobile application development required for either instructors or students. However, basic computer, mathematics, proficiency with personal computers, and some knowledge of application development environments are required. Some knowledge of networking (TCP/IP) as well as basic operating system setup and administration is required.

The setup and lab environment is crucial to success. The exercises are predicated upon their order of precedence. Each exercise is dependent upon the successful completion of the previous exercise. All software is provided for free, Open Source, or a free trial for 180 days.

These activities are meant to build upon each other. The first exercise sets up the server in which the data will reside. The second exercise installs the specific database (MySQL) in which the data from the client will reside on the server. The third exercise is an activity that will set up

Visual Studio and ready the environment for programming a client within the IDE. The final activity will teach students how to write a client program that selects data from the above database and displays it on the local machine.

Learning Objectives

1. Students will demonstrate the ability to set up a Windows Server.
2. Students will demonstrate the ability to install MySQL.
3. Students will demonstrate specific knowledge of an application development environment.
4. Students will synthesize knowledge gained in the previous learning objectives to create a client application.

Required Materials

1. Windows PC with Web Browser
2. Internet Connectivity
3. MS Visual Studio IDE

Classroom Exercises

1. Installation of Windows Server 2019.
 - a. The instructor begins the discussion on Server machines. The following definitions and concepts should be explained:
 - a. Explain the role of a server
 - b. Data repository
 - c. High availability
 - b. Students may review the literature on the Internet for further information and discussion on the function of a server.
 - c. The instructor will then demonstrate the download and install of MS Windows Server: <https://www.microsoft.com/en-us/evalcenter/evaluate-windows-server-2019> .
 - d. Students should familiarize themselves with the System Requirements for installing Windows Server (Microsoft, 2020).
 - e. Students will then download/install Windows Server Standard edition using the following step-by-step instructions: <https://www.c-sharpcorner.com/article/step-by-step-installation-of-windows-server-2019-standard2/>
2. Installation of MySQL
 - a. The instructor begins the discussion on Server machines. The following definitions and concepts should be explained:
 - a. Explain the role of a database
 - b. SQL
 - c. Queries
 - b. Students may review the literature on the Internet for further information and discussion on SQL and databases.

- c. The instructor will then demonstrate the download and install of MySQL and MySQL workbench <https://dev.mysql.com/downloads/installer/> .
- d. Students should familiarize themselves with the System Requirements for installing MySQL and MySQL workbench (Oracle, 2010).
- e. Students will then download/install MySQL and MySQL Workbench on Windows using these instructions:
 - a. MySQL for Windows Server:
<https://dev.mysql.com/doc/refman/8.0/en/windows-installation.html>
 - b. MySQL Workbench for Windows Server:
<https://docs.oracle.com/cd/E19078-01/mysql/mysql-workbench/wb-installing.html>
- f. The default installation will install a sample database named “sakila”
- 3. Installation of MS Visual Studio.
 - f. The instructor begins the discussion on IDEs. The following definitions should be explained:
 - a. Application development
 - b. Mobile application development
 - c. Integrated Development Environment
 - g. Students may review the literature on the Internet for further information and discussion on IDEs.
 - h. The instructor will then demonstrate the download and install of MS Visual Studio 2019 Community Edition:
<https://visualstudio.microsoft.com/vs/community/> .
 - i. Students should familiarize themselves with the System Requirements for installing Visual Studio and reference the systems requirements in the References section (Microsoft, 2019)
 - j. Students will then download/install MS Visual Studio 2019 using the instructions found on: <https://visualstudio.microsoft.com/vs/getting-started/>
- 4. Client-side programming in MS Visual Studio.
 - a. The instructor begins the discussion on client-server architecture. The following definitions should be explained:
 - a. Programming
 - b. Algorithms
 - c. Client vs. Server concepts
 - b. Students may review the literature on the Internet for further information and discussion on client-server programming.
 - c. Students will start Visual Studio.
 - a. Select “Create a new project”
 - b. Select “Windows Forms App (.Net) in C#”
 - i. The instructor/students can select another language (depending upon familiarity). However, the code in this article is programmed in C#.
 - ii. Name and create the project being mindful of the location on disk

- in which the project is stored.
- iii. A blank form within the VS IDE will show.
 - d. In order to attach to a MySQL database, a database connector must be added to the project.
 - a. Select Tools, NuGet Package Manager, Manage NuGet Packages.
 - b. Select MySqlConnection (see Figure 1).

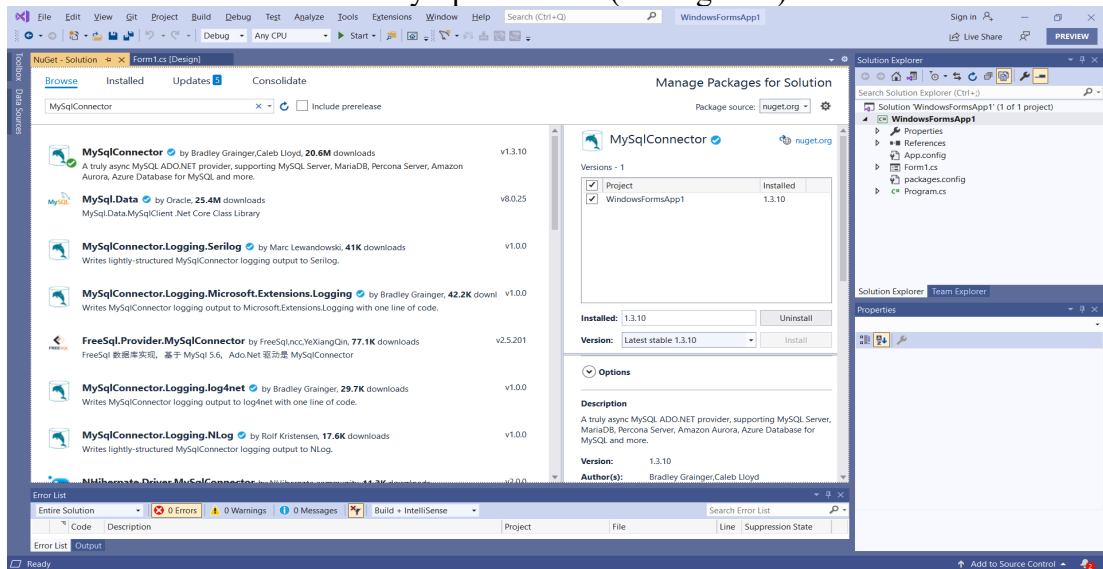


Figure 1. NuGet MySqlConnection Package.

- e. From the toolbox select the following and drag them to the black Windows Form:
 - a. Button
 - b. TextBox
- f. Doubleclick the Button1 on the form.
- g. In the Form1.cs (programming code), add the following in the using statements area:
 - a. Using MySqlConnection;
- h. In the Button1_Click module are the following statements:
 - a. MySqlConnection con = new MySqlConnection("server=nnn.nnn.nnn.nnn;user id=youruser;password=yourpassword;persistsecurityinfo=True;database=sakila");
 - i. Where server=... Is the IP address of your Windows Server.
 - ii. Where id= a valid userID of that sakila database
 - iii. Where password= a valid password for the user
 - b. Seven other statements shown in Figure 2.
- i. Click on the green Start arrow in the Visual Studio Toolbar. The program should run.
- j. Then click on button1 in your program and it will select (from the MySQL

database) the actress Penelope Guinness (see Figure 2).

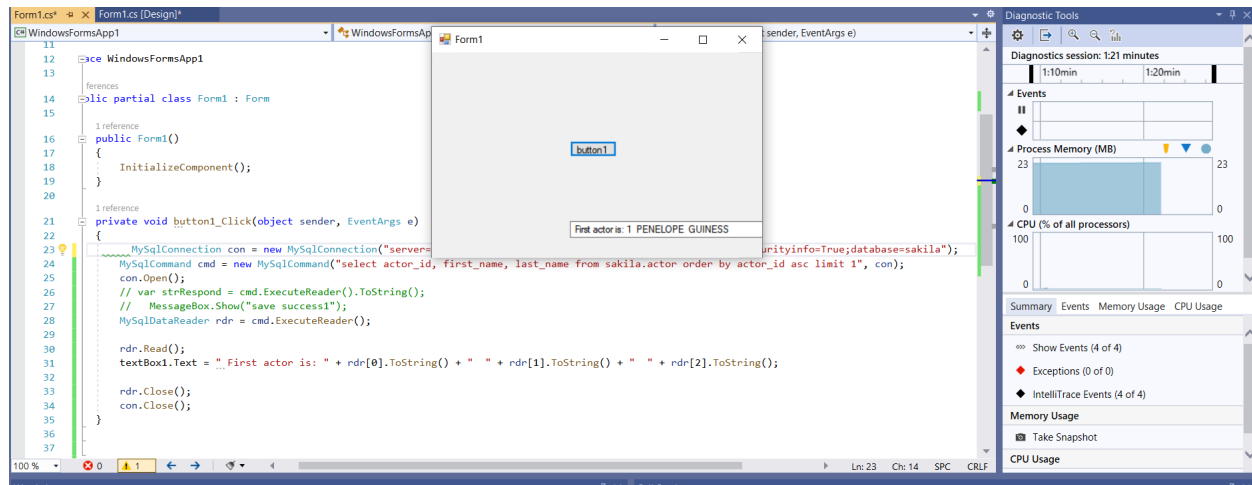


Figure 2. Running client application.

Conclusion

In this article, the authors begin by providing a literature review and definitions specific to client-server application development and teaching application development in the classroom.

Definitions of terms pertinent to client-server application development were provided. A discussion of the importance of teaching application (client-server) development was presented as well.

At the culmination of this article, four classroom exercises were presented that will engage students in learning about client-server application development. Instructions for setting up a complete Windows Server with a MySQL database were provided. Additionally, instructions to write an application that selects data from a MySQL database were provided. Instructors can follow the steps outlined above and students will create their own local client-server application.

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Self-Career Promotion Behaviors of School-Based Agricultural Education Teachers

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Abstract

The purpose of this study was to examine the career promotion behaviors of School-Based Agricultural Education teachers. This study employed survey methodology and included all New Mexico SBAE teachers (N=99). Results indicated teachers were most likely to promote teaching as a career option through student involvement in the curriculum and modeling positive teaching behaviors. It was found that professional commitment, social engagement with students, and prior FFA membership explained 27% of the variance in teachers' decisions to promote teaching as a career. It was recommended that teachers be provided opportunities to learn how to incorporate career promotion activities in their classrooms and programs to encourage students to become SBAE teachers. It was further recommended to engage current teachers with undergraduate agricultural education students to discuss the impact SBAE teachers have on their students' decisions to enter the profession.

Introduction/Theoretical Framework

The teacher shortage issue plaguing the school-based agricultural education (SBAE) teaching profession is not new (Marx et al., 2017) and was recognized as early as 1921 (Camp, 2000). Contributing to the shortage of teachers, which has resulted in multiple program closures, continues to be increased by retirements of baby-boomer teachers (Thieman et al., 2016) and the variety of career options for agricultural education graduates outside of the teaching profession, among other issues (Lawver & Torres, 2011). Kantrovich (2007) reported the shortage has the potential to further increase if students are not recruited into teacher preparation programs. To address the issue, Thieman et al. (2016) suggested the development of a pipeline of preservice teachers for the profession to ensure an adequate supply of future teachers.

Recruitment efforts to increase the supply of SBAE teachers currently exist and are well documented (Calvin & Pense, 2013; Thieman et al., 2016). Marx et al. (2017) indicated that stakeholders in agriculture consistently report the necessity to recruit secondary agricultural education students and positively portray the profession of teaching. However, recruiting students from the inside is not without challenges. Calvin and Pense (2013) reported the time commitment of teaching, the economy, family responsibilities, and the negative perception of the career field, among other factors, serve as barriers which contribute to the challenge of recruiting future teachers. Nevertheless, researchers have indicated that secondary agriculture teachers positively influence their students' career decisions to pursue teaching (Ball & Torres, 2010; Lawver & Torres, 2012; Park & Rudd, 2005; Wildman & Torres, 2001) and are often credited by

their students as role models when selecting agricultural education as a college major and teaching as a career (Hillison et al., 1986; Marx et al., 2014; Park & Rudd, 2005).

The teaching profession emphasizes and thrives on the establishment of long-term, meaningful connections with students, through social engagement, in a way that characterizes the job of teaching (Klassen et al., 2013; Roorda et al., 2011). Researchers have proposed that teacher-student relationships may play the primary role in fostering student engagement and positive student outcomes (Davis, 2003). Furthermore, teacher engagement has been linked to teacher attitudes and motivation levels, which are transmitted to students (Klassen et al., 2013; Roth et al., 2007). As an inherent career promotion technique, Park and Rudd (2005) suggested SBAE teachers should model positive attitudes and behaviors to their students. Furthermore, Thieman et al. (2016) suggested impactful relationships with students can be a catalyst for students to follow in their agriculture teacher's footsteps, suggesting additional investigation into the relationship between job engagement and career promotion behaviors of SBAE teachers is warranted.

The commitment of SBAE teachers to remain in the profession has been linked to the teacher shortage in agricultural education (Kantrovich, 2007). McKim et al. (2017) suggested highly committed teachers promote agriculture program stability. Conversely, Myers et al. (2004) reported teachers who displayed low levels of professional commitment negatively impacted recruitment and retention of students in SBAE programs. While it is clear this variable is vital to the stability of individual agriculture programs, few researchers have explored how the relationship between professional commitment and career promotion behaviors impacts the sustainability of the larger agricultural education profession, suggesting an examination of this phenomena.

The Theory of Planned Behavior served as the foundation for this study as it "provides a useful conceptual framework for dealing with the complexities of human social behavior" (Ajzen, 1991, p. 206). Furthermore, this theory provides a means of understanding individuals' decisions to act and can allow the development of programs to meet student needs (Murphrey et al., 2016). Ajzen and Fishbein (2005) suggested that an individual's behavior is a result of the combination of beliefs, attitudes, and intentions. Ajzen (1991) posited intentions precede behavior and presented a model that depicts the influences on intention. Ajzen (2006) explained that individuals act on behavioral decisions based upon *behavioral beliefs* (what one thinks the outcomes of the behavior will be), *normative beliefs* (what other people think about the behavior), and *control beliefs* (what one understands about the factors that facilitate or discourage the behavior).

Purpose/Objectives

It is known that SBAE teachers play a significant role in their students' decisions to pursue teaching as a career option but, there is a lack of knowledge regarding the factors which influence their self-career promotion behaviors to students. Therefore, the central purpose of this study was to add to the body of knowledge regarding teacher recruitment practices by

determining the extent of self-career promotion efforts of SBAE teachers. To accomplish this purpose, the following objectives were used to frame the examination:

1. Describe the self-career promotion behaviors of New Mexico SBAE teachers.
2. Describe the levels of social engagement with students and professional commitment of New Mexico SBAE teachers.
3. Determine if a linear model exists explaining a significant portion of the variance in New Mexico SBAE teachers' self-career promotion behaviors, as explained by social engagement with students, professional commitment, and selected demographic variables.

Methods

The population for this study consisted of all SBAE teachers in New Mexico ($N=99$). Teacher contact information was provided by the New Mexico FFA Association. Permission to conduct the study was granted by the Human Subjects Committee at Eastern New Mexico. Data was collected using the web-based data collection service Qualtrics® and was guided by suggestions outlined by Dillman et al. (2009), which yielded a final response rate of 69% ($n = 68$). As recommended by Lindner et al. (2001), nonresponse error was controlled by comparing early and late responders and no significant differences were found.

The survey instrument consisted of sections devoted to career promotion behaviors, job engagement, professional commitment, and demographics. To identify how teachers promoted teaching as a career option, the participants were provided a list of choices guided by findings from Arnett-Hartwick (2015) and included student involvement in the curriculum, modeling teaching behavior, general encouragement, discussions during careers units/lessons, and no promotion. Participants were also provided an opportunity to describe their behaviors if the response choices did not accurately describe their behaviors.

The professional commitment construct was developed using the eight-item professional commitment scale (Blau, 1985). Professional commitment items were measured on a seven-point Likert-type scale ranging from 1 *Strongly Disagree* to 7 *Strongly Agree*. Sorenson and McKim (2014) reported reliability of this construct, using Cronbach's alpha, as .84. *Post hoc* analysis of this construct for the current study was established at $\alpha=.85$.

Social engagement with students was measured using the Social Engagement – Students (SES) sub-scale of the larger Engaged Teacher Scale (ETS) (Klassen et al., 2013). This sub-scale reflects particular characteristics of teachers' relationship development with their students. The SES sub-scale is comprised of 4-items in a 7-point Likert-type format with response choices ranging from 1=*Never*, 2=*Rarely*, 3=*On Occasion*, 4=*Sometimes*, 5=*Often*, 6=*Frequently*, 7=*Always*. Klassen et al. (2013) reported reliability of the SES sub-scale at $\alpha=.83$. *Post hoc* analysis of this scale for the current study was established at $\alpha=.83$.

For this study, the average teacher was male ($n=37$, 54.4%) who was 37 years of age and had been teaching for 10.5 years. Fifty-eight (85.3%) of the teachers were former FFA members and 55 (80.8%) reported completing a traditional agricultural education teacher preparation program.

Results/Findings

Objective one sought to identify how [STATE] SBAE teachers promoted teaching as a career to their students. Over half of the teachers promoted teaching as a career by engaging students in the curriculum (29.4%, $n=20$) and by modeling teaching behavior (25.0%, $n=17$). However, 25% ($n=17$) of the teachers indicated they did not actively promote the profession to their students. These findings are summarized in Table 1.

Table 1

New Mexico SBAE Teachers Agricultural Education Self-Career Promotion Behaviors

Career Promotion Behavior	<i>N</i>	%
Student involvement in the curriculum	20	29.4
Modeling teacher behavior	17	25.0
No promotion	17	25.0
General encouragement for students who show interest	8	11.8
Discussion during careers lessons/units	6	8.8

Describing the teachers' levels of social engagement with students and professional commitment was the focus of objective two. The mean social engagement score showed the teachers often engaged in social behaviors with their students ($M = 5.83$; $SD = 0.91$). Additionally, the teachers were neither overly committed nor uncommitted to the profession ($M = 4.60$; $SD = 1.60$). These findings can be found in Table 2.

Table 2

Social Engagement and Professional Commitment Mean scores of New Mexico SBAE Teachers

Variable	<i>M</i>	<i>SD</i>
Social Engagement – Students ^a	5.83	0.91
Professional Commitment ^b	4.60	1.60

Note. ^a 7-point scale, 1=Never, 2=Rarely, 3=On Occasion, 4=Sometimes, 5=Often, 6=Frequently, 7=Always. ^b 7-point scale, 1=Strongly Disagree, 2=Moderately Disagree, 3=Slightly Disagree, 4=Neither Agree nor Disagree, 5=Slightly Agree, 6=Moderately Agree, 7=Strongly Agree.

Objective three sought to determine if a linear model exists explaining a significant proportion of the variance in New Mexico SBAE teachers' decisions to promote teaching as a career option, as explained by social engagement with students, professional commitment, and selected demographic variables including gender, age, teaching experience, prior FFA membership, and route to teacher certification. In combination, independent variables established a statistically significant model describing career promotion behaviors of New Mexico SBAE teachers ($F=2.72$, $p=.02$) which explained 27% ($R^2=.27$) of the variance in career promotion behaviors. These data can be found in Table 3.

Table 3

Regression Analysis for Factors Explaining the Variance in Career Promotion

Variable	B	SE B	β	T	<i>p</i>
Social Engagement – Students	-.16	.05	-.41	-3.06	<.01
Professional Commitment	.09	.04	.33	2.51	.02
Prior FFA Membership	.35	.15	.35	2.34	.02
Age	-.02	.01	-.61	-1.69	.10
Experience	.02	.01	.44	1.21	.23
Gender	.05	.10	.07	.51	.61
Certification	.07	.15	.07	.48	.63

Note. $R^2 = .27$, $F = 2.72$, $p = .02$

Conclusions/Recommendations/Implications

New Mexico SBAE teachers were more likely to promote teaching as a career option to their students by involving them in the curriculum and through modeling teaching behaviors. Engaging students through activities in the agriculture program and by modeling positive teaching behaviors have been found to be positive influences on students' decisions to teach (Lawver & Torres, 2012).

Professional commitment and prior FFA membership were positive predictors of teachers actively promoting SBAE teaching to their students. Since professional commitment has been linked to program sustainability, perhaps teachers view their commitment to the career as more than just their commitment to their job but, to the profession as a whole. Furthermore, as a majority of the teachers were former FFA members, it could be reasonably implied that experiences in the organization may serve as a catalyst for teachers to promote the career.

However, social engagement with students was a statistically significant negative predictor of career promotion. This finding stands in contrast to conclusions from prior researchers (Thieman et al., 2016) who indicated the relationships forged between teachers and students aid in the recruitment of future teachers. But, upon closer analysis, this finding may not be as counterintuitive as it appears. As teachers engage with their students and forge healthy relationships, they become more aware of their students' challenges and desires. With this in mind, perhaps the teachers who are more socially engaged are more understanding and accepting of their students' beliefs and choose to promote the careers for which their students are best suited.

The sustainability of agricultural education depends on an adequate supply of teachers to replace those who leave the profession. If agriculture teachers have a significant influence on the career decisions of their students, it is recommended that secondary teachers are provided the tools and resources to adequately promote teaching. Additionally, teachers need to be made aware that their actions and behaviors have an impact on their students. Engaging panel discussions

between current undergraduate agricultural education students and current SBAE teachers may be an opportunity for teachers to witness the positive impacts they have on their students and the future of the profession.

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Childcare Worker Career Path Exploration

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Introduction

This article provides factual information for those interested in a career as a childcare worker. The given information about the job specifications, such as duties and benefits, may prove beneficial in helping those interested decide if this career is right for them. The following information about the childcare worker career will be presented in the following order: responsibilities, how to become one, pay and benefits, job outlook, and an interview with someone currently working in this field

Responsibilities of Childcare Workers

According to the U.S. Department of Labor (2019), childcare workers take care of children. This includes ensuring the children's safety, preparing food for them, and making sure the children have good hygiene such as changing infants and toddlers' diapers (U.S. Department of Labor, 2019). Additionally, they must create routines and schedules for the children and coordinate activities that involve learning and exploration (U.S. Department of Labor, 2019). For children who have not begun elementary school, childcare workers will prepare them for kindergarten through guided educational activities (U.S. Department of Labor, 2019). Childcare workers may help children who are in school with homework and transport them to and from their activities. They record the children's routines, interests, and progress (U.S. Department of Labor, 2019). As stated by the U.S. Department of Labor (2019), those in the profession must also be aware of any emotional or developmental problems they notice in the children and notify their parents or guardians upon discovering a problem.

The U.S. Department of Labor (2019) says there are three types of childcare workers: childcare center workers, family childcare providers, and nannies. Childcare center workers work at childcare centers where they collaborate with other childcare workers as well as preschool teachers and teacher assistants and educate child through a structured curriculum (U.S. Department of Labor, 2019). As stated by the U.S. Department of Labor (2019), childcare centers tend to offer part-time and full-time shifts throughout the day, but Alice Fothergill's (2013, p. 435) study on mothers' and childcare workers' experiences with childcare states that even some full-time employees may work a second job. Family childcare providers take care of children in their own home, so because of this, they must market their business and perform other business management tasks, including writing contracts (U.S. Department of Labor, 2019). Additionally, they may work long hours to accommodate parents or guardians who work early or late and occasionally allow children to spend the night (U.S. Department of Labor, 2019). Nannies work at families' homes to take care of their children, so they often work for just one family at a time and sometimes even live in the family's home (McKay, 2019; U.S. Department of Labor, 2019). In some cases, usually with more affluent families, nannies' duties may expand

to assisting the parents or guardians with their work and managing the entire household which could include supervising renovations or landscaping (Gardner, 2005, p. F1). Sometimes, they work over 40 hours a week (U.S. Department of Labor, 2019).

How to Become a Childcare Worker

The educational requirements to become a childcare worker vary by state (U.S. Department of Labor, 2019). Those with a high school diploma have an increased chance of employment, but it is not a requirement (U.S. Department of Labor). Some choose to obtain a postsecondary degree in early childhood education, and those with a degree will be qualified for working in higher level positions and can work in Head Start programs. In addition, those with previous experience and a bachelor's degree can advance to become a preschool or childcare center director (U.S. Department of Labor, 2019). Especially for those with little to no professional experience in childcare, education and child development courses can be used as experience says Kristina Ericksen (2018), a digital writer for Rasmussen College. She also says even courses in various areas such as psychology, sociology, and interpersonal communications can be used as experience because those courses could help provide them with a greater understanding of children (Ericksen, 2018). Nannies are not required to obtain an education, but it may prove beneficial to obtain some type of education in childhood education or another relevant field and get a CPR certification (McKay, 2019; U.S. Department of Labor, 2019).

The U.S. Department of Labor (2019) explains that childcare centers are often required to have a license in a majority of states, so to obtain a license, the childcare center's employees must have a record of their completed immunizations, have at least a minimum amount of training, and complete a background check. Even if they do not work in a childcare center, they will usually need to pass a background check and will need to make sure they have various vaccinations which may include varicella; measles, mumps, and rubella; tetanus and diphtheria; influenza; and hepatitis (Davila, 2017; Magnesi, 2018). States and employers may require credentials, such as the Child Development Association (CDA) credential which is the credential most often required (U.S. Department of Labor, 2019). As for training, those in the childcare field are often required to complete training before beginning a position as well as further training each year (U.S. Department of Labor, 2019).

As for preferred qualities, communication skills are essential for speaking to parents or guardians about their children's progress, listening to parents or guardians' guidelines concerning the care of their child, and instructing children (U.S. Department of Labor, 2019). They also need to have good decision-making, problem-solving, and critical thinking skills to respond to difficult situations, emergencies, or other problems (McKay, 2019; U.S. Department of Labor, 2019). Patience and physical stamina are needed to work with frustrating and energetic children (U.S. Department of Labor, 2019). Organizational and time management skills prove beneficial in managing a schedule for the children, and lastly, creativity helps those in the profession create entertaining activities for children (McKay, 2019).

Pay and Benefits

According to the U.S. Department of Labor (2019), in May 2018, childcare workers earned a median hourly wage of \$11.17. An hourly wage of less than \$8.53 was earned by the lowest 10 percent, as opposed to more than \$16.55 which was earned by the highest 10 percent (U.S. Department of Labor, 2019). The U.S. Department of Labor (2019) shows that elementary and secondary schools, with a median hourly wage of \$12.39, was the top industry for childcare workers.

According to Fothergill (2013, p. 437), one main benefit is that childcare workers often enjoy working with children because they have a passion for giving them proper care. Additionally, as found in Amy Armenia's (2009, p. 570) study on the family childcare providers motivation for employment, if family childcare providers have their own children, they have the opportunity to stay at home with their own children during the day while also working.

Job Outlook

The U.S. Department of Labor (2019) states that from 2018-2028, childcare worker employment is expected to increase 2 percent. This is slower than the average projected employment for other occupations likely because the number of parents and guardians working at home and childcare costs have increased (U.S. Department of Labor, 2019). However, the U.S. Department of Labor (2019) explains that childcare workers will continue to be in demand for working parents and guardians because it is important for children to receive early childhood education. Because of the need to replace those who have left the field, there should be sufficient job openings each year (U.S. Department of Labor, 2019).

Interview with Denise Allen at Wee Wisdom Nursery School in Muncie, Indiana

Denise Allen is the director at Wee Wisdom Nursery School. Denise was interviewed by Edward Lazaros on November 20, 2019. The interview questions along with Denise's responses are listed in the following sections:

1. What is your favorite part about your job?

"My favorite part of the job is working with children and watching them grow and develop. Being a part of that is a privilege that everyone who works here shares. We are a close group of employees, and we do in-services together, and we grow together as a team. I like the team work that we have here as we are able to be a part of the lives of children as they develop" (D. Allen, personal communication, November 20, 2019).

2. What are the main challenges you have in your daily work?

"We are a pretty well-oiled wheel, so we run pretty smoothly. Getting career-oriented parents on board with developing a well-balanced life for the students at school and home takes a considerable amount of effort sometimes, but it is well worth the effort that we put into it. We

want to make sure parents are a part of our team because it helps the child's development work" (D. Allen, personal communication, November 20, 2019).

3. What previous experience prepared you for this job?

"I have a master's degree in special education, and I feel that was a big asset for me. I taught at Ball State University in the Department of Special Education as an instructor years ago. Being in special education and learning how to divide a simple task into small steps and teaching the child these small steps to achieve the main goal is what special education was all about. Our writing, reading, and math programs that we have focus on different stages of development. We focus on small steps so students can master a skill and have success. I was previously a special education administrator in a school district. This helped me learn how to train teachers and create individualized education for our students" (D. Allen, personal communication, November 20, 2019).

4. What advice would you give someone interested in pursuing a career in childcare?

"They need to spend as much time as possible with children through volunteer work, babysitting, and trying to expand babysitting to see if they enjoy it. They need to move up from just one child to multiple children because this career operates in classrooms. They need to be able to work with groups of children but still be able to help students with individual needs. Teaching methods need to be practiced. Volunteer work at a daycare center is only allowed if the applicant is out of high school or going through a vocational program and their supervising teacher has placed them. They need to be very organized and goal-oriented and have good people skills and be able to communicate well with everyone (colleagues and parents). They have to be honest and look for positives in everything. If a problem arises, they need to be a part of the solution. They need to be creative in their thought process, be able to follow protocol, and deal with problems. They also need to be able to be respectful of confidential information on a daily basis" (D. Allen, personal communication, November 20, 2019).

5. What kinds of technology do you use during your daily work?

"In the office, the main system we use is ProCare. This is our database that tracks parents, emergency contacts, people who can pick up, and billing. This is the heart of our organization when it comes to technology. Student profiles also are stored in this system. The system is very helpful because after the initial intake with parents, we can document a one page summary that teachers and staff can use before students start" (D. Allen, personal communication, November 20, 2019).

"We also use a system called SeeSaw. If students create something in class, students can send it to their parents through the SeeSaw software on iPads that the students use" (D. Allen, personal communication, November 20, 2019).

“Students also get to utilize a printer,” which is displayed in Figure 1, “to export short stories that can be posted, so students can share them with their parents” (D. Allen, personal communication, November 20, 2019).

Figure 1: The children can use this printer.



“Light tables are used, so students can build three dimensional objects that are lit up” (D. Allen, personal communication, November 20, 2019). Figures 2 and 3 show the light tables.

Figure 2: Students can build objects using this light table.



Figure 3: The light on this light table is turned on.



In Figure 4, “there is a special room in the facility that relates to STEM [Science, Technology, Engineering, and Math]” (D. Allen, personal communication, November 20, 2019).

Figure 4: Students do STEM activities in this room.



“We have a parent resource room where educational videos can be displayed for parents” (D. Allen, personal communication, November 20, 2019). Figures 5 and 6 show this room.

Figure 5: In this room, parents can access various resources.



Figure 6: Parents can watch educational videos on the TV, and from the papers along the right edge of the photo, they can read about parenting tips, such as dealing with poor behavior.



“We also have a parent portal where parents have links to different websites that are highly respected for children to use on a basis deemed appropriate for the child” (D. Allen, personal communication, November 20, 2019).

Conclusions

Childcare workers impact children’s development and education, so this career is best for those who can effectively communicate with parents or guardians and children, have strong

organizational skills, and a passion for children. Despite the slow projected employment for childcare workers, parents and guardians who work will continue to need childcare services. Those who would like to increase their chances of employment should consider obtaining the CDA credential.

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The Need for Cognition and Self-Regulated Learning in Online Environments

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Abstract

For students to be successful in online courses, they must be able to understand and control their learning. These abilities are known as self-regulated learning which consists of cognition, metacognition, and motivation. A student's need for cognition refers to the tendency to purposefully engage in cognitive activities. Students with high need for cognition have been found to be more intrinsically motivated to learn and put forth more effort when faced with challenging tasks. Guided by Bandura's social cognitive theory, this study sought to describe the relationship between self-regulated learning and the need for cognition among students enrolled in an online agriculture course. The findings indicated that students are effective at structuring their learning environments and setting academic goals. Furthermore, a moderate correlation was identified between self-regulated learning and the need for cognition. Suggestions are made to research strategies and provide guidance and support for students as they engage in more online courses.

Introduction

Over the past 20 years, students have been provided additional opportunities for learning (Chumbley et al., 2015). Since 2003, online courses have realized an increase in enrollment of over 400% (Allen & Seaman, 2013). According to the National Center for Education Statistics (2016), in 2013, there were over 5.5 million students enrolled in at least one online course, accounting for over 27% of all post-secondary students in the United States. Research Priority 4, within the American Association for Agricultural Education National Research Agenda, 2016-2020 (Edgar et al., 2016), addressed the need for meaningful, engaged learning in all environments. Bain (2004) concluded the best teaching is found, in part, when teachers let students assume control of their learning. This is particularly relevant due to the self-regulated nature of online learning. Technology and online communications have become dominant in the lives of millennials, which has led to evolving student interests and motivations to learn (Edgar et al., 2016). Therefore, as the number of students enrolled in online courses continues to increase, investigating self-regulated learning in the online environment is necessary to ensure student success in this academic setting (Chumbley et al., 2015).

The ability of students to understand and control their learning is referred to as self-regulated learning (Schraw et al., 2006). Self-regulated learning is also believed to include background knowledge, metacognitive knowledge, and various motivational constructs (Sperling et al., 2004). These constructs guide students as they develop goals and establish strategies to achieve their academic objectives (Schraw et al., 2006). Learning more with less effort and higher academic satisfaction are typical of students who display higher levels of self-regulated learning (Zimmerman, 2000). However, effective self-regulated learning is not an innate ability, and students who do not practice individual responsibility and persistence are at risk of attrition in the online environment (Hart, 2012).

Self-regulated learning consists of three primary components: cognition, metacognition, and motivation (Schraw et al., 2006). Cognition includes the skills necessary to encode, memorize, and recall information (Schraw et al., 2006). Within the cognitive component, three types of learning skills are included and are referred to as cognitive strategies, problem solving strategies, and critical thinking skills (Schraw et al., 2006). These strategies include a variety of activities to improve learning such as student-generated questions before or during reading (Chinn & Brown, 2002) or the construction of graphs and tables (House, 2002) to provide students the opportunity to view the concepts. According to Pressley and Wharton-McDonald (1997), self-regulated students are varied and flexible in their use of cognitive learning strategies.

A student's need for cognition refers to the tendency to purposely engage in cognitive activities and enjoy thinking (Cacioppo & Petty, 1982). Individuals displaying motivated behaviors to engage in cognitive activities are described as having a high need for cognition, where those who are opposite are more likely to avoid those behaviors and activities (Cacioppo et al., 1996). Individuals who have a high need for cognition are more likely to be intrinsically motivated and will explore more learning strategies to address complex tasks (Day et al., 2007). These individuals are also more likely to put forth more effort with higher performance in the face of challenging tasks (Dornic et al., 1991). Additionally, the need for cognition has been found to be of equal or more importance than metacognition when solving challenging problems (Coutinho, 2006). Those individuals with a low need for cognition are more likely to use external regulation of learning and are more likely to use simple learning strategies (Cazan & Indrecia, 2014) and thus, do not develop the deep understanding of new concepts and ideas like those who display a high need for cognition.

Need for cognition has been positively correlated with self-regulated learning strategies (Cazan & Indrecia, 2014). Investing more cognitive resources when processing information (Enge et al., 2008), and reflecting upon relevant information when solving tasks (Cacioppo & Petty, 1982), along with selecting more task relevant information (Verplanken, 1993) are behaviors associated with individuals who have a higher need for cognition. These areas are also key characteristics of effective self-regulated learners.

From an online perspective, especially with younger students, effective environment structuring is a key driver in academic success (Chumbley et al., 2015). In an asynchronous, online environment managing one's learning environment is paramount to effective learning. On the other hand, similar students have indicated low levels of task management strategies (Chumbley et al., 2015). Davis and Neitzel (2011) found students with low levels of task management were more likely to resist web-based learning. These issues may be attributed to maturity or lack of online experience. However, Cunningham and Billingsly (2003) noted as students begin to successfully regulate and transition their learning, they develop the skills to seek sources of and acquire knowledge to be successful in an online environment.

Theoretical Framework

The theoretical framework for this study is grounded in Bandura's (1986) social cognitive theory, particularly personal factors. At the center of Bandura's theory is the concept of reciprocal determinism suggesting that learning is the result of personal, environmental, and behavioral factors (Bandura, 1986). Personal factors include an individual's beliefs and attitudes that affect learning and behavior (Bandura, 1986). Researchers have applied Bandura's (1997) social cognitive theory to academic learning. As a result, self-regulated learning theory emerged which contends learning is directed by an interaction of cognitive, metacognitive, and motivational components (Zimmerman, 2000).

From a social cognitive perspective, individuals learn to become self-regulated by progressing through four levels of development: observational, imitative, self-controlled, and self-regulated (Zimmerman, 2000). Observational learning is associated with modeling while imitative learning is focused on social guidance and feedback (Schraw et al., 2006). These factors tend to rely on external factors for development. On the other end of the spectrum, as students develop, they begin to rely increasingly on internal, self-regulatory skills (Schraw et al., 2006). As students become more self-controlled, they will develop "internal standards for acceptable performance and become self-reinforcing via positive self-talk and feedback" (Schraw et al., 2006, p. 112). Finally, at the self-regulatory level, learners possess strong self-efficacy beliefs, which allows them to utilize a variety of cognitive strategies to self-regulate their learning (Schraw et al., 2006).

Objectives

The purpose of this study was to describe the relationship between self-regulated learning and the need for cognition among students enrolled in an online agriculture course. The objectives guiding the study were:

1. Describe the need for cognition among students enrolled in an online agriculture course.
2. Determine the levels of self-regulated learning among students enrolled in an online agriculture course.

3. Describe the relationship between the need for cognition and self-regulated learning of students enrolled in an online agriculture course.

Methods

Participants for the study consisted of a convenience sample of students enrolled in an online dual enrollment agronomy course during the spring semester. Through a single direct administration, data were collected from 52 students who completed the instrumentation. The students were mostly male (58%) and predominately Hispanic (41%), with Caucasian (30%), Native American (19%), and African-American (10%) students completing the remainder of the sample. Due to the methods employed to collect data, no follow-up procedures were followed to assess non-respondents.

The Need for Cognition Scale measured students' tendency to engage in cognition (Cacioppo et al., 1984). The 18-item, five-point Likert-type scale ranges from strongly disagree (1) to strongly agree (5). As recommended by Cacioppo et al. (1984), scores on nine items were reverse coded. Items were summed for an overall need for cognition score. The Need for Cognition Scale has a reported Cronbach's alpha coefficient of .90 (Stedman et al., 2009).

To measure self-regulated learning in online agriculture courses, a short form of the Online Self-regulated Learning Questionnaire (OSLQ) was used (Lan et al., 2004). The OSLQ short form is a 24-item scale employing a 5-point Likert-type format with responses ranging from strongly disagree (1) to strongly agree (5). Barnard et al. (2008) indicated higher scores on the OSLQ indicated better self-regulation in online learning. Within the OSLQ, self-regulated learning is delineated into six constructs: environment structuring, goal setting, time management, help seeking, task strategies, and self-evaluation. The OSLQ has a reported Cronbach's alpha coefficient of .96 (Chumbley et al., 2015).

Findings

Describing the need for cognition among students enrolled in an online agriculture course was the purpose of the first objective. The Need for Cognition Scale was used to determine the participants' levels of need for cognition. The theoretical range of the scale equals 18 to 90. The mean score on the Need for Cognition Scale was 57.43 ($SD = 7.41$) with a range of 46 to 77 points indicating low need for cognition and high need for cognition, respectfully.

Objective two was to determine the self-regulated learning scores of the students enrolled in an online agriculture course. Students enrolled in the course tended to have the highest level of self-regulated online learning within the construct of environment structuring ($M=3.73$, $SD=.89$). Students tended to have the lowest levels in time management ($M=3.30$, $SD=.96$). These data can be found in Table 1.

Table 1

Self-Regulated Learning of Online Dual Enrollment Students

Construct	<i>M</i>	<i>SD</i>
Environment Structuring	3.73	.89
Goal Setting	3.51	.73
Help Seeking	3.39	.98
Task Strategies	3.39	.98
Self-Evaluation	3.32	.92
Time Management	3.30	.96
Scale total:	3.45	.80

Objective three was addressed by using Pearson's Product Moment correlation coefficient to explore the relationship between online self-regulated learning and the need for cognition. A moderate correlation was identified between self-regulated learning and need for cognition ($r = .37, p < .05$).

Conclusions/Recommendations

Similar to previous studies, of the online self-regulated learning, environment structuring received the high scores. From this, it can be implied that students in an online environment understand their cognitive needs to the degree that they can create an atmosphere most conducive to their learning. Conversely, students still struggle with self-evaluation and time management. However, it should be noted the students participating in the study were still enrolled in high school and, due to maturity, these skills may not be fully developed. However, with the moderate correlation between need for cognition and self-regulated learning, it is apparent that the previously mentioned skills are important to success in an online environment. Stedman et al. (2009) noted a discrepancy when attempting to articulate when individuals develop the need for cognition among traditional college students. If there is a question about this concept among students of that maturity, it could be conceivably implied that the students in this study have yet to reach that point in their lives and, are thus, still developing the cognitive skills and awareness to evaluate their learning and develop more specific skills to address their learning needs.

With the daily advances in technology, it can be reasonably implied that distance learning will remain a staple in the educational fabric of this country. However, compared to traditional teaching and learning, this platform is still in its infancy. Teachers of online courses must be engaged with their students to the degree that they can assist with the development of the self-regulated skills needed to successfully complete distance classes. Further development of time management and self-evaluation skills among the enrollees in these courses is a must if meaningful learning is to take place. Incorporating problem-based learning and authentic assessment opportunities for students in these environments will further aid them as they continue to mature and develop into fully self-regulated learners.

Continued research must be conducted to aid researchers in understanding the personal, behavioral, and environmental factors that impact self-regulated learning. Since the need for cognition plays a moderate role in self-regulated learning, developing a model that delineates the

factors influencing the need for cognition is warranted. Furthermore, developing an understanding when students begin to develop a need for cognition may provide teachers and researchers the necessary baseline data to begin aiding students to become more engaged in online learning.

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Exploring Precursor Variables Related to Help-Seeking in Online Learning Environments

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Abstract

Students face numerous challenges in the online courses. The isolation that occurs in this environment impacts students' ability to seek help. This study sought to determine the relationship between precursor variables and help-seeking in an online dual enrollment course. Relationships between the precursor variables of self-efficacy for learning and performance, goal setting, intrinsic motivation, and task value and help-seeking were statistically significant. Faculty are encouraged to be proactive with students to develop help-seeking skills. Researchers are encouraged to analyze the relationship between student interaction in online and help-seeking.

Introduction

In 2015, 2.8 million post-secondary students were enrolled exclusively in online courses (U.S. Department of Education, 2016). Whether students are enrolled in synchronous, asynchronous, or hybrid courses they face myriad challenges that are unique to the online environment (McInnerney & Roberts, 2004) and to be successful, must be able to regulate their own learning (Swafford, 2017). However, due to the nature of online courses, a communicative disconnect may exist between the student and teacher as well as among other students (Slagter van Tryon & Bishop, 2009). This challenge "can interfere with a behavior that is critical to academic success, help-seeking" (Dunn et al., 2014, p. 75). As Edgar et al. (2016) suggested in the *American Association for Agricultural Education National Research Agenda: 2016-2020*, students must be engaged in meaningful learning in all environments and therefore, an investigation into this phenomenon is warranted.

Researcher proposed models of help-seeking include multiple stages and decision points that determine how learners address learning and learning difficulties (Gross & McMullen, 1983; Karabenick & Newman, 2009; Nelson-Le Gall, 1981). The models include common elements including, 1) determine whether there is a problem; 2) determine whether help is wanted/needed; 3) decide whether to seek help; 4) decide on the type of help (goal); 5) decide whom to ask; 6) solicit help; 7) obtain help; and 8) process the help received. There is no presumption these

events occur in order or that learners are mindful of the steps involved (Karabenick & Dembo, 2011). Karabenick and Dembo (2011) posited the help-seeking process involves a combination of automatic and controlled cognitive processing.

As academic help-seeking is a social act, providing opportunities within the online environment may promote help-seeking. Engaging students in trainable learning behaviors, like self-regulation may influence students' tendency to seek help (Dunn et al., 2014). Enrollment in online dual credit programs is an opportunity to create environments where students can develop self-regulated skills, which includes help-seeking, needed for future academic success (Chumbley et al., 2015).

Theoretical Framework

Self-regulated learning is an active process where students set learning goals and then work toward their goals by monitoring, regulating, and controlling their behaviors which are guided and constrained by their goals and the educational environment (Pintrich, 2000). The theoretical framework guiding this study was Zimmerman's (1998) model of the development of self-regulated learning skills. This model includes three phases including, forethought, performance control, and self-reflection. The forethought phase includes the processes that precede learning and include analysis of the learning task and self-motivation beliefs. Students who are self-motivated prior to learning will be efficacious in their beliefs and have clearly defined individual learning expectations (Zimmerman, 1998). The performance control phase occurs during the learning process. This phase includes the processes of controlling one's learning and self-observation, including self-experimentation. Self-reflection is the final phase. According to Zimmerman and Schunk (2001), students perform self-evaluation based upon social comparisons and adjust their performance for the next task. The forethought phase the model served as the foundation for the current study.

Purpose and Objectives

The purpose of this study was to explore the relationships between selected precursor variables and self-regulated learning behaviors, specifically help-seeking. The specific objectives of the study were to:

1. Describe the help-seeking behaviors among students enrolled in an online agriculture dual enrollment course.
2. Describe the help-seeking precursor variables of self-efficacy for learning and performance, goal setting, intrinsic motivation, and task value of students enrolled in an online agriculture dual enrollment course.
3. Determine the relationships between the precursor variables and help-seeking behaviors of students enrolled in an online agriculture dual enrollment course.

Methods

This study was part of a larger descriptive study and included a census of all secondary students enrolled in an online/hybrid introductory horticulture dual enrollment course (N=153). Students completed all assessments (tests, quizzes, discussion posts, final projects) online and engaged in laboratory activities under the guidance of their secondary agriculture instructor. Data were collected, following procedures outlined by Dillman et al. (2008) via an online survey platform embedded in a link within the course learning management system. The final response rate was 85%. The study was comprised of slightly more females (57%) than males (43%).

Academically, the course included Seniors (44%), Juniors (32%), and Sophomores (24%). Students identified themselves as Native Americans (41%), Caucasian (33%), and Hispanic (26%).

Help-seeking and goal setting were measured using sub-scales of the Online Self-Regulated Learning Questionnaire (OSLQ) (Lan et al., 2004). The help-seeking sub-scale included four items and the goal setting sub-scale included five items in a 5-point Likert-type format with response choices ranging from *strongly disagree* (1) to *strongly agree* (5). Chumbley et al. (2015) reported a .90 Cronbach's alpha reliability coefficient for this sub-scale. Self-efficacy for learning and performance, intrinsic motivation, and task value were measured using sub-scales of the Motivated Strategies for Learning Questionnaire (MSLQ) (Pintrich et al., 1991). The self-efficacy sub-scale (Cronbach's $\alpha=.93$) included eight items, the intrinsic motivation sub-scale (Cronbach's $\alpha=.74$) included four items, and the task value sub-scale (Cronbach's $\alpha=.90$) included six items. These sub-scales are in a Likert-type format with a 7-point response format with choices ranging from *not at all true of me* (1) to *very true of me* (7).

Findings

Objective one was to describe the help-seeking behaviors among students enrolled in an online agriculture dual enrollment course. Students had an overall help-seeking mean score of 3.36 ($SD=.57$). Table 1 illustrates students' level of help-seeking in the online agriculture course.

Table 1
Help-Seeking of Online Dual Enrollment Students

<i>Item</i>	<i>Mean</i>	<i>SD</i>
If needed, I try to meet my classmates face-to-face.	3.54	0.87
I find someone who is knowledgeable in course content so that I can consult with him or her when I need help.	3.50	0.90
I share my problems with my classmates online so we know what we are struggling with and how to solve problems.	3.33	0.90
I am persistent in getting help from the instructor through email.	3.15	0.87
Scale Total:	3.38	0.56

Note. 5-point scale. 1 = *Strongly Agree*, 2 = *Disagree*, 3 = *Neither Agree nor Disagree*, 4 = *Agree*, 5 = *Strongly Agree*.

Objective two sought to describe the levels of task value, self-efficacy for learning and performance, intrinsic goal orientation, and goal setting of students enrolled in an online agriculture dual enrollment course. It should be noted task value, self-efficacy for learning and performance, and intrinsic goal orientation were measured using a 7-point scale while goal setting was measured using a 5-point scale. Table 2 illustrates students' mean scores for the precursor variables related to help seeking.

Table 2

Mean Scores of Precursor Variables Related to Help-Seeking of Online Students

Precursor Variable	<i>M</i>	<i>SD</i>
Task Value	5.03	1.07
Self-Efficacy for Learning and Performance	4.95	1.10
Intrinsic Goal Orientation	4.87	1.03
Goal Setting	3.65	0.66

Note. Goal Setting, 5-point scale. 1 = *Strongly Agree*, 2 = *Disagree*, 3 = *Neither Agree nor Disagree*, 4 = *Agree*, 5 = *Strongly Agree*. Intrinsic Goal Orientation, Task Value, and Self-Efficacy for Learning and Performance, 7-point scales. 1 = *not at all true of me*, 7 = *very true of me*.

Objective three sought to determine the relationships between help-seeking and the precursor variables task value, self-efficacy for learning and performance, intrinsic goal orientation, and goal setting. Results of a Pearson product-moment correlation yielded substantial (Davis, 1971) associations between help-seeking and precursor variables. These data can be found in Table 3.

Table 3

Correlations among Precursor Variables and Help-Seeking of Online Students

Variable	Self-Efficacy	Intrinsic Motivation	Goal Setting	Task Value
Help-Seeking	0.68	0.59	0.54	0.51

Note. All correlations were significant at the 0.01 level.

Conclusions

Objective one sought to describe the help-seeking behaviors among students enrolled in an online agriculture dual enrollment course. Students in this study were more likely to meet classmates face-to-face or consult with knowledgeable individuals when help was needed. The students met with classmates online to share struggles and develop strategies to solve problems. However, students were least likely seek help from the instructor through email. Cunningham and Billingsley (2003) indicated as students gain experience in the online environment they

develop the strategies to acquire the knowledge needed to be successful. As students in this course were secondary students, they may be more likely to seek help from trusted acquaintances rather than the university faculty member with whom they may have never met.

The focus of objective two was to describe the precursor variables related to help-seeking. As help-seeking is a strategy of self-regulated learning (Shunk & Zimmerman, 2008) students must be motivated to learn to develop and incorporate the strategies to aid in their learning. The findings suggest the students in this study were still in the developmental stages of incorporating the strategies to be successful in the online environment. As students gain experience in the online environment, their help-seeking skills will develop and their ability to navigate the challenges inherent to online learning will improve (Shunk & Zimmerman).

Objective three sought to determine the relationships between help-seeking and the selected precursor variables. All precursor variables had substantial relationships with help-seeking. Shunk and Zimmerman (2008) indicated these variables serve as a foundation for developing help-seeking skills. Help-seeking aids students in solving problems, maintain task engagement and interest, and learn (Shunk & Zimmerman, 2008).

Implications

In addition to aiding individual students, help-seeking has implications with the classroom environment. Help-seeking has positive effects on teachers' sense of engagement as it indicates students are interested in their teaching (Shunk & Zimmerman, 2008). As teachers become more engaged with their students, their abilities to assess student learning become more acute and are able to modify teaching plans and methodologies to improve existing teaching strategies. Furthermore, help-seeking behaviors can contribute to a classroom of inquisitiveness, collaboration, and intellectual discourse (Shunk & Zimmerman). Due to the inherent isolationism which can exist in the online environment, promoting help-seeking behaviors can mitigate this issue and encourage students to engage with classmates to discuss and collaborate, which will lead to more knowledge in-depth content acquisition and application.

Recommendations

It is recommended that faculty who teach online courses be proactive with students to develop help-seeking skills. Providing students a guide to follow within the course will serve as a foundation for developing the skills needed for success in online courses. As help-seeking is a component of self-regulated learning, including guides for students to follow to improve their self-efficacy in the online environment will increase student engagement and performance (Pintrich & DeGroot, 1990). Additionally, it is recommended that faculty encourage students to provide feedback on course structure and implementation. Feedback will increase student-teacher interaction, which faculty can use to make continuous improvements to online courses.

Goal setting has been linked to self-evaluation in online learning (Chumbley et al., 2015). It is further recommended that faculty include opportunities for students to set course goals. Establishing goals provides students a context to guide future behaviors. Using their goals as a

guide, students will be able to analyze their learning which will promote engagement and collaboration with classmates and faculty to address self-identified learning needs and seek help with complex problems.

Faculty and course developers are encouraged to incorporate valuable learning tasks. Problem-based learning strategies have been shown to aid in the development of self-regulated learning skills (Iran-Nejad & Chissom, 1992). Therefore, it is recommended that this teaching method be included in online courses to provide a context where students are required to create their own knowledge, leading to further development of self-regulated learning strategies and thus, improved help-seeking skills.

Researchers are encouraged to analyze the relationship between online course discussion boards and help-seeking. Discussion boards provide an embedded platform for students to engage with peers and faculty by posing questions and comments. As this relationship is assessed, faculty can use resulting data to create more meaningful discussion platforms to engage students and ultimately promote proactive strategies for students to seek help.

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Students with Disabilities in CTE: Post High School Success

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Abstract

This study was conducted using quantitative methods to determine if a relationship exists between Career and Technical Education (CTE) concentrators with disabilities' Technical Skill Assessment (TSA) performance and their attaining related placement after high school. The study included data from 65,606 Missouri students who graduated during the years 2015-2019. To investigate the relationship between TSA assessment performance and attaining related placement, multiple descriptive models were run in aggregate and individually by CTE program area. The data reveal students who pass their TSA assessment are more likely to attain related placement compared to those not passing their assessment. Students with disabilities (SWDs) had substantially lower rates of passing their TSA assessment and attaining related placement. Additional analysis to determine the relationship between students' TSA assessment performance and attaining related placement involved multiple binary logistic regression models. The logistic regression models helped determine that SWDs are less likely to attain related placement when compared to students without disabilities. Two exceptions were found when analyzing the findings by CTE program area. SWDs from Agriculture and Marketing programs attained related placement at a rate close to those without disabilities. Also noteworthy, SWDs who passed their TSA assessment were more likely to attain related placement than the SWDs who failed their TSA assessments. The findings from this study may add merit to the numerous secondary CTE programs in the United States and how these can offer multiple benefits to students with disabilities.

Keywords: Students with disabilities, transition, technical skill attainment, TSA, TSA assessment, career and technical education, CTE, related placement, CTE accountability measures, industry-recognized credential

Introduction

In Missouri, the Missouri Department of Elementary & Secondary Education (MODESE) decided to use the Missouri Career and Technical Education Certificate (CTEC) as one option for school districts to meet the requirement of preparing “Success-Ready” students. The Technical Skill Assessment (TSA) plays a significant role in the CTEC as it is one of the required criteria for a student to earn the CTEC. This new state accountability measure is a component of the Missouri School Improvement Program 6 (MSIP 6), which started in August 2020 (MODESE, 2020).

Questions remain however, such as, when a student achieves a certain level on the TSA, what benefits do they realize? Is the achievement a simple grade in the teacher’s grade book, or does it open doors that would not have been there without it? Is there a relationship between students passing the TSA and success after high school? Are all students achieving an appropriate level of success?

Purpose of the Study

The purpose of this study was to determine the relationship, if any, between technical skill assessments (TSAs) and post-high school related placement for CTE students in Missouri between the years 2015-2019 with and without an IEP. Furthermore, this study sought to determine if those students with an IEP who passed their TSA, were as likely to be placed in related employment, post-secondary education, or in the military as those who did not pass their TSA.

Based on this purpose, the following research questions were proposed for this study:

Research Questions

1. Is there a relationship between Missouri CTE students with an IEP who pass their TSA assessment and the attainment of employment, entering post-secondary education, or the military in a field related to their CTE program?
2. Is the relationship different among CTE programs for students with an IEP who pass their TSA assessment and the attainment of employment, entering post-secondary education, or the military in a field related to their CTE program?

Theoretical Framework

The Social Cognitive Career Theory (SCCT) is a developmental approach that focuses on “how an individual’s self-concept becomes a vocational concept” (Swanson & Fouad, 1999, p. 5) and provides a developmental model to view career choice behaviors. Bandura’s (1986) Social Cognitive Theory provides the foundation for the Social Cognitive Career Theory and focuses on the personal attributes of self-efficacy, outcome expectations, and personal goals (Lent & Brown, 1996; Lent et al., 1996). Interacting with these Social Cognitive variables, SCCT conceptualizes career-related interest, choice, and performance processes as interlocking, segmental models.

Outcome expectations are personal beliefs about consequences for performing particular behaviors. These include external reinforcement (tangible rewards for successful performance), self-directed outcomes (confidence in oneself), and outcomes from performing a given task (Lent et al., 1996). Outcome expectations in career decision making are significant, especially for students with IEPs, as perceptions from prior experience and information one acquires about career fields can impact choices (Lent et al.; Lent & Brown, 1996).

SCCT states that individuals form an enduring interest in activities where they perceive themselves as competent and produce a valued outcome (Lent & Brown, 1996). As interests in a particular activity develop that a person believes can be performed well (self-efficacy) and expect to perform it well (outcome expectation), then the individual is likely to uphold a particular goal or become more involved in the activity. In this way, a possible career interest is developed. This process changes over the lifespan, although occupational interests tend to stabilize in the teenage and early adult years (Lent & Brown; Lent et al., 1996).

Career related processes are concerned with two aspects of performance, the level or quality of a person's accomplishments and persistence in a work activity or career path (Lent & Brown, 1996; Lent et al., 1996). Ability affects performance by impacting self-efficacy and outcome expectations (Lent & Brown; Lent et al.). If the student's self-efficacy is low, however, the student can perceive greater barriers to career success (Smith, 2001).

Career choices then, may not reflect personal interest, but instead avoidance of obstacles or perceived barriers (Smith, 2001). Personal and contextual variables, such as race/ethnicity, gender, physical health/disability, socioeconomic status, and genetic endowment are assumed to influence the social cognitive variables (self-efficacy, outcome expectations, occupational goals) and the career development process (Lent et al., 1996). Therefore, specifically examining IEP students' performance on TSAs related to their post-high school placement can provide some insight to how well CTE programs are providing career equity and access for all students.

CTE and Transition

Under IDEA, transition services are defined as a "coordinated set of activities for a child with a disability that are a results-oriented process and meet academic and functional needs" (Individuals with Disabilities Education Act, 2004). One purpose for the Strengthening Career and Technical Education for the 21st Century Act (Perkins V) is to increase the employment opportunities for populations chronically unemployed or underemployed, including those with disabilities (Hyslop, 2018). Studies have shown that CTE is a best practice for students with disabilities (SWD) and should be included as a major component of transition services (Schmalzried & Harvey, 2014). However, students with disabilities (SWD) are not a homogeneous group, as disability or disabilities can vary by type and severity (Brand et al., 2013). SWDs have a variety of "academic and transition abilities, needs, and potentials based on the type and severity of disability" (Lee et al., 2016, p. 79).

While CTE is a promising practice for the transition plans of SWDs, there are persistent concerns about IEP implementation. Communication between CTE teachers and special educators is critical to student success, yet many CTE professionals do not know who is responsible for providing information on SWDs in CTE programs. Career and technical educators often are not present at IEP meetings, educators often have low expectations for SWDs, and transition plans can lack ongoing supports and services (Brand et al., 2013; Schmalzried & Harvey, 2014). There is a continued need for CTE and special education to collaborate to best meet the needs of SWDs in CTE programs (Schmalzried & Harvey, 2014; Wonacott, 2001).

The Relationship between CTE Assessments and Graduate Related Placement

In related studies using the same methodology, Plesnarski (2018) and Staklis and Klein (2010) examined if NOCTI end of course assessment performance was a valid predictor of acquiring related placement or post-secondary placement. Plesnarski found students who were advanced on the NOCTI exam were 1.396 times more likely to attain positive placement compared with students who earned a competent level. In Staklis's and Klein's study, prior to Plesnarski's, the same NOCTI assessment performance rating scale was used to predict the odds of post-secondary enrollment. Their findings had similar positive results. CTE students in Pennsylvania earning an advanced level on the NOCTI exam were 1.39 times more likely to enter post-secondary education. Students with assessment scores at the competent level had 1.28 times more likely odds of entering post-secondary education, and those at the basic level had 1.00 more likely odds.

In a smaller study, Ryan (2019) used a correlation methodology to determine if a relationship existed between CTE completers' TSA assessment performance and positive placement in Missouri. Ryan found a small moderate positive correlation between TSA assessment performance and positive placement after high school. These studies, however, did not examine the relationship between performance on TSA assessments for students with IEPs with related or positive placement.

Students with Disabilities (SWDs) and Post-secondary Success

There are concerns that among SWDs who graduate from high school and attend post-secondary education, completion rates are low. Brand et al. (2013) reported that only 40.7 percent graduated or received a degree within 8 years after high school compared to 52.4 percent of students without disabilities. Lee et al. (2016) also reported that overall employment rates for adults with disabilities were 15% lower than for those without a disability. There is positive evidence, however, that CTE can provide secondary SWDs effective employment and training services.

Research indicates that SWDs involved in CTE have lower dropout and higher graduation rates (Brand et al., 2013; Hehir et al., 2013) and have greater odds of full-time employment (Lee et al., 2016; Wagner et al., 2015). Despite the various needs, abilities, goals, and aspirations of SWDs,

“CTE participation provides educational and post-school employment benefits for students with disabilities” (Harvey et al., 2020, p. 68).

Concentrating in a specific CTE program area may offer SWDs additional opportunities for success compared to those not taking a concentration of CTE courses. Lee et al. (2016) discovered, 62% of the SWDs who were CTE concentrators attained full-time employment compared to 40% to 44% of those not concentrating in CTE. Additionally, CTE concentrating SWDs were less likely to be unemployed or even work in part-time employment. Further validation of the findings relating to CTE concentrating SWDs was research from Theobald et al. (2017). Theobald et al. determined that SWDs who were also CTE concentrators were almost 2 percentage points more likely to be employed, more likely to graduate on time, and less likely to be absent from school. Finally, Wagner et al. (2015) found that SWDs who earned four or more CTE credits in high school were predicted to have increased their odds of securing full-time employment within two years after high school by 2.93.

Methods

This research used a quantitative research design and method of analysis to determine if a relationship existed between TSA performance and post-high school-related placement for CTE completers with IEPs. For this study, a CTE completer is defined as a CTE concentrator who graduates from high school or receives a General Education Diploma (GED). An ex post facto design utilizing binary logistic regression analysis was used to determine if a relationship existed between TSA performance and post-high school-related placement of CTE completers with IEPs.

According to Kleinbaum et al. (2008), “logistic regression analysis is the most popular regression technique available for modeling dichotomous dependent variables” (p. 604). Kleinbaum et al. also stated, “logistic regression helps determine how one or more independent variables are related to the probability of the occurrence of one or two possible outcomes” (p. 12). In relation to this study, the logistic regression helped determine the relationship between the independent variables of TSA performance and IEP status and the dependent variable of related placement.

Participants

To provide a clear description of the participants in this study, the crosstabs function within SPSS was used. Multiple models were built to help describe the participants. Table 1 presents a detailed breakdown of the participants’ demographic makeup. The total number of participants was N=65,606.

The trends over the 5-year period showed males as the largest participant gender, $n=34,934$ (53% of the total). Within race/ethnicity, the largest participant group was White, $n=53,808$ (82% of the total). As far as IEP status, participants without an IEP were a much larger group than those with an IEP, $n=59,861$ (91% of the total). Finally, students not disadvantaged were a larger group of participants, $n=41,275$ (63% of the total).

Table 1*Participant Demographics*

Year	Demographic	Category	n	%	Total
5 Years	Gender	Males	34,934	53.2	$N=$
		Females	30,672	46.8	65,606
	Race/Ethnicity	Asian	888	1.4	
		Black	6,823	10.4	
		Hispanic	2,621	4.0	
		Indian	284	0.4	
		Mixed Races	1,093	1.7	
		Pacific Islander	89	0.1	
		White	53,808	82	
	IEP Status	No IEP	59,861	91.2	
		Has IEP	5,745	8.8	
	SES Status	Not Disadvantaged	41,275	62.9	
		Disadvantaged	24,331	37.1	

Instrumentation

The MODESE College and Career Readiness Data Supervisor was consulted to determine if the data required for this study were available and could be emailed with no identifiable information. A Microsoft Excel spreadsheet pre-populated with headings identical to the MODESE data file-set codes was developed that met the data supervisor's request. Data requested were downloaded into this spreadsheet for analysis (MODESE, 2019).

Variables in the Study

The dependent variable in this study consisted of one dichotomous outcome variable, related placement. The independent variables included one predictor variable, TSA assessment status, and one categorical independent variable: IEP status. The TSA assessment status and placement status coding returned on the Excel spreadsheet were dichotomous nominal variables. In order to

run a Binary Logistic Regression, the nominal variables were converted into ordinal-ranked dichotomous variables consisting of 0s and 1s.

Procedures for Data Analysis

To answer research questions one and two, descriptive statistics and binary logistic regression models were run. The total numbers and percentages of IEP and non-IEP students passing or not passing their TSA assessments and then entering employment, the military, or continuing education related to their CTE program area, were presented for each research question. To determine if a relationship existed between CTE students with IEPs who passed their TSA assessments and attainment of related placement, two binary logistic regression models were run for each research question. One set of two models for IEP and non-IEP students overall and another set of models for IEP and non-IEP students by CTE Program area.

The logistic regression models were used to determine the relationship between the dichotomous dependent outcome variable related placement and the dichotomous independent predictor variable TSA performance, which was pass/fail on the assessment. Odds ratios (OR) and the odds percentages of attaining related placement for each model were also determined using SPSS's logistic regression functionality. Odds ratios were considered the odds of a participant attaining related placement when controlling for those who passed the TSA assessment and the other independent variables in each model. The odd ratios' percentage increases or decreases were presented to help clarify the results. To determine if the independent variable in the logistic regression models were significant the Wald test was utilized. For this study, Wald values less than $p < .05$ were considered statistically significant.

Findings

The first question, is there a relationship between Missouri CTE students with an IEP who pass their TSA assessment and the attainment of employment, entering post-secondary education, or the military in a field related to their CTE program? Table 2 presents the TSA assessment performance and placement relation results for students with IEPs and those not having an IEP. Among the group of students with IEPs, 57.6% passed their TSA assessments. Those without IEPs passed their TSA assessments at a rate of 76.3%.

This study's focus, IEP and non-IEP students who passed their TSA assessment and attained related placement had similar results in aggregate. Students with IEPs who passed their TSA assessment and attained related placement, made up 60.6% of that category. Those students without an IEP who passed their TSA assessment and attained related placement, made up 78.1% of that category. From these data, it is apparent that students with IEPs who pass the TSA

assessment more often attained related placement than those who failed the assessments. The results also show that students with IEPs are not as successful in attaining related placement compared to those without IEPs.

Table 2

TSA Assessment and Placement Results by IEP Status

IEP Status			Placement Relation				Totals	
			Not Related Placement		Related Placement			
			<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Has IEP	TSA	Failed Test	852	49.5%	1,585	39.4%	2,437	42.4%
		Passed Test	869	50.5%	2,439	60.6%	3,308	57.6%
	Total		1,721	100%	4,024	100%	5,745	100%
No IEP	TSA	Failed Test	4,196	29.7%	10,017	21.9%	14,213	23.7%
		Passed Test	9,926	70.3%	35,722	78.1%	45,648	76.3%
	Total		14,122	100%	45,739	100%	59,861	100%
Total	TSA	Failed Test	5,048	31.9%	11,602	23.3%	16,650	25.4%
		Passed Test	10,795	68.1%	38,161	76.7%	48,956	74.6%
	Total		15,843	100%	49,763	100%	65,606	100%

Table 3 presents the logistic regression results in two models or steps. Model A contains IEP status only. The results are shown for students with IEPs compared to those without IEPs. Students with IEPs had an odds ratio of .722. This signifies that the students with IEPs have odds of attaining related placement reduced by a factor of .722 or -28% compared to students without IEPs.

Model B in Table 3 adds passing the TSA assessment as a variable in the model. When passing the TSA is added to the model the OR for students with IEPs increases to .780. This signifies that when passing the TSA is accounted for in the model, students with IEPs' odds of attaining related placement increased from .722 to .780. Students with an IEP increase their odds of attaining related placement by .066, which equates to an almost 7% increase in the odds of attaining related placement when the TSA assessment is passed. Viewing the results from the perspective of comparing students without IEPs to those with IEPs, the results are concerning. When controlling for passing the TSA assessment, students without IEPs have an odds ratio of 1.28, which signifies over a 28% increase in the odds of attaining related placement compared to

students with IEPs. An interesting result to point out is the differences of the effect to students with and without IEPs after adding passing the TSA assessment to the models. Students with IEPs' ORs increased (.722 to .780) when adding the TSA results compared to the students without IEPs ORs' which decreased (1.39 to 1.28).

Table 3

Logistic Regression Models by IEP Status

Variable	Model A				Model B			
	Odds Ratio	SE	95% CI	OR %	Odds Ratio	SE	95% CI	OR %
IEP (No IEP)	1.39*	.030	1.31-1.47	39%	1.28*	.031	1.21-1.36	28%
IEP (Has IEP)	.722*	.030	.680-.766	-28%	.780*	.031	.734-.828	-.22%
TSA (Passed TSA)	-	-	-	-	1.51*	.020	1.50-1.57	51%

* $p < .05$

Research question two was, is the relationship different among CTE programs for students with an IEP who pass their TSA assessment and the attainment of employment, entering post-secondary education, or the military in a field related to their CTE program? To address research question two, TSA assessment and related placement results were analyzed after using the crosstabs function within SPSS to display the appropriate outputs.

Table 4 presents IEP and non-IEP students' TSA performance, pass or fail, and related or not related placement disaggregated by CTE program area. Overall, the mean TSA pass rate for students with IEPs is $M=54.74\%$ with a standard deviation of $SD=18.11\%$. The mean TSA pass rate for students without IEPs is $M=72.6\%$ with a standard deviation of $SD=13.13\%$. The CTE programs with the highest rates for IEP students who passed their TSA were Health Sciences (80.4%), Agriculture (64.5%), Engineering (56.7%), and Skilled Technical Sciences (56.3%).

This study's focus, IEP and non-IEP students who passed their TSA assessment and attained related placement revealed interesting results when disaggregated by CTE program. The CTE programs with the largest differential between those with and without IEPs are Marketing (-29.1%), FCS (-21.3%) Agriculture (-18.5%), and Skilled Technical Sciences (-18.2%). The CTE programs with the smallest differential between students with and without IEPs for the study's focus group are Health Sciences (-3.7%) and Engineering (-6.0%).

From these data, it is apparent that students with IEPs who pass the TSA assessment more often attained related placement than those who failed the assessments within their field. The results

also show that students with IEPs are not as successful in attaining related placement compared to those without IEPs across all CTE program areas.

Table 4

TSA Assessment and Placement Results by CTE Program Area and IEP Status

CTE Program				Not Related Placement		Related Placement		Totals	
				<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Ag	Has IEP	TSA	Failed Test	102	43.4%	218	32.7%	320	35.5%
			Passed Test	133	56.6%	448	67.3%	581	64.5%
	No IEP	TSA	Failed Test	604	19.3%	1,354	14.2%	1,958	15.4%
			Passed Test	2,532	80.7%	8,185	85.8%	10,717	84.6%
Business	Has IEP	TSA	Failed Test	85	52.5%	153	41.1%	238	44.6%
			Passed Test	77	47.5%	219	58.9%	296	55.4%
	No IEP	TSA	Failed Test	686	28.8%	1,806	25.0%	2,492	25.9%
			Passed Test	1,696	71.2%	5,422	75.0%	7,118	74.1%
Engineering	Has IEP	TSA	Failed Test	26	51.0%	29	38.2%	55	43.3%
			Passed Test	25	49.0%	47	61.8%	72	56.7%
	No IEP	TSA	Failed Test	444	40.7%	844	32.2%	1,288	34.7%
			Passed Test	647	59.3%	1,775	67.8%	2,422	65.3%
FCS	Has IEP	TSA	Failed Test	157	59.9%	283	46.5%	440	50.5%
			Passed Test	105	40.1%	326	53.5%	431	49.5%
	No IEP	TSA	Failed Test	518	27.0%	1,470	25.2%	1,988	25.6%
			Passed Test	1,403	73.0%	4,360	74.8%	5,763	74.4%
Health Sciences	Has IEP	TSA	Failed Test	32	32.0%	50	15.7%	82	19.6%
			Passed Test	68	68.0%	268	84.3%	336	80.4%
	No IEP	TSA	Failed Test	367	23.5%	937	12.0%	1,304	13.9%
			Passed Test	1,197	76.5%	6,903	88.0%	8,100	86.1%
Marketing	Has IEP	TSA	Failed Test	23	88.5%	59	76.6%	82	79.6%
			Passed Test	3	11.5%	18	23.4%	21	20.4%
	No IEP	TSA	Failed Test	574	68.8%	1,259	47.5%	1,833	52.6%
			Passed Test	260	31.2%	1,393	52.5%	1,653	47.4%
Skilled Tech	Has IEP	TSA	Failed Test	427	48.2%	793	41.6%	1,220	43.7%
			Passed Test	458	51.8%	1,113	58.4%	1,571	56.3%

CTE Program				Not Related Placement		Related Placement		Totals	
				<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
	No IEP	TSA	Failed Test	1,003	31.4%	2,347	23.4%	3,350	25.3%
			Passed Test	2,191	68.6%	7,684	76.6%	9,875	74.7%
Totals	Has IEP	TSA	Failed Test	852	49.5%	1,585	39.4%	2,437	42.4%
			Passed Test	869	50.5%	2,439	60.6%	3,308	57.6%
	No IEP	TSA	Failed Test	4,196	29.7%	10,017	21.9%	14,213	23.7%
			Passed Test	9,926	70.3%	35,722	78.1%	45,648	76.3%

Table 5 disaggregates the logistic regression results by CTE program area. Model A presents the results for each predictor variable, IEP and TSA, individually. Model B presents the results when both IEP and TSA are entered into the model simultaneously. There are multiple interesting findings in Table 5. First, in Model A, there are non-significant findings related to non-IEP students from Agriculture and Marketing. These non-significant findings indicate that there is no statistically significant difference in the odds of IEP and non-IEP students attaining related placement in these fields. The remaining five program areas all have significant findings indicating that students without IEPs' odds of attaining related placement are higher than those with IEPs. Additionally, in Model A, there are significant findings related to students with IEPs in Engineering, Health Sciences, and Skilled Technical Sciences. Students with IEPs in Engineering are .624 times as likely or a 38% decrease in the odds of attaining related placement than those without IEPs. Students with IEPs in Health Sciences are .634 times as likely or a 37% decrease in the odds of attaining related placement than those without IEPs. Students with IEPs in Skilled Technical Sciences are .686 times as likely or a 31% decrease in the odds of attaining related placement than those without IEPs.

Model A also presents the results for the variable passing the TSA assessment disaggregated by CTE program area. All program areas had statistically significant results, indicating students who pass their TSA assessments are more likely to attain related placement. Students in three program areas have significantly higher findings than the other four areas. Students in Marketing and Health Sciences who pass their TSA, have an OR of 2.43 and 2.29 respectively. This indicates that students from these programs are 2.43 and 2.29 times more likely to attain related placement when the TSA assessment is passed. Significantly lower but the third-highest program area is Skilled Technical Sciences. Students in Skilled Technical Sciences who pass their TSA are 1.51 times more likely to attain related placement.

Model B presents the results by CTE program area which includes IEP and passed the TSA assessment variables. These variables are entered into the logistic regression model simultaneously and do have an impact on the outcome variable attainment of related placement. Similar to the findings in Model A the variable IEP in Agriculture and Marketing results are not significant indicating when controlling for passing the TSA assessment there is no statistically

significant difference in the odds of IEP and non-IEP students attaining related placement. Notable for the variable IEP, when controlling for TSA assessment, is the similar reductions in the odds of attaining related placement across every CTE program. Skilled Technical Sciences had the highest odds reduction of 4% while Engineering had the lowest at 2%. These results indicate that when passing the TSA assessment is entered into the model, the odds of attaining related placement for students with IEPs decreased across all CTE programs between 2 to 4 percent when passing the TSA assessment was included in the model.

Table 5

Logistic Regression Models by CTE Program Area and IEP Status

Model A: Variables Ran Individually						Model B: Variables Ran Together			
CTE Program	Predictor Variable	Odds Ratio	SE	95% CI	OR %	Odds Ratio	SE	95% CI	OR %
Ag <i>n</i> =13,576	Has IEP	.932	.079	.799-1.08	-	1.01	.080	.862-1.18	-
	Pass TSA	1.46*	.050	1.32-1.61	46%	1.46*	.051	1.32-1.61	46%
Bus <i>n</i> =10,144	Has IEP	.757*	.097	.626-.915	-24%	.787*	.098	.650-.953	-21%
	Pass TSA	1.25*	.050	1.13-1.38	25%	1.24*	.051	1.12-1.37	24%
Engr <i>n</i> =6,789	Has IEP	.624*	.185	.432-.891	-38%	.639*	.185	.444-.919	-36%
	Pass TSA	1.46*	.073	1.27-1.68	46%	1.45*	.073	1.26-1.68	45%
FCS <i>n</i> =8,622	Has IEP	.766*	.078	.657-.893	-23%	.796*	.080	.681-.930	-20%
	Pass TSA	1.20*	.054	1.08-1.33	20%	1.17*	.055	1.05-1.30	17%
H.Sci. <i>n</i> =9,822	Has IEP	.634*	.118	.503-.799	-37%	.664*	.119	.526-.839	-34%
	Pass TSA	2.29*	.067	2.01-2.61	129%	2.28*	.067	1.20-2.59	128%
Mkt <i>n</i> =3,589	Has IEP	.931	.230	.593-1.46	-	1.16	.233	.736-1.84	-
	Pass TSA	2.43*	.083	2.06-2.86	143%	2.44*	.084	2.07-2.88	144%
S.Tech <i>n</i> =16,061	Has IEP	.686*	.045	.627-.750	-31%	.734*	.046	.671-.804	-27%
	Pass TSA	1.51*	.039	1.40-1.63	51%	1.45*	.039	1.34-1.57	45%

**p*<.05

Discussion

The combined student results related to research question one showed that a large majority of all students, those with and without IEPs, passed their TSA assessments and attained related placement. When the results for the total number of students are separated by IEP status, major disparities are evident. The 76% TSA pass rate for students without IEPs compared to the 58% pass rate for students with IEPs is a concern. The positive results relating to TSA assessment performance and attaining related placement of students with IEPs help validate the achievement of technical skills attainment through passing a TSA assessment. Students with IEPs who passed their TSA assessment and attained related placement was 60.6% compared to those not passing their TSA assessment but still attaining related placement at 39.4%. The 21.2% higher rate of attaining related placement for the IEP students who pass the TSA assessment is

noteworthy. These findings further validate the research of Lee et al. (2016), Theobald et al. (2017), and Wagner et al. (2015). SWDs who concentrate in CTE coursework are more likely to be successful after high school. Passing a TSA assessment increases the likelihood of success after high school.

The logistic regression analysis used in research question one provided an odds ratio (OR) or predictive relationship between the variables. The analysis revealed that students with an IEP are less likely to attain related placement compared to those without IEPs. Essentially, students without IEPs had increased chances or odds of attaining related placement by a factor of 1.39 compared to students with IEPs whose chances or odds were reduced by a factor of .28. When passing the TSA assessment was accounted for in the model, the results still revealed an odds reduction but it was less, going from .722 up to .780. SWDs who concentrate in CTE coursework and pass their TSA assessments have the potential to be most successful after graduating high school.

The findings related to research question two, which disaggregated the data by CTE program area, showed some positive and negative results. The CTE programs with the highest TSA assessment pass rates for SWDs coincide with the overall pass rates. Health Sciences, Agriculture, Engineering, and Skilled Technical Sciences students with IEPs and those without IEPs had the highest pass rates. These findings are more than likely a result of the industry-aligned and focused curriculum and assessments commonly used in each of these program areas.

The logistic regression models used in research question two show concerning results relating to the IEP students' odds of attaining related placement when compared to those without IEPs. Students with IEPs in every CTE program area had lower odds of attaining related placement when compared to those without disabilities. These results are caused by the lower than desired TSA pass rates students with IEPs have compared to their counterparts. Encouraging results are found when passing the TSA assessment is added in Model B of Table 5. When passing the TSA assessment is added, students with IEPs within every CTE program area had increased odds of attaining related placement. This information adds value to CTE assessments as a possible avenue to prepare all CTE students for success after high school.

Implications

Results of this research indicate that students with IEPs who pass the TSA have greater odds of post-secondary success. Across all content areas passing the TSA resulted in greater odds for related placement for students with IEPs. As other studies have found (Lee et al., 2016; Theobald et al., 2017; Wagner et al., 2015), CTE is a best practice for students with disabilities.

The non-statistically significant findings between non-IEP and IEP students for Missouri Agriculture and Marketing programs in the logistic regression models should be noted. These findings revealed that IEP students in these programs across the years studied, attained related placement near the same rate as their non-IEP peers. Additional questions are raised in this finding however, as we are unsure what may be happening within these programs compared to other CTE content areas. Are teachers differentiating instruction more effectively? Are the students placed in these programs a better “fit” than those in other programs? Additional research should seek to determine how these programs are achieving this equity so it can be replicated in other CTE content areas.

While some of these findings are encouraging for students with IEPs who pass the TSA across all CTE content areas, there are some concerns raised as well. Students with IEPs who passed their TSA still attained related placement 18% less frequently than their non-IEP peers. Is this related to their ability or perceptions among employers hiring students? Does this mean IEP students are less effective in communicating their knowledge and skills? Determining reasons for this discrepancy can assist educators in better preparing IEP students with additional tools to gain positive placement.

Particularly in Engineering, Health Sciences, and Skilled Technical Sciences, students with IEPs are not fairing as well as their non-IEP peers. The differences between these programs and Agriculture and Marketing programs should be examined more closely to determine the causes for these differences. In Missouri, oftentimes Agriculture and Marketing teachers have a more traditional teacher preparation, whereas teachers in Engineering, Health Sciences, and Skilled Technical Sciences are alternatively certified. Could this preparation impact the expectations teachers have of students? Or are the students’ disabilities not a positive match for the field the student has selected? Additional research should explore the differences between CTE content areas.

As a quantitative study, this research provides a snapshot of how well Missouri is providing SWDs opportunities for career success and where additional work may still be needed. This study did not examine communication between CTE teachers and special educators, expectations CTE teachers have of their students, or CTE teachers’ knowledge of IEPs and transition plans, all interplaying variables of students’ self-efficacy beliefs. Future studies should examine the mediating role of the CTE teacher in the career preparation of students with IEPs in Missouri.

Support systems for students with disabilities in CTE programs should also be examined. Given the finding that students with IEPs who pass the TSA are attaining related placement more often than those who fail the assessments, educators should work to scaffold learning for CTE concentrators with IEPs to attain this goal. Every effort should be made to remove barriers and provide necessary support to SWDs in CTE programs to successfully complete the TSA. This study indicates that earning that CTE credential prior to the end of high school is having a positive impact on students' post-secondary success.

Summary

The mixed findings of this study indicate that while some CTE content areas are starting to provide equitable career preparation for CTE students with IEPs, there is still work to be done. High quality CTE programs should be free of bias, inclusive, and non-discriminatory for all students, including those with disabilities. While the data indicate some achievements have been attained in this area, CTE programs need to continue to eliminate barriers, maintain and even increase supportive services, and seek additional resources to provide accommodations and modifications for all students to be "Success Ready" through CTE programs of study.

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